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Aims and Scope

Turkish Journal of Colorectal Disease is an official journal of the Turkish Society of Colon and Rectal Surgery to provide epidemiologic, pathologic, diagnostic and therapeutic studies relevant to the management of small intestine, colon, rectum, anus and pelvic floor diseases. It was launched in 1991. Although there were temporary interruptions in the publication of the journal due to various challenges, the Turkish Journal of Colorectal Disease has been published continually from 2007 to the present. It is published quarterly (March, June, September and December) as hardcopy and an electronic journal at http://www.turkishjcrd.com/

The target audience of Turkish Journal of Colorectal Disease includes surgeons, pathologists, oncologists, gastroenterologists and health professionals caring for patients with a disease of the colon and rectum.

The Turkish name of the journal was formerly Kolon ve Rektum Hastalıkları Dergisi and the English name of the journal was formerly Journal of Diseases of the Colon and Rectum.

Turkish Journal of Colorectal Disease is indexed in **TÜBİTAK/ULAKBİM, Directory of Open Access Journals (DOAJ), British Library, ProQuest, Root Indexing, Idealonline, Gale/Cengage Learning, Index Copernicus, Turkish Citation Index, Hinari, GOALI, ARDI, OARE, J-GATE** and **TürkMedline.**

The aim of Turkish Journal of Colorectal Disease is to publish original research papers of the highest scientific and clinical value at an international level. Furthermore, review articles, case reports, technical notes, letters to the editor, editorial comments, educational contributions and congress/meeting announcements are released.

Turkish Journal of Colorectal Disease is an independent open access peer-reviewed international journal printed in Turkish and English languages. Manuscripts are reviewed in accordance with "double-blind peer review" process for both referees and authors. The Editorial Board of the Turkish Journal of Colorectal Disease endorses the editorial policy statements approved by the WAME Board of Directors. The journal is in compliance with the uniform requirements for manuscripts submitted to biomedical journals published by the International Committee of Medical Journal Editors (NEJM 1997;336:309-315, updated 2001).

Open Access Policy

This journal provides immediate open access to its content on the principle that making research freely available to the public supports a greater global exchange of knowledge. Open Access Policy is based on rules of Budapest Open Access Initiative (BOAI) http://www.budapestopenaccessinitiative.org/.

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Instructions for authors are published in the journal and at www.turkishjcrd.com

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Authors are responsible for the manuscripts they publish in Turkish Journal of Colorectal Disease. The editor, editorial board, and publisher do not accept any responsibility for published manuscripts.

If you use a table or figure (or some data in a table or figure) from another source, cite the source directly in the figure or table legend.

The journal is printed on acid-free paper.

Financial expenses of the journal are covered by Turkish Society of Colon and Rectal Surgery.

Editorial Policy

Following receipt of each manuscript, a checklist is completed by the Editorial Assistant. The Editorial Assistant checks that each manuscript contains all required components and adheres to the author guidelines, after which time it will be forwarded to the Editor in Chief. Following the Editor in Chief's evaluation, each manuscript is forwarded to the Associate Editor, who in turn assigns reviewers. Generally, all manuscripts will be reviewed by at least three reviewers selected by the Associate Editor, based on their relevant expertise. Associate editor could be assigned as a reviewer along with the reviewers. After the reviewing process, all manuscripts are evaluated in the Editorial Board Meeting.

Turkish Journal of Colorectal Disease's editor and Editorial Board members are active researchers. It is possible that they would desire to submit their manuscript to the Turkish Journal of Colorectal Disease. This may be creating a conflict of interest. These manuscripts will not be evaluated by the submitting editor(s). The review process will be managed and decisions made by editor-in-chief who will act independently. In some situation, this process will be overseen by an outside independent expert in reviewing submissions from editors.

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Amaç ve Kapsam

Türk Kolon ve Rektum Hastalıkları Dergisi, Türk Kolon ve Rektum Cerrahi Derneği'nin resmi dergisidir. Bu dernek; ince barsak, kolon, rektum, anüs ve pelvik taban hastalıkları gibi hastalıkların yönetimi ile ilişkili epidemiyoloijk patolojik, tanısal ve tedavi edici çalışmalar yapar. Derneğimiz 1991'de kurulmuştur. Çeşitli zorluklar nedeniyle geçici aksaklıklar olsa da Türk Kolon ve Rektum Hastalıkları Dergisi 2007'den bu yana aralıksız olarak basılmaktadır ve 3 ayda bir olmak üzere (Mart, Haziran, Eylül, Aralık) basılı dergi ve elektronik olarak (http://www.turkishjcrd.com/) yayımlanır.

Derginin hedef kitlesini; cerrahlar, patologlar, onkologlar, gastroenterologlar ve kolorektal hastalarına hizmet veren profesyoneller oluşturur. Derginin amacı; uluslararası düzeyde en yüksek bilimsel ve klinik değeri olan orijinal çalışmaları yayınlamaktır. Bunlara ek olarak derleme (review) makaleleri, olgu sunumları, teknik notlar, editöre mektuplar, editöryal yorumlar, eğitim yazıları ve kongre/toplantı duyuruları yer almaktadır.

Derginin Türkçe eski adı; Kolon ve Rektum Hastalıkları Dergisi ve İngilizce eski adı; Journal of Diseases of the Colon and Rectum'dur.

Kolon ve Rektum Hastalıkları Dergisi, **TÜBİTAK/ULAKBİM, Directory of Open Access Journals (DOAJ), British Library, ProQuest, Root Indexing, Idealonline, Gale/Cengage Learning, Index Copernicus, Türk Atıf Dizini, Hinari, GOALI, ARDI, OARE, J-GATE ve TürkMedline**'de indekslenmektedir.

Türk Kolon ve Rektum Hastalıkları Dergisi, İngilizce ve Türkçe olarak yayımlanan; bağımsız, hakemli, uluslararası bir dergidir. Eserler, hem hakemler hem de otörler tarafından "çift kör hakem denetimi (peer review)" yöntemi ile değerlendirilir. Türk Kolon ve Rektum Hastalıkları Dergisi'nin Editör Kurulu, World Association of Medical Editors (WAME) politikalarına bağlı olarak yürütülmektedir. Bu dergi, Uluslararası Tıp Dergisi Editörler Komitesi (NEJM 1997;336:309-315, updated 2001) tarafından bildirilen, biyomedikal dergilere gönderilen makalelerin uyması gereken standartlara uygunluk göstermektedir.

Açık Erişim Politikası

Bu dergi bilginin yer değiştirmesi ve toplum içinde bilgiye özgürce ulaşma olanağı sağlamak üzere açık erişime imkan vermektedir. Açık Erişim İlkesi "Budapeşte Açık Erişim Girişimi (BOAI)" http://www.budapestopenaccessinitiative.org/ kurallarına dayanmaktadır.

Derginin mali giderleri Türk Kolon ve Rektum Cerrahi Derneği tarafından karşılanmaktadır.

Yazarlar için Kılavuz

Yazarlar için kılavuz hem yayınlanan dergide hem de "http://www.turkishjcrd.com" web sayfasında bulunmaktadır.

Telif Hakkı Devri

Yazarlar Türk Kolon ve Rektum Hastalıkları Dergisi'nde yayınladıkları yazılardan kendileri sorumludurlar. Editör, editör kurulu ve yayıncı hiçbir sorumluluk kabul etmemektedir. Başka bir kaynaktan tablo ya da figür (veya tablo/figürden bir veri) kullandıysanız, direkt olarak tablo ya da figürü kaynak gösteriniz.

Dergi asitsiz kağıda basılmaktadır.

Derginin mali giderleri Türk Kolon ve Rektum Cerrahi Derneği tarafından karşılanmaktadır.

Editöryal Politika

Her yazının alınmasını takiben, bir kontrol listesi Editör Yardımcısı tarafından tamamlanır.

Editör yardımcısı, her yazıyı gerekli öğeleri sağladığı ve yazar kılavuzuna uyumu açısından kontrol eder, ardından editöre iletir. Editör değerlendirmesinin ardından her bir yazı için editör yardımcısı tarafından gözlemciler (reviewers) belirlenir. Genelde, her bir yazıyı ilgili uzmanlıkları göz önüne alınarak atanmış en az 3 gözlemci inceler. Yardımcı editör de diğer gözlemcilerle birlikte gözlemci olarak atanabilir. Gözlemci incelemesinin ardından yazılar editör kurul toplantısında değerlendirilir.

Türk Kolon ve Rektum Hastalıkları Dergisi'nin editör ve editör kurulu üyeleri aktif araştırmacılardır. Kendi araştırmalarının da Türk Kolon ve Rektum Hastalıkları Dergisi'nde yayınlanmasını pek ala arzu edebilirler. Bu durum çıkar sorunları doğurabilir. Bu yazılar, yazıyı yazan editör(ler) tarafından değerlendirilemez. Bu gibi durumlarda bu süreç, (editörlerin yazı başvurularında) yazıların uzman olan bağımsız kişiler tarafından incelenmesiyle aşılabilir.

Abonelik Bilgileri

Türk Kolon ve Rektum Hastalıkları Dergisi, Türk Kolon ve Rektum Cerrahisi Derneği üyelerine, Dünya'da ve Türkiye'deki kütüphanelere ücretsiz dağıtılmaktadır. Yayınlanmış tüm sayılar ücretsiz olarak şu linkte mevcuttur (http://www.turkishjcrd.com/).

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GENERAL INFORMATION

Turkish Journal of Colorectal Disease (TJCD) is the journal of Turkish Society of Colon and Rectal Surgery. The mission of the Journal is to advance knowledge of disorders of the small intestine, colon, rectum, anus and pelvic floor. It publishes invited review articles, research articles, brief reports and letters to the editor, and case reports that are relevant to the scope of the journal, on the condition that they have not been previously published elsewhere. Basic science manuscripts, such as randomized, cohort, cross-sectional, and case control studies, are given preference. Invited reviews will be considered for peer review from known experts in the area.

Manuscripts should be prepared according to ICMJE guidelines (www.icmje.org). All manuscripts are subject to editorial revision to ensure they conform to the style adopted by the journal. There is a double blind kind of reviewing system.

Reviewed and accepted manuscripts are translated from Turkish to English by the Journal through a professional translation service. Prior to printing, the translations are submitted to the authors for approval or correction requests, to be returned within 7 days. If no response is received from the corresponding author within this period, the translation is checked and approved by the editorial board.

Accepted manuscripts are published in both Turkish and English languages.

All manuscripts submitted to the Turkish Journal of Colorectal Disease are screened for plagiarism using the 'iThenticate' software. Results indicating plagiarism may result in manuscripts being returned or rejected.

Turkish Journal of Colorectal Disease does not charge any article submission or processing charges.

The abbreviation of the Turkish Journal of Colorectal Disease is "TJCD", however, it should be denoted as "Turk J Colorectal Dis" when referenced.

EDITORIAL POLICIES

All manuscripts will be evaluated by the scientific board for their scientific contribution, originality and content. Authors are responsible for the accuracy of the data. The journal retains the right to make appropriate changes on the grammar and language of the manuscript. When suitable the manuscript will be sent to the corresponding author for revision. The manuscript, when published, will become the property of the journal and copyright will be taken out in the name of the journal

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Disclosure Statement

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In the cover letter the authors should state if any of the material in the manuscript is submitted or planned for publication elsewhere in any form including electronic media. A written statement indicating whether or not "Institutional Review Board" (IRB) approval was obtained or equivalent guidelines followed in accordance with the Helsinki Declaration of 2013 update on human experimentation must be stated; if not, an explanation must be provided. The cover letter must contain address, telephone, fax and the e-mail address of the corresponding author.

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The ORCID (Open Researcher and Contributor ID) number of the correspondence author should be provided while sending the manuscript. A free registration can create at http://orcid.org.

Online Submission

Only online submissions are accepted for rapid peer-review and to prevent delay in publication. Manuscripts should be prepared as word document (*.doc) or rich text format (*.rtf). After logging on to the web www. journalagent.com/krhd double click the "submit an article" icon. All corresponding authors should be provided a password and an username after providing the information needed. After logging on the article submission system with your own password and username please read carefully the directions of the system to provide all needed information in order not to delay the processing of the manuscript. Attach the manuscript, all figures, tables and additional documents. Please also attach the cover letter with "Assignment of Copyright and Financial Disclosure" forms.

Manuscript Preparation Guidelines

Turkish Journal of Colorectal Disease follows the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" (International Committee of Medical Journal Editors: Br Med J 1988;296:401-5).

Upon submission of the manuscript, authors are to indicate the type of trial/research and statistical applications following "Guidelines for statistical reporting in articles for medical journals: amplifications and explanations" (Bailar JC III, Mosteller F. Ann Intern Med 1988;108:266-73).

Preparation of research articles, systematic reviews and meta-analyses must comply with study design guidelines:

CONSORT statement for randomized controlled trials (Moher D, Schultz KF, Altman D, for the CONSORT Group. The CONSORT statement revised recommendations for improving the quality of reports of parallel group randomized trials. JAMA 2001; 285:1987-91) (http://www.consort-statement.org/);

PRISMA statement of preferred reporting items for systematic reviews and meta-analyses (Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 2009; 6(7): e1000097.) (http://www.prisma-statement.org/);

STARD checklist for the reporting of studies of diagnostic accuracy (Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA,

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Glasziou PP, Irwig LM, et al., for the STARD Group. Towards complete and accurate reporting of studies of diagnostic accuracy: the STARD initiative. Ann Intern Med 2003;138:40-4.) (http://www.stard-statement.org/);

STROBE statement, a checklist of items that should be included in reports of observational studies (http://www.strobe-statement.org/);

MOOSE guidelines for meta-analysis and systemic reviews of observational studies (Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting Meta-analysis of observational Studies in Epidemiology (MOOSE) group. JAMA 2000; 283: 2008-12).

Text Formatting

Manuscripts should be submitted in Word.

Use a normal, plain font (e.g., 10-point Times Roman) for text.

Use the automatic page numbering function to number the pages.

Do not use field functions.

Use tab stops or other commands for indents, not the space bar.

Use the table function, not spreadsheets, to make tables.

Save your file in docx format (Word 2007 or higher) or doc format (older Word versions).

Title Page

All manuscripts, regardless of article type, should start with a title page, containing:

The title of the article;

The short title of the article

The initials, names and qualifications of each author;

The main appointment of each author;

The name(s) of the institution(s) of each author;

The name and email address of the corresponding author;

Full disclosures of potential conflicts of interest on the part of any named author, or a statement confirming that there are no conflicts of interest;

The word count excluding abstract, references, tables, figures and legends;

The place and date of scientific meeting in which the manuscript was presented and it's abstract published in the abstract book, if applicable.

Article Types

Original Articles

This category includes original research including both clinical and basic science submissions. The work must be original and neither published, accepted, or submitted for publication elsewhere. Any related work, either SUBMITTED, in press, or published from any of the authors should be clearly cited and referenced.

All clinical trials must be registered in a public trials registry that is acceptable to the International Committee of Medical Journals Editors (ICMJE). Go to (http://www.icmje.org/faq.html). Authors of randomized controlled trials must adhere to the CONSORT guidelines, available at: www.consort-statement.org, and provide both a CONSORT checklist and flow diagram. We require that you choose the MS Word template at www.consort-statement.org for the flow chart and cite/upload it in the manuscript as a figure. In addition, submitted manuscripts must include the unique registration number in the Abstract as evidence of registration.

All authors are expected to abide by accepted ethical standards for human and animal investigation. In studies that involve human subjects or laboratory animals, authors must provide an explicit statement in Materials and Methods that the experimental protocol was approved by the appropriate institutional review committee and meets the guidelines of their responsible governmental agency. In the case of human subjects, informed consent, in addition to institutional review board approval, is required.

Original Articles should not exceed 3000 words (excluding abstract, references, tables, figures and legends) and four illustrations.

Original Articles should be organized as follows:

Abstract: The abstract must contain fewer than 250 words and should be structured as follows:

Aim: What was the purpose of the study?

Method: A brief description of the materials - patients or subjects (i.e. healthy volunteers) or materials (animals) - and methods used.

Results: What were the main findings?

Conclusion: What are the main conclusions or implications of the study?

Keywords: Below the abstract provide up to 6 key words or short phrases. Do not use abbreviations as keywords.

Introduction: State concisely the purpose and rationale for the study and cite only the most pertinent references as background.

Materials and Methods: Describe your selection of the observational or experimental subjects clearly (patients or experimental animals, including controls). Provide an explicit statement that the experimental protocols were approved by the appropriate institutional review committee and meet the guidelines of the responsible governmental agency. In the case of human subjects, state explicitly those subjects have provided informed consent. Identify the methods, apparatus/product** (with manufacturer's name and address in parentheses), and procedures in sufficient detail to allow other workers to reproduce the results. Give references to established methods, including statistical methods; provide references and brief descriptions of methods that have been published but are not well known, describe substantially modified methods, including statistical methods, give reasons for using them, and evaluate their limitations;

Results: Present the detailed findings supported with statistical methods. Figures and tables should supplement, not duplicate the text; presentation of data in either one or the other will suffice. Emphasize only your important observations; do not compare your observations with those of others. Such comparisons and comments are reserved for the discussion section.

Discussion: State the importance and significance of your findings but do not repeat the details given in the Results section. Limit your opinions to those strictly indicated by the facts in your report. Compare your finding with those of others. No new data are to be presented in this section.

Acknowledgments: Only acknowledge persons who have made substantive contributions to the study. Authors are responsible for obtaining written permission from everyone acknowledged by name because readers may infer their endorsement of the data and conclusions. Begin your text of the acknowledgment with, "The authors thank…".

Authorship Contributions: The journal follows the recommendations of the ICMJE for manuscripts submitted to biomedical journals. According to these, authorship should be based on the following four criteria:

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; and

Drafting the work or revising it critically for important intellectual content; and

Final approval of the version to be published; and

Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

All other contributors to the paper should be credited in the 'Acknowledgments' section.

References: The author should number the references in Arabic numerals according to the citation order in the text. Put reference numbers in parenthesis in superscript at the end of citation content or after the cited author's name. Use the form of "Uniform Requirements for manuscript abbreviations in Turk Bilim Terimleri" (http:/www.bilimterimleri.com).

Journal titles should conform to the abbreviations used in "Cumulated Index Medicus".

Journals; Last name(s) of the author(s) and initials, article title, publication title and its original abbreviation, publication date, volume, the inclusive page numbers.

Example: 1. Dilaveris P, Batchvarov V, Gialafos J, Malik M. Comparison of different methods for manual P wave duration measurement in 12-lead electrocardiograms. Pacing Clin Electrophysiol 1999;22:1532-1538.

Book chapter; Last name(s) of the author(s) and initials, chapter title, book editors, book title, edition, place of publication, date of publication and inclusive page numbers of the extract cited.

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Example: 1. Schwartz PJ, Priori SG, Napolitano C. The Long QT Syndrome. In: Zipes DP, Jalife J, eds. Cardiac Electrophysiology. From Cell to Bedside. Philadelphia; WB Saunders Co. 2000:597-615.

Tables: All tables are to be numbered using Arabic numerals. Tables should always be cited in text in consecutive numerical order. For each table, please supply a table caption (title) explaining the components of the table. Identify any previously published material by giving the original source in the form of a reference at the end of the table caption. Footnotes to tables should be indicated by superscript lower-case letters (or asterisks for significance values and other statistical data) and included beneath the table body.

Figures: Figures should work under "Windows". Color figures or grayscale images must be at least 300 dpi. Figures using "*.tiff", "*.jpg" or "*.pdf" should be saved separate from the text. All figures should be prepared on separate pages. They should be numbered in Arabic numerals. Each figure must have an accompanying legend defining abbreviations or symbols found in the figure. Figures could be submitted at no additional cost to the author.

Units of Measurement and Abbreviations: Units of measurement should be in Systéme International (SI) units. Abbreviations should be avoided in the title. Use only standard abbreviations. If abbreviations are used in the text, they should be defined in the text when first used.

Permissions: Authors wishing to include figures, tables, or text passages that have already been published elsewhere are required to obtain permission from the copyright owner(s) and to include evidence that such permission has been granted when submitting their papers. Any material received without such evidence will be assumed to originate from the authors.

Invited Review Articles

Abstract length: Not to exceed 250 words.

Article length: Not to exceed 4000 words.

Reference Number: Not to exceed 100 references.

Reviews should include a conclusion, in which a new hypothesis or study about the subject may be posited. Do not publish methods for literature search or level of evidence. Authors who will prepare review articles should already have published research articles on the relevant subject. The study's new and important findings should be highlighted and interpreted in the Conclusion section. There should be a maximum of two authors for review articles.

Case Reports

Abstract length: Not to exceed 100 words.

Article length: Not to exceed 1000 words.

Reference Number: Not to exceed 15 references.

Case Reports should be structured as follows:

Abstract: An unstructured abstract that summarizes the case.

Introduction: A brief introduction (recommended length: 1-2 paragraphs).

Case Report: This section describes the case in detail, including the initial diagnosis and outcome.

Discussion: This section should include a brief review of the relevant literature and how the presented case furthers our understanding to the disease process.

References: See under 'References' above.

Acknowledgments.

Tables and figures.

Technical Notes

Abstract length: Not to exceed 250 words.

Article length: Not to exceed 1200 words.

Reference Number: Not to exceed 15 references.

Technical Notes include description of a new surgical technique and its application on a small number of cases. In case of a technique representing a major breakthrough one case will suffice. Follow-up and outcome need to be clearly stated.

Technical Notes should be organized as follows:

Abstract: Structured "as above mentioned".

Indications

Method

Comparison with other methods: advantages and disadvantages, difficulties and complications.

References, in Vancouver style (see under 'References' above).

Acknowledgments.

Tables and figures: Including legends.

Letters to the Editor

Article length: Not to exceed 500 words.

Reference Number: Not to exceed 10 references

We welcome correspondence and comment on articles published in Turkish Journal of Colorectal Disease. No abstract is required, but please include a brief title. Letters can include 1 figure or table.

Video Article

Article length: Not to exceed 500 words.

Reference Number: Not to exceed 5 references

Briefly summarize the case describing diagnosis, applied surgery technique and outcome. Represent all important aspects, i.e. novel surgery technique, with properly labelled and referred video materials. A standalone video vignette, describing a surgical technique or interesting case encountered by the authors.

Requirements: The data must be uploaded during submission with other files. The video should be no longer than 10 minutes in duration with a maximum file size of 350Mb and 'MOV, MPEG4, AVI, WMV, MPEGPS, FLV, 3GPP, WebM' format should be used. Documents that do not exceed 100 MB can be uploaded within the system. For larger video documents, please contact iletisim@galenos.com.tr All videos must include a narration in English. Reference must be used as it would be for a Figure or a Table. Example: ".....To accomplish this, we developed a novel surgical technique (Video 1)." All names and institutions should be removed from all video materials. Video materials of accepted manuscripts will be published online.

Letters to the Editor

Article length: Not to exceed 500 words.

Reference Number: Not to exceed 10 references

We welcome correspondence and comment on articles published in Turkish Journal of Colorectal Disease. No abstract is required, but please include a brief title. Letters can include 1 figure or table.

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Article length: Not to exceed 1000 words.

Reference Number: Not to exceed 10 references.

Editorials are exclusively solicited by the Editor. Editorials should express opinions and/or provide comments on papers published elsewhere in the same issue. A single author is preferred. No abstract is required, but please include a brief title. Editorial submissions are subject to review/request for revision, and editors retain the right to alter text style.

Ethics

This journal is committed to upholding the integrity of the scientific record. As a member of the Committee on Publication Ethics (COPE) the journal will follow the COPE guidelines on how to deal with potential acts of misconduct.

Authors should refrain from misrepresenting research results which could damage the trust in the journal, the professionalism of scientific authorship, and ultimately the entire scientific endeavor. Maintaining integrity of the research and its presentation can be achieved by following the rules of good scientific practice, which include:

The manuscript has not been submitted to more than one journal for simultaneous consideration.

The manuscript has not been published previously (partly or in full), unless the new work concerns an expansion of previous work (please provide transparency on the re-use of material to avoid the hint of text-recycling ("self-plagiarism").

A single study is not split up into several parts to increase the quantity of submissions and submitted to various journals or to one journal over time (e.g. "salami-publishing").

No data have been fabricated or manipulated (including images) to support your conclusions.

No data, text, or theories by others are presented as if they were the author's own ("plagiarism"). Proper acknowledgments to other works must be given (this includes material that is closely copied (near verbatim), summarized and/or paraphrased), quotation marks are used for verbatim copying of material, and permissions are secured for material that is copyrighted.

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Consent to submit has been received explicitly from all co-authors, as well as from the responsible authorities - tacitly or explicitly - at the institute/organization where the work has been carried out, before the work is submitted.

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Each manuscript submitted to The Turkish Journal of Colorectal Disease is subject to an initial review by the editorial office in order to determine if it is aligned with the journal's aims and scope, and complies with essential requirements. Manuscripts sent for peer review will be assigned to one of the journal's associate editors that has expertise relevant to the manuscript's content. All accepted manuscripts are sent to a statistical and English language editor before publishing. Once papers have been reviewed, the reviewers' comments are sent to the Editor, who will then make a preliminary decision on the paper. At this stage, based on the feedback from reviewers, manuscripts can be accepted, rejected, or revisions can be recommended. Following initial peer-review, articles judged worthy of further consideration often require revision. Revised manuscripts generally must be received within 2 months of the date of the initial decision. Extensions must be requested from the Associate Editor at least 2 weeks before the 2-month revision deadline expires; The Turkish Journal of Colorectal Disease will reject manuscripts that are not received within the 3-month revision deadline. Manuscripts with extensive revision recommendations will be sent for further review (usually by the same reviewers) upon their re-submission. When a manuscript is finally accepted for publication, the Technical Editor undertakes a final edit and a marked-up copy will be e-mailed to the corresponding author for review and to make any final adjustments.

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The Turkish Journal of Colorectal Disease publishes abstracts of accepted manuscripts online in advance of their publication in print. Once an accepted manuscript has been edited, the authors have submitted any final corrections, and all changes have been incorporated, the manuscript will be published online. At that time the manuscript will receive a Digital Object Identifier (DOI) number. Both forms can be found at www.journalagent.com/krhd. Authors of accepted manuscripts will receive electronic page proofs directly from the printer, and are responsible for proofreading and checking the entire manuscript, including tables, figures, and references. Page proofs must be returned within 48 hours to avoid delays in publication.

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Yazarlara Bilgi

GENEL BİLGİ

Türk Kolon ve Rektum Hastalıkları Dergisi, Türk Kolon ve Rektum Cerrahisi Derneği'nin dergisidir. Derginin misyonu; ince bağırsak, kolon, rektum, anüs ve pelvik taban bozuklukları hakkındaki bilgiye katkı sağlamaktır. Dergi daha önce başka bir yerde yayınlanmamış olması koşuluyla, derginin kapsamı ile ilgili ve talep üzerine yazılan derleme makaleleri, araştırma makaleleri, kısa raporlar ve editöre mektuplar ve olgu sunumlarını yayınlamaktadır. Randomize, kohort, kesitsel ve vaka kontrol çalışmaları gibi temel bilim yazılarına öncelik verilir. Alanında bilinen uzmanlarca talep üzerine yazılan derlemeler dikkate alınacaktır.

Yazılar ICMJE yönergelerine göre (http://www.icmje.org/) hazırlanmalıdır. Tüm yazılar dergi tarafından benimsenen stile uygunluk sağlamak için editöryal kontrol ve düzeltmelere tabi tutulmaktadır. Derginin çift kör bir değerlendirme sistemi vardır. Değerlendirilen ve kabul edilen yayınlar Türkçeden İngilizceye veya İngilizceden Türkçeye derginin profesyonel çeviri hizmeti aracılığıyla tercüme edilir. Yayınlanmadan önce, çeviriler onay veya düzeltme istekleri için yazarlara gönderilir ve 7 gün içinde geri dönüş talep edilir. Bu süre içinde yanıt alınamazsa, çeviri kontrol ve yayın kurulu tarafından onaylanır.

Kabul edilen yayınlar hem Türkçe hem de İngilizce olarak yayınlanır.

Türk Kolon ve Rektum Hastalıkları Dergisi'ne gönderilen tüm yayınlar 'iThenticate' yazılımı kullanılarak intihal açısından taranır. İntihal saptanan durumlarda yayın iade veya reddedilir.

Türk Kolon ve Rektum Hastalıkları Dergisi, makale gönderme veya işlem ücreti adı altında herhangi bir ücret talep etmemektedir.

Türk Kolon ve Rektum Hastalıkları Dergisi'nin kısaltması "TJCD"dir, ancak, refere edildiğinde "Turk J Colorectal Dis" olarak kullanılmalıdır.

YAYIN POLİTİKASI

Tüm makaleler bilimsel katkıları, özgünlük ve içerikleri açısından bilimsel komite tarafından değerlendirilecektir. Yazarlar verilerinin doğruluğundan sorumludurlar. Dergi gerekli gördüğü yerlerde dil ve uygun değişiklik yapma hakkını saklı tutar. Gereğinde makale revizyon için yazara gönderilir. Dergide basılan yayın derginin malı haline gelir ve telif hakkı "Türk Kolon ve Rektum Hastalıkları Dergisi" adına alınmış olur. Daha önce herhangi bir dilde yayınlanmış makaleler dergide yayınlanmak üzere kabul edilmeyecektir. Yazarlar bir başka dergide yayınlanmak üzere olan makaleyi teslim edemez. Tüm değişiklikler, yazar ve yayıncının yazılı izin alındıktan sonra yapılacaktır. Tüm makalelerin tam metinleri derginin www.journalagent.com/krhd web sitesinden indirilebilir.

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Telif hakkı devir bildirimi

Açıklama bildirimi

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Makale Hazırlama Kuralları

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İnsan katılımcılı araştırma ve/veya hayvan deneyleri

Bilgilendirilmiş Onam

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Gecikmeyi önlemek ve hızlı hakemlik için sadece çevrim içi gönderimler kabul edilir. Yazılar word belgesi (*.doc) veya zengin metin biçimi (*.rtf) olarak hazırlanmalıdır. www.journalagent.com/krhd adresinde web oturumu açtıktan sonra "Makale gönder" ikonuna tıklayın. Tüm yazarlar, gerekli bilgileri sisteme girdikten sonra bir şifre ve bir kullanıcı adı alır. Kendi şifre ve kullanıcı adınız ile makale gönderme sistemine kayıt olduktan sonra yazının işleme alınmasında bir gecikme olmaması için gerekli tüm bilgileri sağlamak için sistemin yönergelerini dikkatlice okuyunuz. Makaleyi ve tüm şekil, tablo ve ek dökümanları ekleyiniz. Ayrıca üst yazı ve "Telif Hakkı ve Finansal Durum" formunu ve yazının tipine göre aşağıda belirtilen kılavuzların kontrol listesini ekleyiniz.

Makale Hazırlama Kuralları

Türk Kolon ve Rektum Hastalıkları Dergisi "Biyomedikal Dergilere Gönderilen Makaleler için Gerekli Standartları" izler. (International Committee of Medical Journal Editors: Br Med J 1988; 296: 401-5).

Yazarlar yayınlarını gönderirken, çalışmalarının türünü ve uygulanan istatistik yöntemlerini "Tıbbi Dergilere Gönderilen Makaleler için İstatistiksel Raporlama Rehberi"ne uygun olarak belirtmelidir (Bailar JC III, Mosteller F. Ann Intern Med 1988;108:266-73).

Araştırma makalesi, sistematik değerlendirme ve meta-analizin hazırlanması aşağıdaki çalışma tasarımı kurallarına uymak zorundadır; (CONSORT statement for randomized controlled trials (Moher D, Schultz KF, Altman D, for the CONSORT Group.

The CONSORT statement revised recommendations for improving the quality of reports of parallel group randomized trials. JAMA 2001; 285:1987-91) (http://www.consort-statement.org/);

PRISMA statement of preferred reporting items for systematic reviews and meta-analyses (Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 2009; 6(7): e1000097.) (http://www.prisma-statement.org/);

STARD checklist for the reporting of studies of diagnostic accuracy (Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA, Glasziou PP, Irwig LM, et al., for the STARD Group. Towards complete and accurate reporting of studies of diagnostic accuracy: the STARD initiative. Ann Intern Med 2003;138:40-4) (http://www.stard-statement.org/);

STROBE statement, a checklist of items that should be included in reports of observational studies (http://www.strobe-statement.org/);

MOOSE guidelines for meta-analysis and systemic reviews of observational studies (Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting Meta-analysis of observational Studies in Epidemiology (MOOSE) group. JAMA 2000; 283: 2008-12).

Metin Biçimlendirme

Yazılar Word programı ile hazırlanarak teslim edilmelidir.

- Metin için normal, düz yazı tipi kullanın (örneğin, 10 punto Times Roman).

- Sayfa numarası için otomatik sayfa numaralandırma işlevini kullanın.

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- Alan fonksiyonları kullanmayın.

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- Tablo yapmak için diğer işlevleri değil, elektronik tablo fonksiyonunu kullanın.

- Dosyanızı .docx formatında (Word 2007 veya üstü) ya da .doc formatında (eski Word sürüm) kaydedin.

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Tüm yazılar, makale türü ne olursa olsun, aşağıdakileri içeren bir başlık sayfası ile başlamalıdır:

- Makalenin başlığı;

- Makalenin kısa başlığı;

- Yazarların isimleri, isimlerinin baş harfleri ve her yazarın akademik ünvanı;

- Her yazarın görevi;

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- Herhangi bir yazarın olası bir çıkar çatışması olduğunu teyit eden bir ifade, aksi takdirde çatışma olmadığını belirtir bir açıklama;

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Makale Tipleri

Orijinal Makaleler

Bu kategori, klinik ve temel bilimde orijinal araştırmaları içerir. Yayın orijinal olmalı ve başka bir dergide yayınlanmış/gönderilmiş ya da kabul edilmiş olmamalıdır. Yazarlar, herhangi biri tarafından bir dergiye gönderilmiş, baskıda veya basılmış ilgili herhangi bir çalışmaya atıfta bulunmak istiyorlarsa açıkça atıfta bulunulmalı ve kaynak gösterilmelidir.

Tüm klinik çalışmalar, Uluslararası Tıp Dergisi Editörler Komitesince (ICMJE) kabul gören bir kayıt sistemine kayıtlı olmalıdır. Bunun için http://www.icmje.org/faq.html adresine müracaat edin. Randomize kontrollü çalışmaların yazarları da, www.consort-statement.org adresinden başvurulabilen CONSORT kılavuzuna uymalıdır ve yayınlarıyla birlikte CONSORT kontrol listesi ve akış diyagramı tebliğ edilmelidir. Akış şeması olarak www.consort-statement.org adresinde bulunan MS Word şablonunun kullanılması ve bunun yayının içinde bir alıntı veya bir figür olarak yerleştirilmesi gereklidir. Buna ek olarak, sunulan yayınlar her yayına spesifik verilen özel kayıt numarasını içermelidir.

Tüm yazarların, insan üzerindeki çalışmalar ve hayvan deneylerinde etik standartlara uymaları beklenmektedir. İnsan üzerindeki veya laboratuvar hayvanları içeren çalışmalarda, yazarların yayının Gereç ve Yöntem kısmında deney protokolünün ilgili kurumsal inceleme komitesi tarafından onaylandığını ve sorumlu devlet kurumu kurallarına uyduğunu açık bir dille açıklamaları gereklidir. İnsan üzerindeki çalışmalarda kurumsal inceleme kurulu onayına ek olarak, aydınlatılmış onam da bulunmalıdır.

Orijinal Makaleler (özet, kaynaklar, tablolar, rakamlar hariç) 3000 kelime ve dört figürü aşmamalıdır.

Orijinal Makaleler aşağıdaki gibi organize edilmelidir:

Özet: Özet 250 kelimeyi geçmemeli ve şunları içermelidir;

Amaç: Çalışmanın amacı nedir?

Yöntem: Kullanılan yöntem ve materyaller (örneğin hayvanlar) veya hastalar ya da konu (sağlıklı gönüllüler gibi) hakkında kısa bir açıklama içermelidir.

Bulgular: Ana bulgular nelerdir?

Sonuç: Çalışmanın ana sonuçları ve etkileri nelerdir?

Anahtar kelimeler: Özetin altında en az 3 anahtar kelime veriniz. Kısaltmaları anahtar kelime olarak kullanmayınız.

Giriş: Açık bir dille çalışmanın amaç ve gerekçesini belirtin ve çalışmanın arka planını açıklarken sadece en önemli kaynaklardan alıntı yapın.

Gereç ve Yöntem: Gözlemsel veya deneysel deneklerin (hastalar, deney hayvanları veya kontrol grupları dahil) seçim şeklini açıklayın. Deney protokolünün ilgili kurumsal inceleme komitesi tarafından onaylandığını ve ilgili devlet kurumu kurallarına uyduğunu açık bir dille açıklayın. İnsan çalışması durumunda, tüm şahısların aydınlatılmış onamlarının alındığını açık bir dille belirtin. Yöntem, cihaz ve ürünleri tanımlayın (Parantez içinde üretici firma adı ve adresi)** Uygulanmış olan tüm prosedürler, diğer çalışmacıların aynı deneyi tekrar edebilecekleri detay ve netlikte anlatılmalıdır. İstatistiksel yöntemler de dahil olmak üzere yerleşik ve yaygın olarak bilinen çalışma yöntemleri için kaynaklar belirtilmelidir. Yayınlanmış ancak yaygın olarak bilinmeyen yöntemler için ise kaynaklar ve kısa tanımlamalar verilmelidir. Kullanma sebepleri ve limitasyonları belirtilmelidir.

Bulgular: İstatistiksel yöntemlerle desteklenmiş bulgularınızı ayrıntılı olarak sunun. Şekil ve tablolar metni tekrar değil, takviye etmelidir. Verilerin hem metinde hem figür olarak verilmemesi gerekir. Metin veya figürden birisi olarak verilmesi yeterlidir. Sadece kendi önemli izlenimlerinizi belirtin. Kendi izlenimlerinizi diğerlerininkiyle karşılaştırmayın. Bu tür karşılaştırma ve yorumlar tartışma bölümünde yapılmalıdır.

Tartışma: Bulgularınızın önem ve anlamını vurgulayın ancak bulgular kısmında verilenleri tekrarlamayın. Fikirlerinizi yalnızca bulgularınızla kanıtlayabildiklerinizle sınırlı tutun. Bulgularınızı diğerlerininkiyle karşılaştırın. Bu bölümde yeni veriler bulunmamalıdır.

Teşekkür: Sadece çalışmaya ciddi katkılarda bulunmuş kişilere teşekkür edin. Yazarlar ismen teşekkür ettikleri herkesten yazılı izin almak zorundadır. Teşekkür kısmına "Yazarlar ….teşekkür eder" şeklinde başlayın.

Yazarlık ve Katkı Sağlayanlar: Dergi, biyomedikal dergilere gönderilen yayınlara yönelik ICMJE tavsiyelerini izler. Buna göre "yazarlık" aşağıdaki dört kritere dayalı olmalıdır:

Yazar;

- Yayının konsept veya dizaynına, çalışmanın verilerinin elde edilmesine, analizine ve yorumlanmasına önemli katkılar veren; ve

- İşi hazırlayan veya entellektüel içerik açısından eleştirel biçimde gözden geçiren; ve

- Yayınlanacak son şekli onaylayan; ve

- Çalışmanın her bir bölümünün doğruluğu ve bütünlüğü ile ilgili sorunları uygun bir şekilde inceleyen ve çözüm sağlayan sorumlu kişidir.

Bu şartların hepsini sağlamayan diğer tüm katılımcılar yazar değil, "Teşekkür" bölümünde anılması gereken katkı sağlamış kişilerdir.

Kaynaklar: Kaynakları 1'den başlayarak Arap rakamları ve alfabetik sıra ile verin. Kaynak numaraları cümle sonunda noktadan sonra üstte küçük rakamlar şeklinde (superscript) yazılmalıdır. Kısaltmalar için gerekli standartları http:/www.bilimterimleri.com adresinde bulunan Türk Bilim Terimleri Kılavuzu'ndan edinin.

Dergi başlıkları "Cumulated Index Medicus" kısaltmalarına uygun olmalıdır.

Dergiden: Yazar/yazarların soyadı ve adının ilk harfi, makale başlığı, dergi başlığı ve derginin özgün kısaltması, yayın tarihi, baskı, kapsayıcı sayfa numaralarını içermelidir.

Örneğin: 1. Dilaveris P, Batchvarov V, Gialafos J, Malik M. Comparison of different methods for manual P wave duration measurement in 12-lead electrocardiograms. Pacing Clin Electrophysiol 1999;22:1532-1538.

Kitap Bölümü: Yazar/yazarların soyadı ve adının ilk harfi, bölüm başlığı, kitap editörleri, kitap başlığı, basım, yayın yeri, yayın tarihi, kapsadığı sayfa numaralarını içermelidir

Örneğin: 1. Schwartz PJ, Priori SG, Napolitano C. The Long QT Syndrome. In: Zipes DP, Jalife J, eds. Cardiac Electrophysiology. From Cell to Bedside. Philadelphia; WB Saunders Co. 2000:597-615.

Tablolar: Tüm tablolar Arapça sayılarla numaralandırılmalıdır. Tüm tablolardan metin içerisinde numara sırası ile bahsedilmelidir. Her tablo için tablonun içeriği hakkında bilgi veren bir başlık verin. Başka yayından alıntı olan tüm tabloları tablonun alt kısmında kaynak olarak belirtin. Tabloda dipnotlar tablonun altında, üst karakter olarak küçük harflerle verilmelidir. İstatistiksel anlamlı değerler ve diğer önemli istatistiksel değerler yıldız ile işaretlenmelidir.

Şekiller: Şekillerin "Windows" ile açılması gerekir. Renkli şekiller veya gri tonlu görüntüler en az 300 dpi olmalıdır. Şekiller ana metinden ayrı olarak "*.tiff", "*.jpg" veya "*.pdf" formatında kaydedilmelidir. Tüm şekil ayrı bir sayfada hazırlanmalı ve Arap rakamları ile numaralandırılmalıdır. Her şekilde kendisindeki işaret ve sembolleri açıklayan bir alt yazı olmalıdır. Şekil gönderme için yazardan hiçbir ek ücret alınmaz.

Ölçü Birimleri ve Kısaltmalar: Ölçü birimleri System International (SI) birimleri cinsinden olmalıdır. Kısaltmalardan başlıkta kaçınılmalıdır. Sadece standart kısaltmalar kullanın. Metinde kısaltma kullanılırsa ilk kullanıldığı yerde tanımlanmalıdır.

İzinler: Yazarlar yayınlarına önceden başka bir yerde yayınlanmış şekil, tablo, ya da metin bölümleri dahil etmek isterlerse telif hakkı sahiplerinden izin alınması ve bu izin belgelerinin yayınla beraber değerlendirmeye gönderilmesi gerekmektedir. Böyle bir belgenin eşlik etmediği her materyalin yazara ait olduğu kabul edilecektir.

Davetli (Talep üzerine yazılan) Derlemeler

Özet uzunluğu: 250 kelimeyi aşmamalıdır.

Makale uzunluğu: 4000 kelimeyi aşmamalıdır.

Kaynak sayısı: 100 kaynağı aşmamalıdır.

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Derlemeler, üzerine konuyla ilgili yeni bir hipotez ya da çalışma oturtulabilecek bir sonuç içermelidir. Literatür taraması metodlarını veya kanıt düzeyi yöntemlerini yayınlamayın. Derleme makaleleri hazırlayacak yazarların ilgili konuda önceden araştırma makaleleri yayımlamış olması gerekir. Çalışmanın yeni ve önemli bulguları sonuç bölümünde vurgulanır ve yorumlanmalıdır. Derlemelerde maksimum iki yazar olmalıdır.

Olgu Sunumları

Özet uzunluğu: 100 kelimeyi aşmamalıdır.

Makale uzunluğu: 1000 kelimeyi aşmamalıdır.

Kaynak sayısı: 15 kaynağı aşmamalıdır.

Olgu Sunumları aşağıdaki gibi yapılandırılmalıdır:

Özet: Olguyu özetleyen bir yapılandırılmamış özet (gereç ve yöntem, bulgular, tartışma gibi bölümlerin olmadığı).

Giriş: Kısa bir giriş (tavsiye edilen uzunluk: 1-2 paragraf).

Olgu Sunumu: Bu bölümde ilk tanı ve sonuç da dahil olmak üzere olgu ayrıntılı olarak anlatılır.

Tartışma: Bu bölümde ilgili literatür kısaca gözden geçirilir ve sunulan olgunun, hastalığa bakışımızı ve yaklaşımımızı nasıl değiştirebileceği vurgulanır.

Kaynaklar: Vancouver tarzı, (yukarıda 'Kaynaklar' bölümüne bakınız).

Teşekkür

Tablolar ve şekiller

Teknik Notlar

Özet uzunluğu: 250 kelimeyi aşmamalıdır.

Makale uzunluğu: 1200 kelimeyi aşmamalıdır.

Kaynak Sayısı: 15 kaynağı aşmamalıdır.

Teknik Notlar, yeni bir cerrahi tekniğin açıklanmasını ve az sayıda olguda uygulanmasını içermektedir. Büyük bir atılım/değişikliği temsil eden bir tekniğin sunulması durumunda tek bir olgu yeterli olacaktır. Hastanın takip ve sonucu açıkça belirtilmelidir.

Teknik Notlar aşağıdaki gibi organize edilmelidir:

Özet: Aşağıdaki gibi yapılandırılmalıdır:

Amaç: Bu çalışmanın amacı nedir?

Yöntem: Kullanılan yöntemlerin, hastalar ya da sağlıklı gönüllülerin veya hayvanların tanımı, malzemeler hakkında kısa bir açıklama.

Bulgular: Ana bulgular nelerdir?

Sonuç: Bu çalışmanın ana sonuçları ve etkileri nelerdir?

Endikasyonları

Yöntem

Diğer yöntemlerle karşılaştırılması: Avantaj ve dezavantajları, zorluklar ve komplikasyonlar.

Kaynaklar: Vancouver tarzı (yukarıda 'Kaynaklar' bölümüne bakınız)

Teşekkür

Tablolar ve şekiller; alt yazıları dahil

Video Makale

Makale Uzunluğu: 500 kelimeyi aşmamalıdır.

Kaynak Sayısı: 5 kaynağı aşmamalıdır.

Tanıyı, uygulanan cerrahi tekniği ve sonucu açıklayarak olguyu kısaca özetleyiniz. Uygun şekilde adlandırılmış ve referans edilmiş video materyalleri ile tüm önemli noktaları, örn; yeni cerrahi tekniği, belirtiniz. Materyaller, yazarların cerrahi tekniğini anlattıkları veya karşılaştıkları ilginç vakalardan oluşmalıdır.

Teknik Gereklilikler: Veriler, makale yükleme sırasında diğer dosyalarla birlikte eklenmelidir. Video süresinin 10 dakikayı geçmemesi kaydıyla dosya boyutu maksimum 350 MB olmalı ve 'MOV, MPEG4, AVI, WMV, MPEGPS, FLV, 3GPP, WebM' formatlarından biri kullanılmalıdır. 100 MB'yi aşmayan video dokümanları sisteme yüklenebilir. Daha büyük video dokümanları için lütfen iletisim@galenos.com.tr adresinden bizimle iletişime geçiniz. Tüm video seslendirmeleri İngilizce olmalıdır. Video atıfları, Şekil veya Tablo atıfları ile aynı biçimde kullanılmalıdır. Örneğin; "….Bunu gerçekleştirmek için, yeni bir cerrahi teknik geliştirdik (Video 1)." Video materyallerinde isim ve kurumlar yer almamalıdır. Kabul edilen makalelerin video materyalleri online yayınlanacaktır.

Editöre Mektuplar

Makale uzunluğu: 500 kelimeyi aşmamalıdır.

Kaynak Sayısı: 10 kaynağı aşmamalıdır.

Türk Kolon ve Rektum Hastalıkları Dergisi'nde yayınlanan makaleler hakkında yorumlar memnuniyetle kabul edilir. Özet gerekli değildir, ancak lütfen kısa bir başlık ekleyiniz. Mektuplar bir şekil veya tablo içerebilir.

Editöryal Yorumlar

Makale uzunluğu: 1000 kelimeyi aşmamalıdır.

Kaynak Sayısı: 10 kaynağı aşmamalıdır.

Editöryal yorumlar sadece editör tarafından kaleme alınır. Editöryal yorumlarda aynı konu hakkında başka yerlerde yayınlanmış yazılar hakkında fikir veya yorumlar belirtilir. Tek bir yazar tercih edilir. Özet gerekli değildir, ancak lütfen kısa bir başlık ekleyiniz. Editöryal gönderimler revizyon/gözden geçirme talebine tabi tutulabilir. Editörler, metin stilini değiştirme hakkını saklı tutar.

Etik

Bu dergi, bilimsel kayıtların bütünlüğünü korumayı tahhüt etmektedir. Yayın Etik Komitesi (COPE) üyesi olarak, dergi olası olumsuz davranışlarla nasıl başa çıkılacağı konusunda Yayın Etik Komitesi (COPE) kılavuzlarını takip edecektir.

Yazarlar araştırma sonuçlarını yanlış sunmaktan; derginin güvenilirliğine, bilimsel yazarlık profesyonelliğine ve en sonunda tüm bilimsel çabalara zarar verebileceğinden dolayı, sakınmalıdır. Araştırma bütünlüğünün sürdürülmesi ve bunun sunumu, iyi bilimsel uygulama kurallarını takip ederek başarılır. Bu da şunları içerir:

- Yazılı eser değerlendirilmek üzere eş zamanlı birden fazla dergiye gönderilmemelidir.

- Yazılı eser daha önceki bir eserin geliştirilmesi olmadıkça, daha önce (kısmen ya da tamamen) yayınlanmamış olmalıdır. [Metnin yeniden kullanıldığı imasından kaçınmak için tekrar kullanılabilir materyallerde şeffaflık sağlayın ("self-plagiarism""kişinin kendinden intihali")].

- Tek bir çalışma; sunum miktarını arttırmak için birçok parçaya bölünmemeli ve zaman içinde aynı ya da çeşitli dergilere gönderilmemelidir. (örneğin "salam-yayıncılık" "salamizasyon").

- Veriler, sonuçlarınızı desteklemek için fabrikasyon (uydurma) ya da manüple edilmiş olmamalıdır.

- Yazarın kendine ait olmayan hiçbir veri, metin veya teori kendininmiş gibi sunulmamalıdır (intihal). Diğer eserlerin kullanımı, (eserin birebir kopyalanması, özetlenmesi ve/veya başka kelimeler kullanarak açıklanmasını da içeren) ya telif hakkı korunacak şekilde izin alınarak ya da tırnak işareti içinde birebir kopyalanarak uygun onay ile kullanılmalıdır.

Önemli not; Türk Kolon ve Rektum Hastalıkları Dergisi intihal taramak için bir program (iThenticate) kullanmaktadır.

- Eser sunulmadan önce sorumlu makamlardan ve çalışmanın yapıldığı enstitü/kuruluşlardan-zımnen veya açıkça-onay alınmasının yanı sıra tüm yazarlardan açıkça onay alınmış olmalıdır.

- Sunulan eserde yazar olarak ismi olanların, bilimsel çalışmaya yeterince katkısı olmuş olmalıdır ve ortak mesuliyet ve sorumluluğu olmalıdır.

Bununla beraber:

- Yazarlık veya yazarların sıra değişiklikleri eserin kabulünden sonra yapılamaz

- Yazının revizyon aşamasında, yayın öncesi veya yayınlandıktan sonra yazar isim eklenmesi veya çıkarılması istemi; ciddi bir konudur ve geçerli sebepler olduğunda değerlendirilebilir. Yazar değişikliği gerekçesi; haklı gerekçeli, inandırıcı ve sadece tüm yazarların yazılı onayı alındıktan sonra; ve yeni/silinmiş yazarın rolü silme hakkında ikna edici ayrıntılı bir açıklama ile kabul edilebilir. Revizyon aşamasında değişiklik olması halinde, bir mektup revise edilmiş yayına eşlik etmelidir. Yayına kabul edildikten veya yayınlandıktan sonra değişiklik olması halinde, bu istek ve gerekli dökümantasyonun yayıncı yoluyla editöre gönderilmesi gerekmektedir. Gerek görüldüğünde bu isteğin gerçekleşmesi için daha fazla doküman talep edilebilir. Değişikliğin kabul veya red kararı dergi editörü insiyatifindedir. Bu nedenle, yayının gönderilmesi aşamasında yazar/yazarlar; gönderecekleri ilgili yazar grubunun isim doğruluğundan sorumludur.

- Yazarlardan sonuçların geçerliliğini doğrulamak amacıyla verilerin ilgili belgelerinin istenmesi halinde bu verileri göndermek için hazır bulundurulmalıdır. Bunlar, ham veri, örnekler, kayıt vb. şeklinde olabilir.

Görevi kötüye kullanma ya da suistimal şüphesi halinde dergi COPE yönergeleri izleyerek bir soruşturma yürütecektir. Soruşturmanın ardından, iddia geçerli görünüyorsa, yazara sorunu gidermek için bir fırsat verilecektir.

Usulsüzlük, şüphe seviyesinde kaldığında; dergi editörü aşağıdaki yollardan birine başvurabilir;

- Makale halen şüpheli ise, reddedilip yazara iade edilebilir.

- Makele online yayınlanmış ise; hatanın mahiyetine bağlı olarak ya yazım hatası olarak kabul edilecek ya da daha ciddi durumlarda makale geri çekilecektir.

- Hatalı yayın ve geri çekme durumlarında açıklayıcı not yayınlanır ve yazarın kurumu bilgilendirilir.

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İnsan ve Hayvan Araştırmaları

İnsan Hakları Beyannamesi

İnsan katılımlı araştırmalar; 1964 Helsinki Deklarasyonu'na ve sonrasında yayımlanan iyileştirici ilkelere uygun olmalıdır ve yazarlar tarafından kurumsal ve/veya ulusal etik kurul komitelerine başvurulup onay alınmış olduğu beyan edilmelidir.

Araştırmanın 1964 Helsinki Deklarasyonu veya kıyaslanabilir standartlara göre yürütülmesi ile ilgili şüphe durumunda, yazarlar bu durumun nedenlerini açıklamak zorundadır ve bağımsız etik kurulları veya diğer değerlendirme kurulları aracılığıyla şüphelerin giderilmesi gerekmektedir.

Aşağıda belirtilen durumlar yazı içerisinde "Kaynaklar" bölümünden önce yer almalıdır:

Etik Kurul Onayı: "Çalışmada insanlara uygulanan tüm prosedürler kurumsal ve ulusal araştırma kurullarının etik standartlarına, 1964 Helsinki Deklarasyonu'na ve sonrasında yayımlanan iyileştirici ilkelere uygun olmalıdır."

Retrospektif çalışmalarda, aşağıda belirtilen cümle yer almalıdır.

"Bu tür çalışmalarda yazılı onam gerekmemektedir."

Hayvan Hakları Beyannamesi

Araştırmalarda kullanılan hayvanların refahına saygı gösterilmelidir. Hayvan deneylerinde, yazarlar hayvanların bakımında ve kullanımında uluslararası, ulusal ve/veya kurumsal olarak oluşturulmuş kılavuzlara uymalıdır ve çalışmalar için kurumdaki veya çalışmanın yapıldığı veya yürütüldüğü merkezdeki (eğer böyle bir merkez varsa) Klinik Araştırmalar Etik Kurulundan onay alınmalıdır. Deneysel hayvan çalışmalarında "Guide for the care and use of laboratory animals http://oacu.od.nih.gov/regs/guide/guide.pdf doğrultusunda hayvan haklarını koruduklarını belirtmeli ve kurumlarından etik kurul onay raporu almalıdırlar.

Hayvanlar ile yürütülen çalışmalarda, aşağıda belirtilen durumlar yazı içerisinde 'Kaynaklar' bölümünden önce yer almalıdır:

Etik Kurul Onayı: "Hayvanların bakımı ve kullanımı ile ilgili olarak uluslararası, ulusal ve/veya kurumsal olarak oluşturulmuş tüm kılavuzlara uyulmuştur."

Eğer uygun bulunduysa (komitenin bulunduğu merkezde): "Hayvan çalışmalarında yapılan tüm uygulamalar kurumsal veya çalışmanın yürütüldüğü merkez tarafından belirlenmiş etik kurallara uyumludur."

Eğer makale insan ya da hayvan katılımlı bir çalışma değilse, lütfen aşağıda yer alan uygun durumlardan birini seçiniz:

"Bu makalenin yazarları insan katılımlı bir çalışma olmadığını bildirmektedir."

"Bu makalenin yazarları çalışmada hayvan kullanılmadığını bildirmektedir."

"Bu makalenin yazarları insan katılımlı veya hayvan kullanılan bir çalışma olmadığını bildirmektedir."

Bilgilendirilmiş Onam

Bütün bireyler ihlal edilemeyecek kişisel haklara sahiptir. Çalışmada yer alan bireyler, elde edilen kişisel bilgilere, çalışmada geçen görüşmelere ve elde edilen fotoğraflara ne olacağı konusunda karar verebilme hakkına sahiptir. Bundan dolayı, çalışmaya dahil etmeden önce yazılı bilgilendirilmiş onam alınması önemlidir. Bilimsel olarak gerekli değilse ve katılımcılardan (veya katılımcı yetkin değilse ebeveynlerinden veya velilerinden) basılması için yazılı onam alınmadıysa, katılımcılara ait detaylar (isimleri, doğum günleri, kimlik numaraları ve diğer bilgileri) tanımlayıcı bilgilerini, fotoğraflarını ve genetik profillerini içerecek şekilde yazılı formda basılmamalıdır. Tam gizlilik sağlanmasının zor olduğu durumlarda, bilgilendirilmiş onam formu şüpheyi içerecek şekilde düzenlenmelidir. Örneğin fotoğrafta katılımcıların göz kısmının maskelenmesi gizlilik açısından yeterli olmayabilir. Eğer karakteristik özellikler gizlilik açısından değiştirilirse, örneğin genetik profilde, yazar yapılan değişikliğin bilimsel olarak sorun oluşturmadığından emin olmalıdır.

Aşağıdaki ifade belirtilmelidir:

Bilgilendirilmiş Onam: "Çalışmadaki tüm katılımcılardan bilgilendirilmiş onam alınmıştır."

Eğer makalede katılımcıların tanımlayıcı bilgileri yer alacaksa, aşağıdaki ifade belirtilmelidir:

"Makalede kişisel bilgileri kullanılan tüm katılımcılardan ayrıca bilgilendirilmiş onam alınmıştır."

DEĞERLENDİRME SÜRECİ

Türk Kolon ve Rektum Hastalıkları Dergisi'ne gönderilen tüm yazılar, sisteme yüklendikten sonra ilk önce editöryal kurul tarafından derginin amaç ve hedeflerine uygunluk ve temel şartları sağlama yönünden değerlendirilecektir. Yazılar, konusunda uzman dergi hakemlerine değerlendirilmek üzere gönderilecektir. Tüm kabul edilen yazılar yayımlanmadan önce, istatistik ve İngiliz dili konusunda uzman editörler tarafından değerlendirilecektir. Sayfaların ilk gözden geçirilmesinden sonra, hakem yorumları ön karar vermek için Editör'e gönderilecektir. Bu aşamada, ilk değerlendirmede bulunanların düşüncesi doğrultusunda, yazı kabul edilebilir, reddedilebilir veya yazıda düzeltme yapılması istenebilir. İlk değerlendirme sonrasında değerli bulunan makaleler için genellikle düzeltme istenir. Düzeltilen makaleler ilk karardan sonraki 2 ay içerisinde tekrar dergiye gönderilmelidir. Süre uzatmaları yardımcı editörden 2 aylık süre bitmeden en az 2 hafta önce talep edilmelidir. Türk Kolon ve Rektum Hastalıkları Dergisi tarafından, 2 aylık düzeltme süresi sona erdikten sonra, yazı kabul edilmeyecektir. Düzeltme yapılan yazılar sisteme tekrar yüklendikten sonra değerlendirilmek üzere (genellikle ilk değerlendirmeyi yapan hakeme) gönderilecektir. Sonuç olarak yayımlanma kararı verildikten sonra, baskı öncesi Teknik Editör tarafından son kez değerlendirilecektir ve iletişim kurulacak olan yazara gözden geçirme ve son düzenlemeleri yapmak üzere işaretlenmiş bir nüshası elektronik ortamda gönderilecektir.

DÜZELTME SONRASI GÖNDERİLMESİ

Revize edilmiş bir versiyonu gönderirken yazar, yorumcular tarafından ele alınan her konuyu ayrıntılı olarak açıklamalı ve nokta nokta ayrıntılı olarak "yorumlara yanıt" sunmalıdır ve ardından belgenin açıklamalı kopyası bulunmalıdır (her yorumcunun yorumu nerede bulunabilir, yazarın cevap ve satır numaraları gibi yapılan değişiklikler).

Bunun yanı sıra ana revize yazı, kabul mektubu tarihinden itibaren 30 gün içinde teslim edilmelidir. Yazının revize edilmiş versiyonunun tanınan süre içinde verilmemesi durumunda, revizyon seçeneği iptal edilebilir. Yazar(lar) ek sürenin gerekli olduğunu düşünüyorsa, ilk 30 günlük süre bitmeden, uzatmayı talep etmelidir.

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Tüm yazılar yayımlanmadan önce profesyonel olarak "English Language Editor" tarafından değerlendirilmektedir.

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YAZIŞMA

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Turkish Journal of
COLORECTAL DISEASE

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COLORECTAL DISEASE

Editorial/Editöryal

Sayın Meslektaşlarım,

Corona virüs salgının tüm dünyayı ve ülkemizi kavurduğu bu dönemde öncelikle sağlıklı olmanızı canı gönülden dilerim. Bu zorlu süreçte, tüm dünyada olduğu gibi ülkemizde de kaybettiğimiz çok değerli meslektaşlarımız oldu. Onların manevi huzurunda saygı ile eğilirim. Hepimizin başı sağ olsun.

COVID-19 salgını hepimizin geri çekilmesine ve elektif olguların durdurulmasına yol açtı ve hatta tüm hayatı durma noktasına getirdi. Bu süreçte, bilimsel çalışmalar ve bilimsel oturumlar ardı ardına iptal edildi veya askıya alındı. Buna rağmen, TKRHD bu sayıda dolu dolu geldi.

Bu sayıda, içinden geçtiğimiz bu süreç nedeniyle, COVID-19 süreciyle ilgili iki derleme makalemize yer verildi. Bu makalelerden ilki, "COVID-19 pandemi sürecinde kolorektal kanseri olan hastaları nasıl yönetmeli" sorusuna cevap verecek çok değerli bir derleme olmanın yanında, ikinci olarak, COVID-19 pandemisinin kontrol altına alınması ve hayatın normalleşmesi üzerine, ertelediğimiz, öteledigimiz veya iptal ettiğimiz birikmiş diğer benign veya elektif olguları yönetme stratejisi sunmaktadır. Normalleşme periyodunun başladığı bu dönemde, en çok merak edilen konulardan birine cevaplar niteliğinde olan bu makalenin çok yararlı olacağını umuyorum.

Bununla birlikte, kendi konularında kolorektal camia içinde oldukça saygın otörlerin iki olağanüstü derlemesine de yer veriyoruz. Bu önemli derlemelerden ilki, hepimizin zorlandığı aşağı rektum kanserlerinde intersfinkterik rezeksiyon sonuçlarını ve bu teknikte robotun etkisini derleyen bir makale. Yeni ufuklar açacak niteliktedir ve zevkle okuyacağınızı tahmin ediyoruz. Diğer önemli derleme ise, seçeneklerimizin çok olmadığı ve oldukça zorlandığımız bir alan olan pelvik taban rahatsızlığında nörostimülasyon tekniğinin ve sonuçlarının derlendiği bir makaledir. Bu makalenin çok ilginizi çekeceğini ümit ediyorum.

Bunun yanında yedi araştırma makalesiyle oldukça yoğun bir bilimsel ziyafet de sunuyoruz. İnsanların yavaş yavaş tatile hazırlandığı bu yaz döneminde başucu bir referans dergisi olacağına inanıyorum. Bunun yanında oldukça ilginç üç olgu sunumunu da ilgiyle okuyacağınızı ümit ediyorum.

Bununla birlikte, yeni dünya düzeninde toplantıların iptal edildiği bu dönemde, TKRHD olarak "webinar" sunumlarına ağırlık vermekteyiz. Oldukça geniş kitlelere ulaştığımızı söylersem yanlış olmayacaktır. Gelecekte bu sistemin kurs programlarının yerine geçeceğini sanıyorum. Yaz dönemlerinde çok bilimsel etkinliğin olmadığı eski zamanların yerine bu yeni sistemle TKRHD Derneği olarak yaz döneminde de bilimsel aktivitelere devam edeceğiz. Takip etmenizi öneririm.

Hepinize sağlıklı günler dilerken, iyi bir yaz geçirmenizi umuyorum.

Prof. Dr. Tahsin Çolak

Baş-Editör

Dear Colleagues,

I wholeheartedly wish you to be healthy in this period when the corona virus pandemic roasts the world and our country. In this challenging process, our very valuable colleagues in our country as well as all over the world lost their lives. I bow with respect in their spiritual presence. We are all so sorry.

The COVID-19 pandemic made us all to retreat, to stop elective surgeries, and even to stop all life. In this process, scientific studies and scientific sessions were canceled or suspended one after another. Despite this, TJCD has arrived full with this issue.

In this issue, due to this process we went through, two reviews related to the COVID-19 process were included. The first of these articles, besides being a very valuable review that will answer the question of "How to manage patients with colorectal cancer during the COVID-19 pandemic process", secondly, upon the control of the COVID-19 pandemic and the normalization of life, it offers a strategy for managing other accumulated benign or elective patients that we delay or cancel. I hope that this article will be very useful by answering to one of the most curious issues during this period of normalization.

However, we also include two extraordinary reviews of highly respected experts in their expertise field in the colorectal community. The first of these important reviews is an article that reviews the results of intersphincteric resection and the effect of the robot in this technique in lower rectal cancers that we all have difficulty with. It is capable of opening new horizons and we anticipate that you will read with pleasure. I hope you will be very interested in the other review that reviews the neurostimulation technique and its results, especially in an area where we do not have many choices in pelvic floor discomfort and where we have difficulty.

In addition, we offer a very intense scientific feast with seven research articles. I believe it will be a bedside reference journal this summer, when people are slowly getting ready for vacation. Besides, I hope you will find interesting and read three case reports.

However, as TJCD, we focus on "webinar" presentations in this period in which meetings in the new world are canceled. It would not be wrong to say that we have reached a very large audience. I think this system will replace course programs in the future. As the TJCD Association, with this new system, we will continue scientific activities in the summer period instead of the old times when there has not been much scientific activity during the summer. I suggest you to follow.

I wish you all good health and wish you a good summer.

Prof. Dr. Tahsin Çolak

Editor-in-Chief

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REVIEW

The COVID 19 Pandemic and Colorectal Cancer: 5W1H - What Should We Do to Whom, When, Why, Where and How?

COVID-19 Pandemisi ve Kolorektal Kanser : 5N1K- Neyi, Neden, Nasıl, Nerede, Ne Zaman ve Kime Yapalım?

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ABSTRACT

The treatment of colorectal cancer, which is an important cause of cancer related death and is still an important public health problem, has become a matter of debate due to the COVID-19 pandemic that emerged in December 2019. This pandemic has forced us to rearrange our entire surgical practice. However, during these arrangements it should be ensured that patients are less affected by the pandemic, hospital resources should be used more efficiently and the risk of healthcare professionals should be minimized. This study discusses how to plan the multimodal treatment of colorectal cancer during the pandemic by using surgical, chemotherapeutic, and radiotherapeutic options while evaluating tailored treatments and the current international guidelines.

Keywords: Colorectal cancer, COVID-19, pandemic, SARS-CoV-2

ÖZ

Kansere bağlı ölümlerin önemli bir nedeni olan ve halen önemli bir toplum sağlığı sorunu olan kolorektal kanserin tedavisi, Aralık 2019'da ortaya çıkan COVID-19 pandemisi nedeniyle tartışma konusu halini almıştır. Yapılacak düzenlemeler hastaların pandemiden daha az etkilenmesini, hastane kaynaklarının pandemi için daha etkili kullanılmasını sağlamalı, sağlık çalışanlarını riske sokmadan planlanmalıdır. Ancak onkolojik ve cerrahi sonuçların bu yapılacak tedavi değişikliklerinden etkilenmemesi ana amaç olmalıdır. Bu çalışmada, kişiselleştirilmiş tedavi ile güncel uluslararası kılavuzlar da tartışılarak, pandemi döneminde kolorektal kanserin cerrahi, kemoterapi, radyoterapi seçenekleri kullanılarak multimodal tedavisinin nasıl planlanacağı tartışılmıştır.

Anahtar Kelimeler: Kolorektal kanser, COVID-19, pandemi, SARS-CoV-2

Introduction

After the outbreak of the new coronavirus (Sars-CoV-2) in Wuhan-China in December 2019, the World Health Organization declared it as pandemic on March 11, 2020. After the diagnosis of the first case of Corona Virus Disease 2019 (COVID-19) in Turkey on March 11, 2020, the Ministry of Health of the Republic of Turkey recommended postponing all elective surgeries on March 17, 2020, to lower the workload in hospitals and to prevent the disruption of healthcare services that will be required in the future period. After these developments, the approach towards the surgical treatment of colorectal cancer patients has been the subject of debate among healthcare professionals. Is colorectal cancer surgery an emergency or elective procedure or one for which conditions necessitate emergency surgery? Should we continue the colorectal procedures as if nothing

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has happened, or should the operations be delayed? How long can colorectal operations be postponed without harming patients? Regarding these questions, the purpose of this review was to establish optimal colorectal cancer management during the COVID-19 pandemic.

Colorectal Cancer Treatment During the COVID-19 Pandemic

"*Treat the patient, not the disease*".

Tailored therapy is the most important step in the treatment of colorectal cancer. The evaluation of five different steps and management of colorectal cancer patients regarding tailored therapy has gained more importance these days.

Factors to Consider in the Treatment Planning

1. Identifying Patients at Risk

The patient's age and concomitant diseases need to be evaluated thoroughly. Most deaths during the COVID-19 outbreak are in the group of over 60 years of age, and particularly in those with comorbid diseases. Unfortunately, colorectal cancer is frequently seen in this age group. Furthermore, the review of the risk factors of patients who have died during the COVID-19 outbreak has shown that the infection had an unfavourable course in patients with coronary heart disease, chronic pulmonary disease, diabetes, hypertension, immunosuppressive diseases (cancer, post-organ transplantation, steroid use and chronic kidney failure), autoimmune diseases, severe obesity and in those who are smokers. Moreover, male sex mortality rates are higher in the COVID-19 pandemic.[1,2]

Other conditions that should not be overlooked are the evaluation of the patient's performance (Karnofsky or WHO score) and the nutritional condition. During the treatment of colorectal cancer, these characteristics of the patient should also be evaluated.

2. Clinical Presentation

In our country, approximately 20%-25% of patients with colorectal cancer initially present to the emergency departments. Therefore, patients with tumour obstruction, perforation or blood loss need to be evaluated separately. The fact that some patients do not present to the emergency department despite having abdominal and defecation complaints that impair their quality of life should be considered. However, if the outbreak is prolonged, we will encounter cases in advanced stages since elective colonoscopy would be performed more rarely.

3. Tumour Characteristics

In every patient diagnosed with colorectal cancer, clinical staging and radiological evaluation of the lung and the entire abdomen are necessary. Based on the clinical staging, the disease should be classified as early, local, regional (presence of lymph node metastasis) or systemic. However, overcrowding in radiology clinics could limit the staging. In addition, patients without clinical findings, but with radiological subileus or closed perforation, should also be considered as an emergency.

4. Surgical Risk Factors

The treatment plan should be made after clinical staging considering the morbidity, length of surgical procedure, the estimated length of hospital stays, the need for intensive care unit (ICU) and the need for blood/blood products. Scoring systems for morbidity risk estimations can be used for this purpose (https://riskcalculator.facs.org/RiskCalculator/).[3] Furthermore, the preoperative risk assessment of the patients by the American Society of Anesthesiologists Classification is also critical in the decision-making process (For example, long and complicated surgeries, such as cytoreductive surgery and hyperthermic perfusion or pelvic exenteration, would not be appropriate during this period).

In emergency or elective surgeries that cannot be deferred, it will be appropriate to prefer procedures, such as stoma only or resection and stoma, to reduce risks.

5. The Condition of the Healthcare System

The COVID-19 pandemic is progressing day by daily, affecting the healthcare system in different ways. Therefore, the conditions of healthcare workers, the availability of a separate operating room and separate ICU for surgical patients in hospitals should also be evaluated.

What Should be the Best Treatment Option for Colorectal Cancer?

Based on the experience gained from colorectal cancer patients in China and Italy, several associations have published guidelines and/or recommendations to protect both patients and healthcare professionals and to provide uninterrupted services to patients when necessary.[4,5,6,7]

The general trend in these publications is to postpone elective surgery as much as possible but to perform emergency surgery provided that general measures are taken. The situation regarding colorectal cancer surgery appears to be more complicated. While there is no debate about performing surgery for emergency conditions such as obstruction or perforation, other conditions associated with colorectal cancer require further consideration of the status of the patient, the stage of the tumour, the risk of the surgical procedure and the condition of the respective hospital.

The Guidelines and Recommendations of International Associations

The "COVID-19 Guidelines for Triage of Colorectal Cancer Patients" of the American College of Surgeons, recommend

approaching each case individually based on three different scenarios for colorectal cancer surgery.[5]

I- *In the first scenario, if the number of COVID-19 patients in the hospital is limited and the hospital has sufficient capacity,* surgery is recommended as soon as possible in nearly obstructing colorectal cancers, tumours requiring frequent blood transfusions, rectal cancers nonresponsive to neoadjuvant therapy. These early-stage cancers that do not require neoadjuvant-adjuvant therapy and in tumour with suspected local perforation or sepsis.

Prophylactic surgeries required for Hereditary syndromes, small colon or rectal carcinoids, large polyps and even malignant polyps can be deferred for three months.

II- *In the second scenario where the number of COVID-19 patients is increasing and the ICU and ventilator capacity is limited,* emergency surgery is recommended in cases with nearly obstructing colon cancer where stenting is not an option, in nearly obstructing rectal cancer, in patients requiring high blood transfusions (inpatient) and in cases with pending evidence of local perforation or sepsis.

III- *In the third scenario where ICU is at full capacity and the need for ventilators cannot be met due to patient overcrowding in hospitals due to progression of the pandemic,* surgery is recommended only for colorectal cancer patients with perforating, obstructing, actively bleeding tumours (inpatient transfusion-dependent) or septic patients.[5]

Similarly, the guidelines published by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) only recommend surgical intervention in cancer patients who are likely to progress or who require emergency intervention.[7]

The Association of Coloproctology of Great Britain and Ireland has a much more conservative approach and recommends alternative strategies such as colonic stenting for patients with obstruction, and even percutaneous drainage for cases with perforation if the patient is suitable and the resources of the hospital are sufficient.[4] If despite all, surgical treatment is required, it is recommended to perform a preoperative risk assessment by consulting anaesthesiologists and intensive care specialists as well and make decisions based on hospital resources. The rationale for this conservative approach is to avoid the growth of overall mortality because of the high environmental risk posed by COVID-19 and the efforts for the careful use of hospital resources. Therefore, it is recommended to determine the urgency or emergency of the clinical condition by considering the presenting condition, symptoms and the disease severity at admission. Also, it is recommended that either planned or unplanned need for ICU should be estimated, optional strategies to reduce this need should be mediated and potential capacity of ICU should be considered.[4]

During the COVID-19 pandemic, one of the points to be considered when deciding on surgery in colorectal cancer patients is the current condition of the hospital. It is necessary to ask the questions of how long we can keep colorectal cancer patients waiting due to the insufficient hospital capacity and the sharp increase in the numbers of COVID-19 cases.

Several studies report different results regarding the length of time for the deferral of colorectal cancer surgery. A large-scale population-based study analysed 39,000 newly diagnosed colorectal cancer patients. The study compared the survival by the time elapsing from diagnosis to treatment separately for each disease. It was observed that the survival rates were significantly different across patient groups treated within 30 days, in the 31-150 days and >151 days of diagnosis.[8] In a retrospective study comparing the time between the moment of diagnosis and treatment (surgical or neoadjuvant treatment) in the colon and rectal cancer, separate analyses were performed both for 35 days and 49 days. No difference was identified between the patients in whom treatment had commenced within 35 days and patients whose treatment began after 35 days concerning survival. Similar results were also obtained when the same data were examined for day 49.[9] In another study, Wanis et al.[10] compared 908 stage I-III colon cancer patients concerning disease-free survival and overall survival according to the time from diagnosis to surgery. The comparison of those who had surgery earlier or later than 30 days revealed that there was no difference in overall survival or disease-free survival. Furthermore, there was no difference even when the threshold was taken as 60 and 90 days. Flemming et al.[11] also compared 4326 stage I-IV colon cancer patients concerning overall survival and cancer-specific survival according to the time to surgery. In patients with the time to surgery >42 days, no difference was identified in overall survival and cancer-specific survival. In a larger-scale retrospective cohort study conducted by Kucejko et al.[12], it was identified that the best survival values were in those operated between 3-6 weeks. The reason for this is thought to be the need to take enough time during the first weeks after the diagnosis to perform proper staging, and also that the patients can be made more suitable for the surgery particularly concerning their cardiac, pulmonary and nutritional conditions. Considering all these studies, it may be thought that elective colon cancer surgery can be deferred for approximately six weeks.

In rectal surgery, it has been shown that when the time between the first symptoms and treatment is longer than 60 days, the rate of survival is lower.[13] In their large cohort study, Yun et al.[14] determined that the deferral of surgery for longer than 30 days was associated with poor survival in rectal cancer. In other words, it appears possible to wait

30 days without affecting survival in rectal cancer as well. It takes 2-3 weeks from the time of diagnosis to surgery or neoadjuvant treatment in many specialised centres on colorectal surgery. Advanced imaging and/or preoperative preparations are performed during this period. However, even a 6-week deferral for rectal cancer surgery similar to the optimum deferral period for colon cancer may not be sufficient to avoid the exhaustion of hospital resources in a potential crisis like the one experienced in Italy.[15]

Today, another approach in rectal cancer is the total neoadjuvant therapy (TNT) approach.[16] The Society of Surgical Oncology states that if feasible, the TNT option should also be considered in rectal cancer cases.[17] It should also be remembered that patients receiving long-term neoadjuvant therapy or TNT will need to visit hospital facilities regularly, resulting in an increased risk of COVID-19 transmission and a higher demand for the use of hospital resources. Therefore, the balance between relatively higher hospital admissions of a patient managed with TNT and the risk of colorectal surgery should be well characterised during the era of the COVID-19 pandemic. ACPGBI recommends short-term radiotherapy for rectal cancers to rule out this possibility.[6] Phase III studies comparing short-term radiotherapy and long-term chemoradiotherapy have failed to show a difference in local control, disease-free and general survival between these two approaches.[18,19] Although long-term chemoradiotherapy is preferred in distal rectal cancers that have invaded the sphincters, the nearby organs or have a positive lateral lymph node, it should not be overlooked that these patients will be spending a long time in the hospital during the pandemic. It is for this reason that even without the COVID-19 pandemic, short-term radiotherapy is being used more frequently today. Short-term radiotherapy will reduce the use of hospital resources and, more importantly, the risk of patient and healthcare workers being infected.

Moreover, it should be considered an option that even patients who can be referred directly to surgery can receive short-term radiotherapy by expanding the indication if needed.[6] In rectal cancer, surgery after neoadjuvant radiotherapy can be planned in eight or even 12 weeks at the latest.[5,6] Moreover, if there is a good response after neoadjuvant therapy, and it is feasible to deliver additional chemotherapy, surgery could be deferred even further.[5] In patients with a complete response after neoadjuvant therapy, the "wait and see approach" could also be suggested by closely monitoring the patient and discussing the situation with the patient.[6] In locally advanced and recurrent rectal cancers and metastatic colorectal cancers, chemotherapy can be considered as an option to defer surgery.[5] It is recommended to make all these decisions in the multidisciplinary tumour (MDT) board and to inform the patient in detail.[6,7]

During the COVID-19 pandemic, the principles of radiation oncologists are grouped in three for the treatment of rectal cancer, similar to the treatment of all other tumours: postponing treatment if the patient's survival and/or local control is not being put at risk if treatment cannot be deferred to complete treatment in the shortest time feasible using hypofractionated plans and to ensure the safety of the patient and the treatment team. The Turkish Radiation Oncology Association has provided all the necessary information to all its members. It has notified them of all the precautions necessary in items by considering the recommendations of the hospital infection committees and, in particular, the publications from Wuhan and Italy.

Another important issue for patients is the quality of life in the deferral period with cancer besides the impact of the COVID-19 pandemic. Studies have shown that the quality of life is also unfavourably affected in those patients.[20]

Before deciding to treat colorectal cancer cases immediately or later, it would be beneficial to remember one more subject. Although the adenoma-carcinoma sequence takes about 7-10 years for colorectal cancer to develop, this process may decrease to 2-3 years in familial and hereditary colorectal cancers. In other words, the progression of the disease occurs in a shorter time in familial and hereditary colorectal cancers. This condition should also be considered when deciding whether to defer treatment. Another issue to consider within this context is that patients younger than 50 years old present at advanced stages and with an unfavourable prognosis. This explains why colorectal cancer is the first among cancer--related deaths under the age of 50.[21]

Another point that should be known when the treatment plan is being made is that the pandemic is also expected to last 3-4 months in our country, as in China and Italy.

Surgical Timing Decisions for Colorectal Cancer Patients During the Pandemic

Based on the assessment of all these data, it would be appropriate to classify colorectal cancer patients in four stages according to the treatment priority. However, all the factors discussed above should be involved in the treatment decision, including patient-related factors, mode of presentation, the characteristics of the tumour, the morbidity of the surgical procedure and the infrastructure of the hospital (Table).

1- Emergency Patients

Patients with radiologically confirmed or clinically diagnosed obstruction, perforation and massive bleeding should be operated immediately.

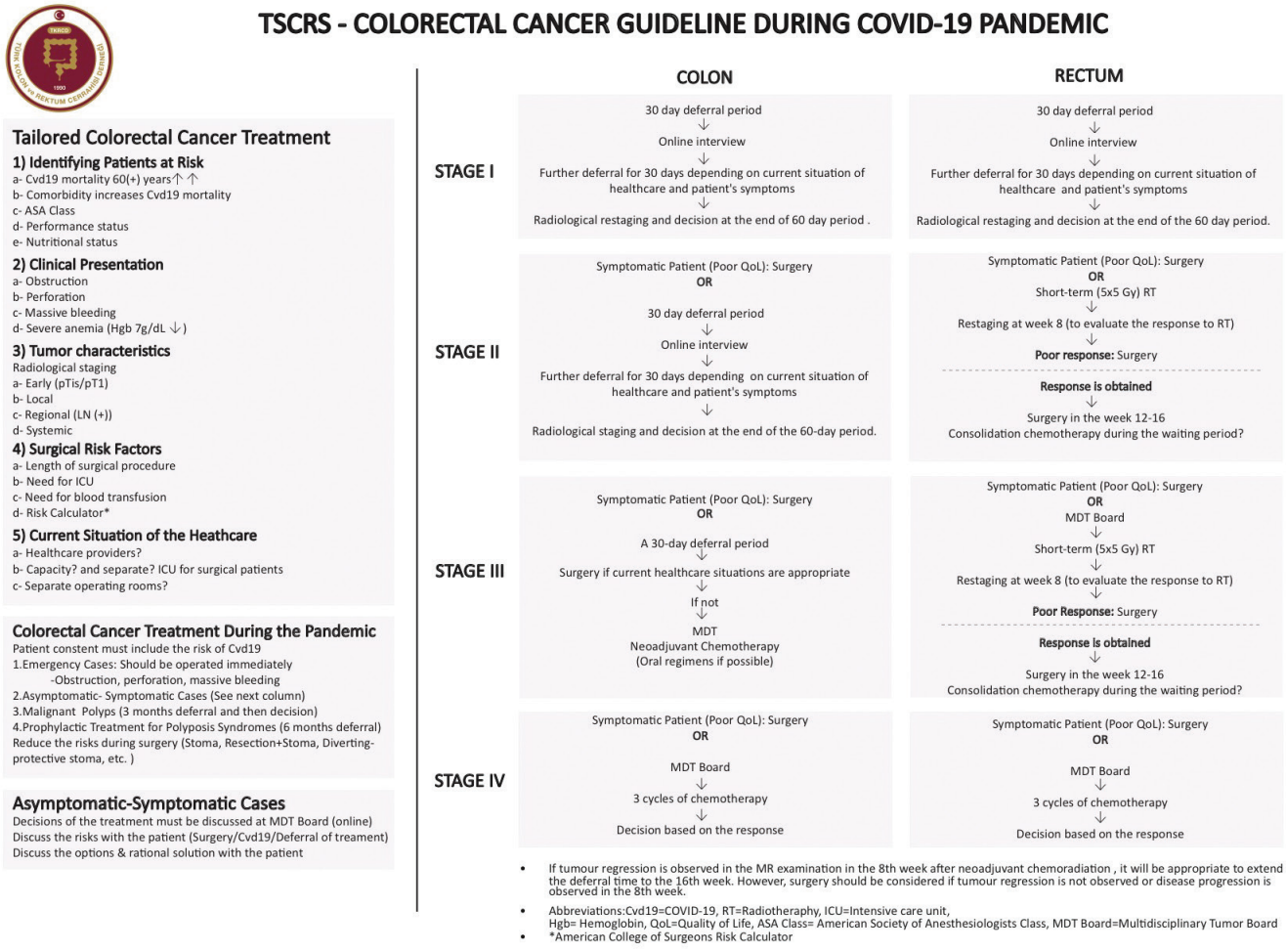
2- Asymptomatic Patients

In general, during the outbreak in our country, it will be appropriate to defer elective colorectal cancer surgery for 30 days and decide again at the end of this period. However, some patients are seriously concerned that the pandemic may become prolonged, and this will increase the waiting time and lead to progression. In addition, during this waiting period, psychological disorders, such as severe anxiety and depression, may also develop. These patients can be operated in hospitals not providing healthcare services for patients affected by the pandemic or in hospitals, maintaining the appropriate standards after informing patients about the risk of COVID-19 infection and obtaining their informed consent.

When deciding to defer, the opinion of infectious diseases specialists and epidemiologists becomes important. Opinions should be sought before postponing for 1 to 1.5 months. If the pandemic is anticipated to progress during this period, the patient and the physician may need to evaluate the medical decision within the current circumstances. It is important that this decision should also be included in the patient's file in written form with its reasons.

i. Surgical Timing in Colon Cancer

Patients diagnosed as a result of screening tests are generally asymptomatic and stage I-II patients. It is known that the oncological outcomes of stage I-II colon cancer found in radiological staging will not be affected unfavourably by the deferral of the treatment for 30 days. If patients need to wait for more than 30 days, the risks of COVID-19 should be explained thoroughly, consent should be obtained and a joint decision should be made. At the end of the 30-day deferral, the patient can be interviewed online, and the treatment can be deferred further for an extra month depending on the current situation of the healthcare facility and the patient's symptoms. However, a need for a further deferral at the end of the 60-day-period warrants radiological staging for decision making in those patients. Furthermore, in asymptomatic but stage III colon cancer patients, it is known that the first 30-day deferral period would not affect the oncological outcomes. However, if deferral will be longer than 30 days, discussing a plan of neoadjuvant chemotherapy (oral regimens if possible) in an online MDT board will be appropriate. In asymptomatic stage IV colon cancer patients, it is possible to identify the chemotherapy



protocols in the MDT board based on the status of systemic diseases and to continue chemotherapy or to plan surgery depending on the radiological response after three courses of chemotherapy (Table).

ii- Surgical Timing in Rectal Cancer

Similarly, cases detected as a result of screening are generally asymptomatic. It is known that for 30-day deferral in stage I rectal cancer cases would not affect the oncological outcomes. If patients need to wait for more than 30 days, the risks of COVID-19 should be explained thoroughly, consent should be obtained, and a joint decision should be made. At the end of the 30-day delay, the patient should be contacted online and depending on our country's condition and the patient's symptoms, treatment can be deferred for another month. However, if it is required to defer once again at the end of the 60 days, in such cases, radiological staging is necessary to make a new decision. Even though radiotherapy is not indicated for all patients with stage II rectal cancer, a short-term (5x5Gy) radiotherapy could be administered to gain time during the pandemic. Then, the radiotherapy response should be evaluated in the eighth week after radiotherapy. If there is a regression with radiotherapy, it will be feasible to prolong the waiting period up to 12 or even 16 weeks. In stage III rectal cancer cases, although radiotherapy is not indicated for all patients, during the pandemic, it is recommended to deliver short-term (5x5Gy) radiotherapy and to assess the response to radiotherapy in the eighth week after radiotherapy. If there is a regression with radiotherapy, it would be feasible to prolong the waiting period up to 12 or even 16 weeks. In stage II and III cases, during the waiting period, the consolidation chemotherapy protocol should also be discussed in the MDT board. In stage II and III patients, if there is no regression in the eighth week with radiotherapy, the decision for surgery can be made depending on the infrastructure of the hospital. The long-term radiotherapy protocol will not be appropriate during the pandemic period, as it increases the length of stay in the hospital, resulting in raising the risk of transmission. It is necessary to choose protocols that will minimise the patient's hospitalisation for both radiotherapy and chemotherapy procedures.

In addition, in rectal cancer patients who have received neoadjuvant chemoradiotherapy (long-term) before the pandemic, the response should be assessed in week 8 and if there is a good response, the delay should be completed to 16 weeks. If the patient is not a good responder surgery should be planned.

3- Symptomatic Patients

In these patients, the decision for surgery can be made without a delay, depending on the severity of symptoms and findings, and their effect on the quality of life. The presence of symptoms and findings that impair the general condition of the patient are important for the decision of surgery (blood transfusion need, persistent abdominal pain, tenesmus, severe diarrhoea, severe weight loss, other symptoms). Symptomatic patients are generally those between stages II-IV. It is necessary to plan treatment after identifying the clinical-stage by good radiological staging. For patients who are symptomatic but can wait, deferral of the surgery during the pandemic should be preferred. The treatment according to the stages is as described for asymptomatic stage I, II and III.

Another issue that should not be forgotten is to select the protocols that will minimise the patient's hospitalisation for both radiotherapy and chemotherapy procedures. Therefore, TNT approaches may not be feasible in stage III rectal cancer.

4- Malignant Polyp - Patients Scheduled for Prophylactic Surgery

It will be appropriate to postpone prophylactic surgeries in patients who have undergone polypectomy and have been diagnosed with malignant polyps, and in inherited polyposis syndromes.

What to Do in Patients Who Have a Surgical Decision?

When deciding on surgery, the resources of the hospital should be evaluated first. If the resources are not sufficient, the patient should be referred to a COVID-free hospital in your region. These patients in the risk group should be informed not only about the surgery they will undergo but about the risk of COVID-19 infection as well.[7] The risk of infection with SARS-CoV-2 must also be added to the consent that will be obtained. Patients should be questioned very carefully regarding the history of COVID-19 during the preoperative period. In patients who are scheduled for elective surgery, the PCR test must be performed 14 days before the operation date, and patients with a negative test should be asked to come to the hospital after absolute isolation at home. To the patients that come to the hospital, a repeat PCR test and computed thorax tomography should be performed 24 hours before the surgery. In cases in which the patient's evaluation results are suitable, elective surgery can be performed. Otherwise, they should receive COVID-19 therapy. Patients who require emergency surgery should be regarded as cases of suspected COVID-19, and a computed tomography of the abdomen and thorax must be obtained.[4] It is essential that all staff should be careful and follow the protocols during the preoperative and postoperative period to prevent infection for all patients hospitalised for surgery. In the operating room, the staff and the doctors are required to operate using personal protective equipment.[4,7,22]

Does Minimally Invasive Surgery (MIS) Increase the Risk of Transmission?

It is known that the SARS-CoV-2 virus is an enveloped virus that is transmitted by droplets.[23,24] Furthermore, reverse transcription polymerase chain reaction tests demonstrate that the virus tested positive in the stool of approximately 30% of patients.[25] It is not known whether there is a risk for infection in MIC/laparoscopic or open abdominal surgery. Nevertheless, because viruses such as Corynebacterium, papillomavirus and HIV can be present in surgical smoke, SARs-CoV-2 may also be present in the smoke caused by energy devices and the cautery or the pneumoperitoneum created by CO_2 during laparoscopy.[26,27,28] Since the aerosol risk is much higher in laparoscopic surgery than open surgery, laparoscopic surgery is not recommended.[4,6,29] Colleagues in China prefer open surgery. However, SAGES argue that the advantages of laparoscopic surgery, such as fewer complications and shorter hospital stays, should particularly be taken into consideration.[7] They have stated that contrary to open surgery, nearly all the particles formed during dissection in laparoscopy can be cleared away using closed ultrafiltration systems.

Minimally invasive surgery (MIS) should not be preferred in patients who are known to be infected or suspected from their history and evaluations performed. However, in patients with negative test results and no signs of COVID-19 pneumonia on thorax computed tomography, MIC can be performed under strict precautions.

It is thought that very efficient filtering can be achieved when the smoke aspiration systems produced to provide a better view in laparoscopic surgery are used with an ultra-low particulate air filter capable of filtering 0.05 microns.[30] If the surgery is to be performed laparoscopically, to reduce the release of aerosols, it is recommended to cut port entrances small enough to avoid gas leaks, to use cautery and energy devices as minimally as possible, if possible only to use monopolar cautery with an aspirator, to maintain intraabdominal pressure at a minimum level, and to finalise the pneumoperitoneum using filtered smoke release systems before extracting the specimen, converting to open surgery for any reason and closing the port incisions.[7,30]

Does Enhanced Recovery After Surgery (ERAS) Have a Role?

The concept called enhanced recovery after surgery (ERAS) or the perioperative multimodal approach aims to discharge early from the hospital, return quickly to daily life, use various perioperative strategies to improve the recovery conditions, reduce the postoperative stress and integrate evidence-based medicine into patient management. It has been shown that ERAS protocols decrease the length of hospitalisation without affecting the risk of complications or re-hospitalisation.

Although individual components vary, most ERAS programmes include avoiding prolonged hunger, optimisation of comorbidities in the preoperative period, preoperative carbohydrate loading, targeted hemodynamic therapy, multimodal analgesia by avoiding opiates, avoidance or early removal of tubes (nasogastric tube, foley catheter and drains) and support of gastrointestinal functions. Early recovery is targeted as a result of these measures.

During the pandemic period, ERAS will not only ensure that the patient is discharged from the hospital earlier but will also prevent the contact of patient secretions and fluids with the surrounding environment by avoiding nasogastric catheter, drains and bladder catheter applications.

The development and widespread use of ERAS in combination with MIS represents a paradigm shift in perioperative care. Although ERAS protocols are mostly associated with laparoscopic surgery, and there will be an expected decline in performing MIS during this period, most ERAS protocols can also be implemented in open surgery. If the condition of the patient, the surgeon and the healthcare centre fulfil the requirements, the application of ERAS protocols will be beneficial for patients, surgeons and public health.

How Will We Make the Final Decision in the Treatment of Colorectal Cancer Patients During the COVID-19 Pandemic?

The risks that colorectal cancer disease and the COVID-19 pandemic impose on the healthcare system should be evaluated by momentary comparisons. The principle of 'treating the patient but not the disease' should be considered after reviewing the five factors in the treatment planning that were described above and have been assessed separately. The morbidity-mortality created by the operation (https://riskcalculator.facs.org/RiskCalculator/) and COVID-19 should be assessed, and the final decision must be made accordingly.

Conclusion

According to the GLOBO CAN 2018 data, colorectal cancer continues to be a serious public health problem, ranking third among cancer-related deaths and fourth among the most common cancer types.[31] During the COVID-19 pandemic, the surgical management of colorectal cancer should be planned to ensure that patients are less affected by the pandemic and hospital resources are used more effectively without putting healthcare workers at risk. However, the main purpose should be that the oncological and surgical results would not be affected by these treatment changes.

There is no need to change the surgical timing of conditions regarded as emergencies. However, in emergency surgeries, the use of MIS should be avoided, or appropriate technical equipment and protective equipment should be used.

In cases where we consider it elective, postponing the surgical treatment of colorectal cancer for stage I and II patients for 4-8 weeks may be brought to the agenda. The MDT board must be held to discuss stage III patients and neoadjuvant treatment options should be evaluated for both the colon and the rectum. Short-term treatments and a long-term waiting period should be preferred in patients who are scheduled for radiotherapy.

MIS should not be used in cases known to be suspected or infected and should be used after all necessary precautions have been taken in non-infected patients.

ERAS applications should be placed on the agenda to benefit from the advantages of early discharge and to prevent the contact of the patient's body fluids with the external environment.

As a result, considering the point Turkey has reached during the pandemic, it appears highly likely that hospital resources will be mobilised for COVID-19 patients in the days ahead. Undoubtedly, emergency surgery should be performed. However, in such a case, the surgery of patients with colorectal cancer who are in the risk group should be deferred as much as possible after taking treatment precautions that will not affect patient survival, will not risk the patient's health, will not put healthcare professionals at any unnecessary risk, and will ensure the more appropriate use of hospital resources.

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REVIEW

Intersphincteric Resection for Low Rectal Cancer: A Review of Anatomy and Surgical Techniques, Oncologic and Functional Outcomes and the Role of Robotics

Aşağı Yerleşimli Rektal Kanser İçin İntersfinkterik Rezeksiyon: Anatomi, Cerrahi Teknikler, Onkolojik ve Fonksiyonel Sonuçlar ve Robotik Cerrahinin Rolü Üzerine Derleme

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ABSTRACT

Intersphincteric resection (ISR) for low rectal cancer is a relatively novel anal-sparing technique that requires a thorough knowledge of the anatomy of the deep pelvic space and advanced surgical skills. The development of laparoscopic intersphincteric resection, through magnification of the surgical field, has renewed the interest in the anatomical description of the anal canal and deep pelvis, which has been historically fraught with inconsistencies. Introduction of the robotic platform has made the deep pelvis technically accessible to a greater number of colorectal surgeons. The literature describes ISR as an oncologically safe technique with good functional outcomes; however, there is often confusion regarding its definition, indications and technical aspects of this challenging procedure. This review aims to evaluate the current state of robotic ISR through the discussion of novel detailed anatomical descriptions, surgical techniques and indications, together with oncological and functional results.

Keywords: Anatomy, intersphincteric resection, rectal cancer

ÖZ

Aşağı yerleşimli rektal kanser için intersfinkterik rezeksiyon (İSR), derin pelvik boşluğun anatomisi ve ileri cerrahi beceriler hakkında kapsamlı bilgi gerektiren nispeten yeni bir anüs koruyucu tekniktir. Cerrahi alanın büyütülmesi yoluyla laparoskopik intersfinkterik rezeksiyonun gelişimi, tarihsel olarak tutarsızlıklar ile dolu olan anal kanalın ve derin pelvisin anatomik tanımına olan ilgiyi yeniledi. Robotik platformun tanıtımı, derin pelvisi teknik olarak çok sayıda kolorektal cerrah için erişilebilir hale getirdi. Literatür, İSR'yi iyi fonksiyonel sonuçları olan onkolojik olarak güvenli bir teknik olarak tanımlamaktadır ancak, bu zorlayıcı prosedürün tanımı, endikasyonları ve teknik yönleri ile ilgili genellikle kafa karışıklığı vardır. Bu derleme, yeni detaylı anatomik tanımlar, cerrahi teknikler ve endikasyonların yanı sıra onkolojik ve fonksiyonel sonuçların tartışılmasıyla robotik İSR'nin mevcut durumunu değerlendirmeyi amaçlamaktadır.

Anahtar Kelimeler: Anatomi, intersfinkterik rezeksiyon, rektal kanser

Introduction

Sir Ernest Miles introduced the abdominoperineal resection (APR) with a permanent colostomy in 1908 for the treatment of low rectal cancers [below 5 cm from the anal verge (AV)], which has been the standard of care in most surgical practices ever since.[1] In 1994, Schiessel et al.[2] introduced the intersphincteric resection (ISR), followed by hand-sewn coloanal anastomosis, as a novel anal-sparing technique.

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The introduction of ISR has revived interest in a deeper understanding of anorectal anatomy in order to optimize dissection through the intersphincteric plane (ISP). Laparoscopic ISR was introduced to improve post-operative short-term outcomes and recovery whilst providing as safe an oncological outcome as open surgery.[3] However, laparoscopic ISR is not a widespread technique due to its technically challenging nature, with only few specialized centers being able to offer such anal sparing resection.[4,5]

Complex pelvic surgery benefits from the technical advantages offered by the robotic platform[5], which results in similar oncological outcomes for ISR as with other conventional surgical approaches but with improved postoperative pelvic function.[6,7]

This paper reviews the current state of robotic ISR through a discussion of novel, detailed anatomical descriptions, surgical indications and oncological and functional results.

Surgical Anatomy of the Intersphincteric Plane

The low pelvic anatomy contains, in close proximity, the genitourinary complex, the rectum/anal canal and the pelvic nerves and vessels within a funnel shaped rigid muscular-tendinous structure, making it a very challenging surgical field for novice surgeons.[8] The introduction of ISR has challenged modern anatomical studies through the combined use of immunostaining, magnetic resonance imaging (MRI) and endoscopic ultrasound (EUS) on both cadaveric and live patients in order to better outline the enigmatic virtual space that is the ISP, which has often been a source of long-lasting anatomic inconsistencies.

The pelvis can be divided schematically into four quadrants (anterior, posterior and two laterals) with specific anatomic landmarks that should be identified for a correct ISP dissection.

Posterior Aspect of the Distal Rectum/Anal Canal

The mucous membrane of the distal rectum/anal canal is surrounded by the muscularis propria, composed of a circular (interior) and longitudinal (exterior) layer of smooth muscle cells. In the anal canal, the circular muscle forms the internal anal sphincter (IAS). The longitudinal muscle (LM) of the anal canal is composed of an inner sheet of dense smooth muscle cells organized in bundles surrounded both internally and externally by sparsely scattered smooth muscle fibers.[9] Cranially, the cells of the LM are directly attached to the skeletal muscle fibers of the levator ani muscle (LAM) (Figures 1a and 8).[9] Caudally, the LM penetrates the inferior (i.e. subcutaneous) part of the external anal sphincter (EAS), splitting into fibers running antero-inferiorly and terminating subcutaneously (Parks' ligament)[10] and others running posteriorly and cranially forming a ligamentous loop composed of collagenous and elastic fibers terminating on the dorsal side of the coccyx. This ligamentous loop was defined by Muro et al.[11] as the anococcygeal ligament (ACL) following Toldt's description in 1903 in an attempt to standardize the international anatomic terms.[12] The EAS is located circumferentially outside of the LM and anteriorly to the ACL and has been described to be composed of three (deep, superficial and subcutaneous)[13] or one continuous sheet.[14] There is a space in the sentence EAS is a skeletal muscle which continues cranially into the LAM, which is composed of three portions (the puborectalis, pubococcygeus and anococcygeus) but is macroscopically a continuous muscular structure.

The LAM adheres tightly to the ventral surface of the coccyx through a dense connective tissue called Raphe of the iliococcygeus and pubococcygeus muscle.[11] A thick tissue located above the LAM, composed of smooth muscle cells, connects the posterior aspect of the LM to the ventral surface of the coccyx.[11,15] This was named by Muro et al.[11] as the "hiatal ligament" (HL) according to a previous description from Shafik[16]; however, it is traditionally classified by colorectal surgeons as the "anococcygeal ligament" (Figure 1b). The ISP is located between the posterior loose portion of the LM and the EAS, and it is accessible transabdominally through the dissection of the HL close to the viscera (Figures 2 and 3). Therefore, the surgical landmark for a correct posterior dissection is the initial exposure and dissection of the HL.

Anterior Aspect of the Distal Rectum/Anal Canal

The anterior region of the anal canal has many similarities between the two genders, and correct anatomical knowledge of it is paramount for correct dissection of the ISP. Nakajima et al.[17] and Muro et al.[18] have investigated the anterior aspect

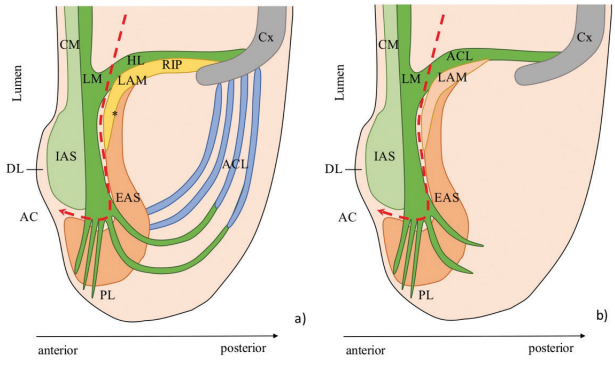

Figure 1. Posterior aspect of the rectal/anal canal. The figures represent the different view between anatomists (a) and colorectal surgeon's clinical experience (b). AC: Anal canal, ACL: Anococcygeal ligament, Cx: Coccyx, CM: Circular muscle of the anal canal, EAS: External anal sphincter, HL: Hiatal ligament, IAS: Internal anal sphincter, LM: Longitudinal muscle of the anal canal, PL: Park's ligament, RIP: Raphe of ileococcygeus and pubococcygeus muscle; *: Overlap between the LAM and EAS, red line: Intersphincteric plane for total ISR. The anatomic model has been designed according to the descriptions of Muro et al.[11]

through cadaveric dissections and anorectal EUS. From the lumen towards the anterior direction lies the mucous membrane of the distal rectum/anal canal, the IAS, the LM and finally the EAS. The difference between genders arises on the distribution of the fibers of the LM. In males the LM fibers of the distal rectum run downwards tridirectionally (Figure 4): 1) Posterior to the EAS, therefore covering the anterior aspect of the IAS; 2) Anterior to the EAS, forming the anterior bundle of the LM (AB), which is sandwiched between the bulbospongiosus muscle and the EAS and terminates in loose connective tissue and 3) Anteriorly into the rectourethralis muscle (RU).[17] In females, the LM fibers coming from the rectum run bidirectionally (Figure 5): 1) The medial fibers of the LM run downwards and, together with the IAS, they converge anteriorly merging into the posterior vaginal smooth muscle layer (MV), the vaginal vestibule and the perineum covering the anterior surface of the EAS and forming an area of muscular intermingling. 2) The lateral fibers of the LM run downwards and medially between the EAS and IAS.[18] Several studies describe the presence of the perineal body (PB) as a fibromuscular tissue in the region between the rectum and the urogenital structures with a mechanical stabilizing effect.[19,20,21] The PB could also be described as the above-mentioned anatomical complex of muscular intermingling between the LM, IAS and EAS.

On the anterior aspect, there is no anatomical clear ISP, as described for the posterior aspect, so the dissection should follow the LM dividing through the fibers running anteriorly both in males (to the RU) and females (area of muscular intermingling between the anal and vaginal muscles) in order to access the correct plane for ISP dissection (Figures 6 and 7). Therefore, the surgical landmark for a correct anterior dissection in males is the posterior aspect of the RU,

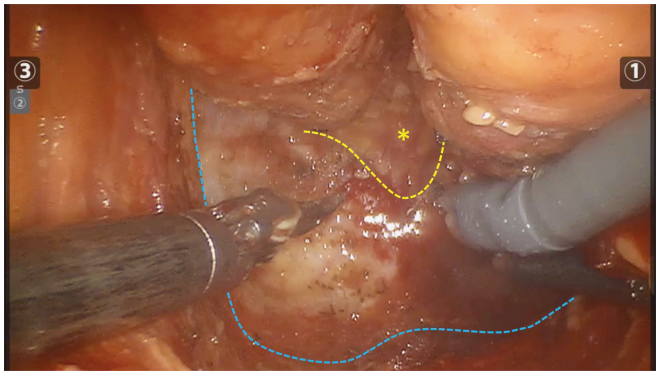

Figure 2. Intra-operative view of the posterior aspect of the rectum after complete exposure of the pelvic floor. Blue dotted line: anterior margin of the sacrum. Yellow intermitted line: margins of the HL before dissection. Star: HL

HL: Hiatal ligament

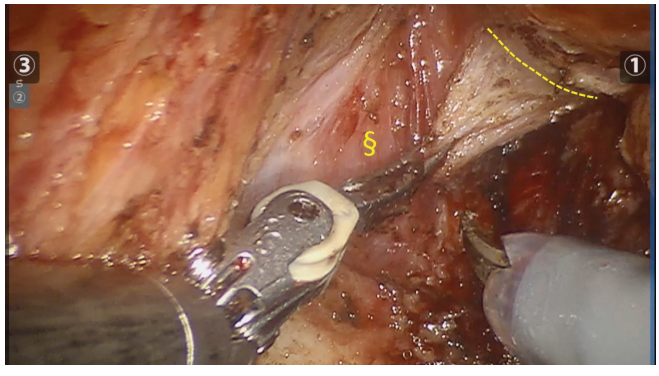

Figure 3. Intra-operative view of the intersphincteric plane after dissection of the HL. Dotted yellow line: ISP. Symbol §: LAM

HL: Hiatal ligament, ISP: Intersphincteric plane, LAM: Levator ani muscle

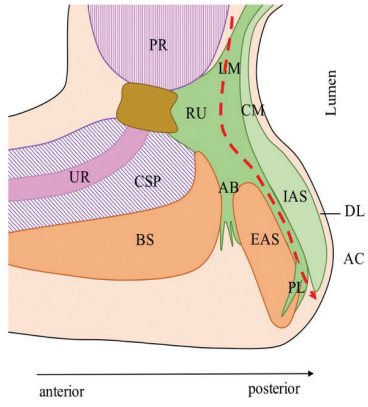

Figure 4. Scheme of the male anatomy of the anterior aspect of the recta/anal canal. AB: anterior bundle of the LM; AC: Anal canal, BS: Bulbospongiosus muscle, CM: Circular muscle of the anal canal, CSP: Corpus spongiosum of the penis; DL: Dentate line, EAS: External anal sphincter; IAS: İnternal anal sphincter; LM: Longitudinal muscle of the anal canal, PL: Park's ligament, PR: prostate, R: Rectum, RU: Rectourethralis muscle, UR: Urethra, red line: dissection plane for accessing the intersphincteric plane for total ISR. The anatomic model has been designed according to the descriptions of Nakajima et al.[17]

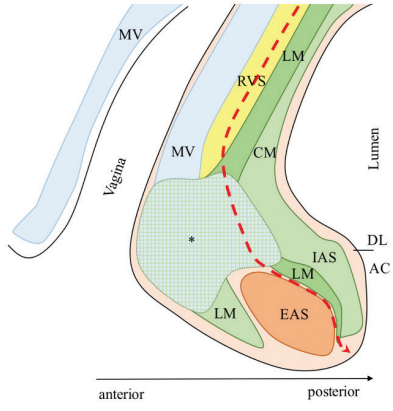

Figure 5. Scheme of the female anatomy of the anterior aspect of the recta/anal canal. AC: anal canal, CM: Circular muscle of the anal canal, DL: Dentate line, EAS: External anal sphincter, IAS: İnternal anal sphincter, LM: Longitudinal muscle of the anal canal, MV: Muscle layer of the vagina, RVS: Rectovaginal septum, *: Area of intermingling between muscle fibers of the LM, the MV and the IAS; red line: Dissection plane for accessing the intersphincteric plane for total ISR. The anatomic model has been designed according to the descriptions of Muro et al.[18]

whilst in females it is the area of muscular intermingling. The anatomist Muro et al.[18], after describing the absence of a surgical plane on the midline, recommends to the surgeon that, due to the presence of a "relatively sparse space in the region anterolateral to the rectum", it could be preferable to approach it laterally before directly detaching the anorectal canal from the vagina in order to reduce the possibility of injury.

Lateral Aspect of the Distal Rectum/Anal Canal

The lateral aspect of the anal canal was described in detail by Tsukada et al.[15] through cadaveric and surgical specimens. The structures are similar to the previously discussed posterior anatomy; however, the following three differences should be considered (Figure 8). Firstly, the smooth muscle layer covering the LAM forming the HL is very thin in this portion. Secondly, the length of the attachment between the LM and the LAM decreases significantly in an anterior-to-posterior direction, with the anterolateral having the greater extension. Thirdly, the overlap between the LAM and the EAS increases as it moves posteriorly.[15] The surgical landmark for a correct lateral dissection is the plane found between the medial edge of the LAM (identified through muscle contraction with electrocautery) and the rectum (Figure 9).

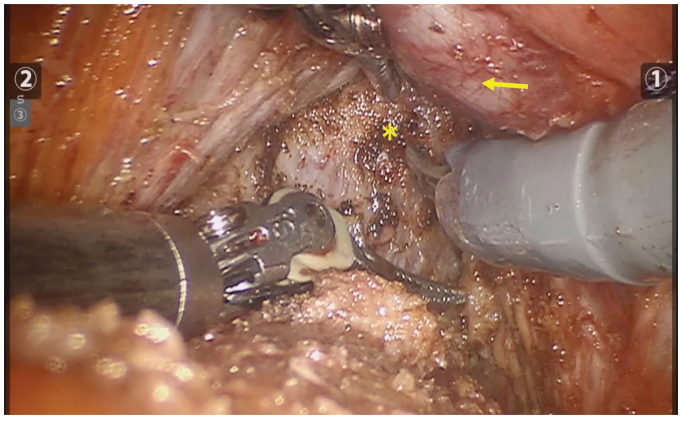

Figure 6. Intra-operative view of the anterior portion in a male patient. *: View of the LM fibers connecting to the posterior aspect of the RU in the male; arrow: prostate

LM: Longitudinal muscle, RU: Rectourethralis muscle

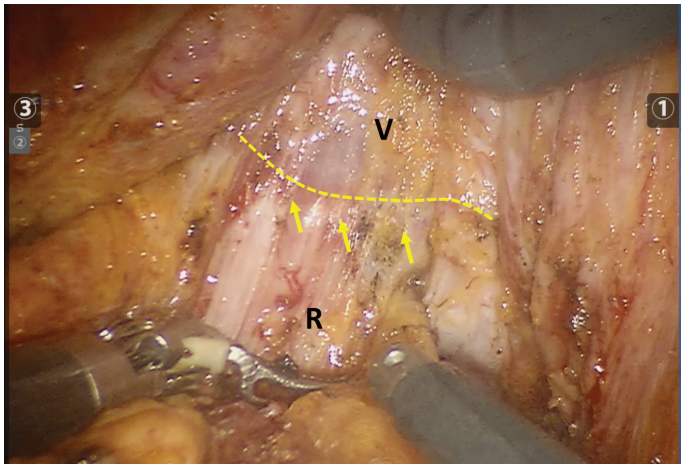

Figure 7. Intra-operative view of the anterior portion in a female patient. V: Posterior wall of the vagina, R: Anterior wall of the rectum/anal canal, dotted line: Plane between the posterior muscle layer of the vagina and the longitudinal muscle of the rectum/anal canal; arrows: Dense tissue corresponding to the intermingling area between the LM, the IAS and the MV described by Muro et al.[18]

LM: Longitudinal muscle, IAS: Internal anal sphincter, MV: Muscle layer of the vagina

Surgical Considerations for ISP Dissection

The correct identification of the ISP is challenging because of the above-mentioned anatomical complexities surrounding the anal canal. The dissection plane should be identified carefully during both abdominal and perianal phases. The

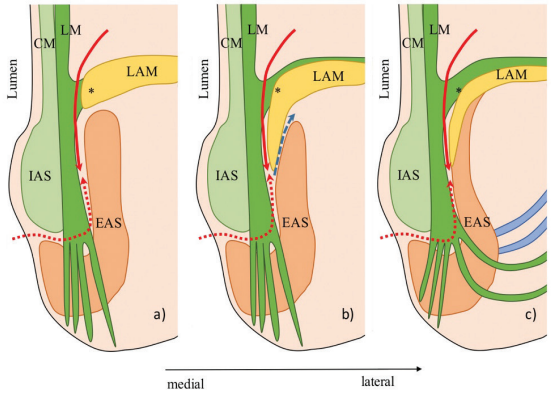

Figure 8. Three views of the anatomy of the rectum/anal canal. Anterolateral (a), lateral (b) and posterior (c) view of the anatomy of the anal canal. CM: Circular muscle of the anal canal, EAS: External anal sphincter, IAS: Internal anal sphincter, LM: Longitudinal muscle of the anal canal, *: Overlap between the LAM and EAS, red line: Intersphincteric plane for total ISR, Blue line: plane of mistaken dissection during the perineal phase. The anatomic models have been designed according to the descriptions of Muro et al.11 and Tsukada et al.[15]

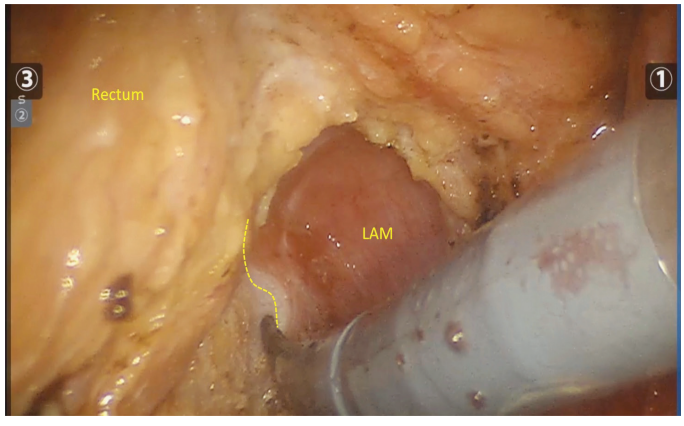

Figure 9. Intra-operative view of the right lateral dissection. LAM: Levator ani muscle; yellow dotted line: dissection line of the ISP

ISP: Intersphincteric plane

safest and easiest starting point for dissection is at the anterolateral portion, due to the absence of the HL, the wide length of the attachment between the LAM and the LM, and the absence of an overlap between the LAM and the EAS. Therefore, after transecting the LAM close to the LM, the access into the virtual plane between the LM and EAS (Figure 8) becomes possible. At the posterior portion, the thick HL must be dissected in order to access the ISP underneath, between the LM and the LAM-EAS complex, which are not tightly attached. Dissection in the anterolateral and posterior portion is easier due to the coplanarity between the abdominal and perianal plane.

The anterior portion is the most challenging because of the local proximity of the genitourinary complex, and the lateral portion is often the cause of dissection misleads. During the perianal phase, after dissecting the plane between the IAS/LM complex and the EAS, the surgical plane may mistakenly move dorsally to the LAM into the ischiorectal fossa, resulting in a mismatch with the abdominal plane (Figure 8).

Definition of Intersphincteric Resection

Schiessel et al.[2] introduced ISR followed by hand-sewn colo-anal anastomosis (CAA) in 1994 as an anal-sparing technique for low rectal cancer. ISR is composed of two distinct phases (abdominal and perianal) consisting of TME and excision of the internal anal sphincter. It was originally classified into two types (subtotal and total ISR).[2] Studies conducted in Japan have further classified ISR into three types according to the extension of the resection: 1) Total ISR, when there is complete removal of the IAS at the intersphincteric groove (ISG); 2) Subtotal ISR, when the resection line lays between the dentate line (DL) and the ISG and 3) Partial ISR, when the resection is at the level of the DL.[22,23] ISR should be differentiated from Parks' conventional CAA and stapled CAA[24] and also from ultra-low anterior resection with CAA, described as transabdominal ISR by some authors[25,26], in order to be fully compliant with the description of Schiessel et al.[2].

Indications for Intersphincteric Resection

ISR is a surgical technique for treating patients with low rectal cancers; however, there is no set definition of such cancers, even if they are generally identified as tumors with a lower margin below 4 or 5 cm from the AV, or below the pelvic floor muscle. Denost et al.[27] have recently classified low rectal cancers into four categories to assist decision making between sphincter-saving surgery versus APR, and which type of sphincter-saving procedure to perform. This classification evaluates the tumor position, from MRI images, only in relation to the LAM and EAS in a frontal view, without considering the circumferential position of the cancer on the anal clock. Kang et al.[28], through a retrospective analysis of surgical specimens, have analyzed the circumferential tumor location, reporting that the anterior aspect most frequently involves the CRM and exhibits deeper tumor invasion. Further studies are needed in order to determine whether the circumferential tumor location may play a role in future treatment strategies, such as a stronger indication for preoperative radiation or the choice of a surgical approach.

In 2012, Martin et al.[29] identified the following indication criteria for ISR: rectal tumors with no evidence of extension into the EAS and/or LAM; distal margin of at least 2 cm for T2/T3 tumors or 1 cm for T1 tumors; exclusion of poorly differentiated adenocarcinoma diagnosed by biopsy and/or preoperative documented impaired fecal continence. These indication criteria were recently confirmed by a national based questionnaire evaluation conducted by the Japanese Society for Cancer of the Colon and Rectum.[30]

In our center, ISR is indicated in the following two circumstances: 1) As an alternative to APR for very low lying rectal cancers (below 4 cm from the AV, with preoperative radiation in the case of cT3); 2) As a conversion from an ultra-low anterior resection in the case of involvement/threatening of the distal gross margin in the resected specimen or in the case of stapler failure for any reason. A hand-sewn side-to-end CAA is performed in most cases of ISR after transanal specimen retrieval. Specimen extraction is carried out through the abdominal wall if the tumor is large or the mesentery is thick, making trans-anal delivery difficult. In such cases, after abdominal extracorporeal resection of the specimen, the returned proximal colon is brought down through the anus, and the CAA is performed in the usual manner.

Standard Features for High-quality Rectal Resections

The primary aim in rectal cancer surgery is to achieve a good-quality TME as described by Heald[31], achieving clearance of two margins: distal and circumferential. The adequacy of the distal rectal resection margin (DRM) has decreased from the historically required 5 cm down to 2 cm.[32,33,34] Since 2005, a DRM of 1 cm has been acceptable for most tumors[35,36], down to a further 5 mm acceptable margin being suggested by some authors for those receiving neoadjuvant treatment.[37] However, because of the difficult intraoperative identification of the DRM after neoadjuvant treatment, many surgeons aim to achieve a minimum of 1 cm.[27] Moreover, the authors have recently found no correlation between oncological outcomes (local recurrence, overall survival and disease-free survival) and DRM <1 cm, with no significant difference also in a subgroup analysis between the DRM ≤0.5 cm group and the 0.5< DRM ≤1 cm group.[38]

Rullier et al.[39] suggested that partial or total removal of the IAS may permit a safe DRM in all cases. However, for low rectal cancers the concept of DRM should be replaced with the principle of the circumferential resection margin (CRM) in order to achieve an oncologically safe resection. A positive CRM, under 1 mm, is associated with a higher rate of local recurrence following rectal resection, regardless of neoadjuvant treatment.[40,41] In low rectal cancers, a positive CRM may cause tumor infiltration into the skeletal muscles of the pelvic floor (EAS and LAM). This makes the preoperative evaluation imperative during cancer staging with a pelvic MRI, and if available, anorectal EUS[42,43,44], in order to better define the surgical strategy (anal-sparing vs APR).

Robotics for Optimal Intersphincteric Resection

The role of laparoscopy in colorectal cancer surgery has undergone several randomized trials that reported it to be oncologically safe, with no difference in overall survival (OS) or disease-free survival (DFS), with improved short term outcomes (improved postoperative pain, reduced blood loss, reduced ileus rate and cosmesis leading to an earlier recovery and hospital discharge) but with a longer learning curve compared with open surgery.[4,45,46,47,48,49] However, the CLASSIC trial documented higher CRM-positive rates in the laparoscopic group compared with the open group (12.4% vs 6.3%).[4] Several technical aspects may have partially affected oncological outcomes, such as the use of rigid, straight, unarticulated instruments in the narrow pelvis, an assistant-dependent, unstable 2-dimensional unmagnified view and poor ergonomics.[4,5] A steep and long learning curve, together with the above technical limitations, has increased interest in the robotic platform for pelvic surgery. Robotic surgery with the introduction of the da Vinci Surgical System (Intuitive Surgical, Sunnyvale, CA, USA) has revolutionized the way complex surgery is performed by eliminating physiologic tremors and providing better ergonomics, an extra working arm, improved dexterity (articulated instruments with seven degrees of freedom), motion scaling, a magnified 3-dimensional stereoscopic view and a surgeon-controlled stable camera.[5] The robotic platform enables the surgeon to perform a stable and fine dissection in the narrow and deep pelvic cavity.[50,51,52,53] The lack of haptic feedback can potentially increase the risk of tissue damage during dissection and traction, but this technical issue can be overcome by using visual signs coupled with experience.[54]

Despite the increasing penetration of robotics in colorectal surgery, there is a lack of high-quality evidence-based studies reporting its superiority over conventional laparoscopic surgery. The current published literature is still based on individual institutions, case series, retrospective studies and meta-analyses with a few underpowered trials.[55]

Intersphincteric dissection (ISD) is one of the most technically demanding rectal surgical procedures. The technical advantages provided by the robotic platform, including clear visibility and wristed instruments, are key to reducing injuries to the adjacent structures during pelvic dissection. Moreover, the robotic approach helps further the depth of the abdominal phase of the ISD, which in turn decreases the duration of the more challenging perineal procedure.

Oncological Outcomes with Robotic ISD

Studies comparing open and laparoscopic ISR have reported long-term survival data with 5-year OS, DFS and LR rates ranging from 62% to 97%, 66.7% to 87% and 0 to 23%, respectively.[56,57,58,59,60,61,62,63,64]

A recent review by Shirouzu et al.[3] on a total of 22 studies evaluated oncological outcomes after ISR for both open and laparoscopic approaches. The results showed a radical resection (R0 resection) in over 90% of patients, but there was wide variation in the reported resection margins: the DRM was between 5 and 25 mm, and the CRM was ≤1 mm in 4% to 19.6% of cases. There was also wide variation in the reported survival rates, with disease-free and overall 5-year survival rates ranging from 68% to 86% and 76% to 97%, respectively.

The main concern for ISR is local recurrence in the pelvic cavity (including at the anastomotic site), which is reported to be between 0 and 22.7%.[3] Neoadjuvant CRT is used to both down-size the tumor and down-stage the disease and is a standard strategy to avoid positive CRM and reduce LR in locally advanced rectal cancer as per the NCCN guidelines.[65,66,67] However, in Japan, neoadjuvant CRT is not carried out for resectable cT1-3 tumors, regardless of the presence of lymph node metastasis within the TME[3], with Akagi et al.[68] reporting a low rate of LR (4.8%). In Japan and South Korea, there are several concerns regarding the role of neoadjuvant RT in patients undergoing ISR, such as associated higher surgical complications[65], a negative impact on anal function[69,70] and sexual disorders[71], with no clear survival benefit.[66]

In the author's center, neoadjuvant RT is offered if the staging pelvic MRI shows a threatened or suspicious CRM and/or in the presence of lymph nodes >5 mm in the short-axis diameter on the lateral pelvis outside the TME plane. The recorded local recurrence rate of 5.6% after 2 years is in range with published literature.[72,73,74]

Publications on robotic ISR with significant patient numbers or follow-up periods is lacking in the literature. Kim et al.[75] published a long-term retrospective study on robotic ISR

patients, reporting 5-year cumulative rates of LR, OS and DFS of 2.5%, 86.7% and 80.7%, respectively.

A multicenter study involving seven institutions from the Korean Laparoscopic Colorectal Surgery Study Group aimed to verify the long-term safety of robotic ISR for low rectal cancer compared with laparoscopic ISR by analyzing long-term follow-up outcomes with a relatively large patient population.[6] There was no statistically significant difference reported between cT3-4 tumors in the robotic and laparoscopic groups in either 3-year LR (9%, p=0.930) or 3-year DFS (76%, p=0.887).[6]

The authors have published a retrospective study on 70 patients with a median follow-up of 36.5 months (range 3.7-69.9) for the laparoscopic group and 33.9 months (range 4.4-61.3) for the robotic group and showed no significant differences in 3-year OS (88.5 vs. 95.2%; p=0.174), 3-year RFS (75.0 vs. 76.7%; p=0.946) and 3-year local RFS (91.7 vs. 87.2%; p=0.466).[76] The 3- year follow-up data can be regarded as clinically significant, as nearly 80% of rectal cancer recurrences occur within 2 years of surgery.[77]

Functional Outcomes with Robotic ISD

After a safe oncological clearance, functional outcomes must also be an important consideration for colorectal surgeons. The anatomical complexity of the pelvis makes surgical dissection very challenging with potential injury to the genitourinary and ano-rectal organs. A thorough knowledge of its anatomy, including the autonomic nerves of the pelvis, may help decrease the functional impact of surgery in the patient. In a dissection study on cadavers, Acar et al.[78] described that the autonomic nerves can be damaged in four crucial areas during Total mesorectal excision (TME): around the origin of the inferior mesenteric artery; in front of the promontory; at the side walls of the pelvis and at the posterolateral corners of the prostate.

Rectal resections have been associated with impairment of urinary and sexual function, with reports of laparoscopic rectal resections fairing worse than their open counterparts[79,80,81], whilst there are studies reporting the robotic platform showing an advantage over laparoscopic rectal surgery.[82,83,84] Kim et al.[82] reported earlier functional recovery in the robotic group compared with the laparoscopic group, while D'Annibale et al.[84] reported complete restoration of erectile function only in the robotic group. The improvement of sexual and urinary functions after robotic surgery may be associated with better nerve visualization and preservation due to the 3-dimensional magnified camera view and the more precise dissection possible in the robotic platform.[5] Urinary and male sexual dysfunction is not worsened by the ISR technique itself but related to the general TME.[6,75,85]

ISR, like traditional APR, aims to provide an oncologically safe resection for very low rectal cancers, but unlike APR, employs an anal-sparing technique, which can have an impact on the patient's quality of life.[50] Two studies reported that robotic ISR was associated with fewer fecal incontinence rates and better sexual function recovery when compared with open surgery.[6,7]

A comprehensive paper by Kim et al.[75] comparing robotic low anterior resection with or without ISR showed significantly higher fecal incontinence scores in total ISR than in partial/subtotal ISR (p<0.001-0.05) in the first 12-24 months after surgery. However, when compared with low anterior resections, any extent of ISR is associated with worse fecal incontinence scores in all forms (solid, liquid, gas incontinence and wearing a pad) (p≤0.001-0.005). It also reported that compared to pre-op manometric measurements (mean resting pressure, maximal squeezing pressure, urge to defecate volume and maximal tolerance volume), this was reduced 24 months postoperatively in the ISR group, with a recovery to an acceptable continence level in the latter period, as observed in other studies.[63,75,86,87] Age, female gender, advanced tumor stage, lower tumor location, neoadjuvant CRT, manual anastomosis, and longer operative time were factors significantly associated to worse manometry values.[58,75]

In our institute, we evaluated functional outcomes through Wexner scores[88] and a functional questionnaire developed by our colorectal division evaluating stool frequency per day, fecal urgency, and day/night-time leakage in patients who had undergone laparoscopic or robotic ISR with at least 12 months follow-up after ileostomy closure.[76] There was no difference in continence between the laparoscopic and robotic groups, with neoadjuvant CRT being the only factor to affect the Wexner score in a multivariate analysis, confirming the negative role of adjuvant radiation therapy on anorectal function.[89,90] However, the number of responses was only 30 of 70 questionnaires, with a potential for a non-response bias in the results. In the authors' clinical experience, partial or subtotal ISR are believed to have a better functional outcome than total ISR, which is often hardly considered in comparison with APR during surgical planning, but the data are still under revision for an official report.

The technical advantages of the robotic platform can open up the possibility of an exclusively trans-abdominal approach to the dissection of the LAM and EAS, which in turn can reduce muscular injuries to the sphincter complex and affect function.[7,26,50,91]

Finally, surgeons who perform ISR should be aware of the potential risk of postoperative painful edematous hemorrhoids, as described by one case report but anecdotally

encountered by many surgeons[92], as a possible indication for prophylactic hemorrhoidectomy during coloanal anastomosis in patients with known external hemorrhoids. Additional studies are needed to describe the impact of symptomatic post-operative hemorrhoidal disease and the role of a preventive treatment.

Functional outcomes should be studied further in order to better understand the impact on quality of life of ISR as a sphincter-saving resection technique, as it has been demonstrated to have a significant impact not only on working and social life but, interestingly, also on a more intimately spiritual aspect in a religious community[93]; however, stoma support with pre- and postoperative health and religious counselling could reduce this impact.[94]

Further multicentric studies are required to better characterize postoperative functions and symptoms, such as those of low anterior resection syndrome in patients undergoing to robotic ISR.

Conclusion

ISR is a challenging surgical technique that requires a thorough knowledge of the deep pelvic space.

ISR requires careful patient selection, adding functional evaluation to the oncological staging, as this will affect the individual surgical strategy.

Robotic ISR enables a nearly total abdominal approach for low lying rectal cancers and reduces the percentage of APR by providing a sphincter-saving procedure with satisfactory functional and good oncological outcomes. Further multicenter randomized studies are needed to confirm the positive results regarding robotic ISR, as the majority of published studies are from single surgeon's experiences in highly trained settings.

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REVIEW

Strategy for Return to General Surgical Elective Surgeries in Controlled COVID-19 Pandemic

Kontrollü COVID-19 Pandemisinde Genel Cerrahi Elektif Ameliyatlarına Geri Dönüş Stratejisi

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ABSTRACT

In these days when the COVID-19 pandemic was under control, a strategy was intended to be developed in the light of international literature to safely return to routine surgical activities and elective surgical operations. For related research articles, a literature review was conducted in all of PubMed, Wos, Google Scholar, Elsevier, Scopus, EBSCO indexes. In addition, the World Health Organization, Ministry of Health, COVID-19 declaration of the scientific board, Turkish Surgical Association, Turkish Society of Colon and Rectal Surgery, Turkish Medical Association, the U.S. Centers for Disease Control, the American Association of Surgeons, the European Union and other relevant information on the websites of the state health agency was searched. The focus was mainly on high-quality studies and on patient flow and safety of health workers during outpatient and elective surgery practices. The scattered information and limited number of literature in the above-mentioned sites, the information and personal experiences obtained from the studies were presented as a strategic algorithm. In the covid-19 crisis, there is a serious elective surgery burden, as elective surgery operations in both the outpatient clinic and the operating room have abruptly ceased. Since it is not possible to remove this load at once, a phased start scenario needs to be planned. The exact timing depends largely on factors beyond our control. Once the restrictions are terminated, clinical and surgical volume will gradually increase. Therefore, it will be necessary to prioritize cases by categorizing them.

Keywords: Surgical, Covid-19, elective, pandemic

ÖZ

COVID-19 pandemisinin kontrol altına alındığı bu günlerde rutin cerrahi aktivitelere ve elektif cerrahi operasyonlara güvenli bir şekilde geri dönmek için uluslararası literatür ışığında bir strateji geliştirilmesi amaçlandı. İlgili araştırma makaleleri için PubMed, WoS, Google Scholar, Elsevier, Scopus, EBSCO indekslerinin tümünde literatür taraması yapılmıştır. Ayrıca, Dünya Sağlık Örgütü, Sağlık Bakanlığı, COVID-19 Bilimsel Kurulu beyanları, Türk Cerrahi Derneği, Türk Kolon ve Rektum Hastalıkları Derneği, Türk Tabipleri Birliği, ABD Hastalık Kontrol Merkezleri, Amerikan Cerrahlar Birliği, Avrupa Birliği ve diğer devlet sağlığı ajansı web siteleri ilgili bilgiler tarandı. Özellikle, yüksek kaliteli çalışmalar, polikliniker ve elektif cerrahi uygulamaları sırasında hasta akışını ve sağlık çalışanlarının güvenliğini konu alan çalışmalara odaklanıldı.
Yukarıda adı geçen sitelerde dağınık şekildeki bilgiler ve kısıtlı sayıda literatür çalışmalardan elde edilen bilgiler ve kişisel deneyimler stratejik bir algoritma haline getirilerek sunuldu. Covid-19 krizi hem poliklinik hem de ameliyathanedeki elektif cerrahi operasyonlar aniden durdurduğundan, ciddi bir elektif cerrahi yükü mevcuttur. Bu yükün birden kaldırılması mümkün olmadığından aşamalı bir başlangıç senaryosunun planlanması gerekmektedir. Tam zamanlama büyük ölçüde kontrolümüz dışındaki faktörlere bağlıdır. Kısıtlamalar kaldırıldıktan sonra, klinik ve cerrahi hacim giderek artacaktır. Bu nedenle olguları kategorize ederek öncelendirmek gerekecektir.

Anahtar Kelimeler: Cerrahi, Covid-19, elektif, pandemi

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Introduction

A new corona virus, named Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2) by World Health Organization (WHO) and causing Coronavirus Disease 2019 (COVID-19) disease, caused a pneumonia outbreak in Wuhan, Hubei, China in December 2019, and this outbreak was soon spread to other states of China and then to the whole world, primarily the European continent.[1,2] Following the introduction of COVID-19 into the pandemic disease group by WHO in January/2020, measures such as maintaining a widespread social distance, closing of workplaces, implementing curfew and using health resources more effectively have been taken in many countries.[3] Due to the lack of sufficient knowledge in managing the COVID-19 pandemic and the lack of experience in how to operate the infected or suspected cases and how to prepare the health teams for these operations and the inability to foresee the number of patients who will apply to health organizations, elective and postponable operations were halted during the pandemic process, emergency surgery or surgical procedures requiring the detection of some cancer cases continued to work. In our country, after the first COVID-19 patient was seen on 11/03/2020, according to the recommendations of the COVID-19 Scientific Board formed by the Ministry of Health, taking into consideration the recommendations of the WHO, many arrangements had to be made in the health services. In particular, these measures to minimize the density in health care facilities, health care providers and reducing the burden on health care resources and the energy to be used in the most healthy way of [personal protective equipment (PPE), inpatient services, intensive care beds etc.] to be used in the most accurate way has been taken. One of these measures was to take the necessary measures to plan non-urgent elective surgery procedures as far as possible to a more appropriate date in the article sent to health institutions by the General Directorate of Health Services of the Ministry of Health on 17/03/2020.[4] It was preferred by most health care providers and surgeons not to perform elective surgeries as of 17/03/2020, only to perform urgent and some cancer surgeries.[5] However, due to this situation, especially postponing of procedures such as endoscopy and colonoscopy, using imaging methods such as computed tomography in the diagnosis and follow-up of COVID-19, due to the patients' complaints about not being hospitalized due to illness or late admission, it was observed that some cancer diseases such as skin, breast, cervix and colorectal cancers began to diagnosed late.[6,7] As a result of these delays, there may be progress in the stage of the disease and changes in the treatment protocols to be applied.

The postponement or cancellation of elective operations and diagnostic procedures such as endoscopy/colonoscopy is a huge problem that will be very difficult for the health system to handle in the future.[8] The postponement of time-dependent elective operations such as Transplant surgery has the potential to lead to worsening health of people with such diseases, lower quality of life and unexpected deaths.[8,9] On the other hand, when suspended elective operations are resumed, it is possible to expect that the time of hospitalization will be longer and complications will increase to some extent, depending on the type of operation that is held and the deterioration in the general condition of the patient. However, some basic factors that may prevent the resumption of elective surgery, for example, lack of doctors, nurses and auxiliary health personnel because of the disease and quarantine; as a result of the inability to process to the supply chain of a suture, surgical staples, such as deficiencies in the material; the appropriate operating room, anesthesiologists and anesthesia, the presence of the appropriate equipment for the intensive care unit (ICU) beds, such as ensuring the adequacy of conditions should be taken into consideration.

In a study showing how many cases were delayed during the 12-week period when the corona virus peaked[10], it was determined that approximately 28.5 million cases were delayed or cancelled around the world, and the majority of these cases were benign. In addition, the average postponement was found to be over 70%, with 80% of benign cases and 37% of cancer cases being delayed. In the same study, it was suggested that it would take about 45 weeks to clear these delayed cases. This study is important for revealing the extent of the problem.[10]

On the other hand, following the control of the COVID-19 pandemic in our country and the determination of the slowdown in the cases, a normalization plan was presented by Turkish Republic Presidency and declerated to the public on 04/05/2020. In this plan, it is declared that the normalization process will be carried out in a "dynamic" manner depending on the course of the outbreak at domestic and abroad and a manual containing the measures to be implemented during the normalization period in May/2020 and training of professional groups to be determined by the Ministry of Health is planned. On the other hand, it is planned that hospitals will begin normal outpatient and elective surgery procedures and pandemic hospitals will be reduced in the period of June/ 2020.[11]

In this process we are preparing to normalize, this includes potential benefits such as having a normalization strategy for general surgeons, protecting the surgical teams against the risk of infection, as well as solving the huge workload ahead of general surgeons without problems under a

specific plan and minimizing the risk of a second wave in the COVID-19 pandemic. The aim of this paper is to propose a return strategy considering the current strategies in the international literature to return efficiently and safely to normal outpatient activities and delayed elective surgery operations after the COVID-19 pandemic we are undergoing.

Materials and Methods

The medical literature on how to perform elective operations under the conditions of the COVID-19 pandemic was extensively reviewed. Search engines and indexes such as "PubMed", "Web of Science" "EBSCO", "Google Scholar" "Elsevier" and "Scopus" were used for this review. The words "COVID-19, corona virus, normalization, elective operations and surgery" were used as key words. The collected articles on this subject were examined in terms of the normalization plan and proposals. In addition, the web sites of WHO, the American Association of Surgeons, Ministry of Health, COVID-19 Scientific Committee, the Turkish Surgical Society (TSS), Turkish Society of Colon and Rectal Surgeons (TSCRS), Turkish Medical Association (TTB) Turkish Anesthesiology and Reanimation Society, and other non-governmental organizations (NGOs) related to COVID-19, the European Union and other states were searched, and relevant information were evaluated. The personal opinions and written statements of experienced authorities regarding the COVID-19 pandemic were also considered. Studies and articles containing safety measures for patients and health teams during outpatient and routine medical interventions, proposing the patient flow and elective operations' management strategy were considered. Articles and studies on COVID-19 were found to generate a high rate of heterogeneity. Due to the very limited number of articles proposing a return strategy to outpatient clinic and elective surgery operations, this information was combined with personal experience and management plans of the authorities to create a return strategy proposal.

Results and Conclusion

A road map has been set out in preparation of the turnaround plan, taking into account some of the compelling or restrictive factors. It was proposed that this roadmap/strategy should be grouped under two main headings: general principles and principles of return to elective surgery:

General Principles

1. First, a planning of the return to elective cases is necessary. This planning should be in a dynamic process. In this process, the involved institutions, Ministry of Health, universities, COVID-19 Science Board, local representatives of WHO, professional associations such as TSS, TSCRS and TTB and other public health-related NGOs should be managed in a multidisciplinary manner and the process should be directed by assessing the course of the pandemic in society and the effects of elective operations on the pandemic. Especially, Ministry of Health is a direct determinant on the State and City Hospitals, since it is an indirect but strong determinant on university hospitals and private/foundation hospitals, it can be a facilitator and guide for preparing a guide on when and how to start elective operations. In the "Presidential Normalization Plan" presented on 04/05/2020, the Ministry of Health has declared that it will prepare a guide in May.[11]
2. There is still an abstention in our country and in the world regarding the transition to elective surgery. As is known, a potential increase in post-operative morbidity and mortality was noted in patients undergoing major surgery during incubation of COVID-19 infection in China.[12] It is reported that the incubation period of COVID-19 infection varies between 0-14 days and the average incubation period is 5 days. In this case, the fact that our patients who are going to perform elective surgery are not known during the incubation period will bring important problems. During perioperative period, caution will be required when starting elective surgeries in order to avoid increased mortality and morbidities in patients developing COVID-19, to reduce viral spread within the hospital, to prevent health workers from becoming infected and to reduce the spread of the virus outside the hospital.[13,14] According to WHO data between 31/12/2019-05/05/2020 due to New Coronavirus disease (COVID-19) in the world 3.517.345 number of cases, 243.401 number of deaths were seen; in our country, Ministry of Health announced as of 10/05/2020 total 129,491 number of cases, 3,520 number of deaths.[15] In the WHO status report dated 05/05/2020, there were 1832 new cases, 59 new deaths in Turkey and the virus was widely circulated in society.[16] Since the number of cases and deaths reported by the Ministry of Health are limited to "Reverse Transcription Polymerase Reaction (PCR)" and cases, and individuals who can be identified as COVID-19 carriers in the community are not yet known, extra tests may be needed to identify these individuals before elective surgery. In Turkey, the possibility of transmission of the infection is "high" and its effect/severity in the community is "moderate", assessed as a "high risk as a result. Overall risk is defined as a combination of the probability and impact of a health threat (Risk = probability X effect).[16] At present, caution is needed in switching to elective surgeries in an environment where the possibility of infection is "high risk". In light of all these, COVID-19 testing is required for the patients with whom we plan the

operation and, if it has not been performed, all medical personnel before elective surgery planning. COVID-19 antigen and antibody test, SARS-CoV real-time reverse transcription polymerase chain reaction (rrt-PCR) test may be performed to assess active transmission or exposure to the virus.[17] It is not recommended to be used in surgical patients due to the variable results of rapid kit tests to control antibodies.[18]

3. When returning to elective operations, COVID-19 should be diverted from widespread pandemic hospitals to centers where COVID-19 suspected/positive patients are collected and no longer cared for as the outbreak subsides. If this is not possible it may be necessary to create isolated COVID-19 services and use the rest of the hospital. It is very important that training for the new status of staff is carried out under the control of infection committees and discipline should not be abandoned in this regard. To prevent the recurrence of this viral infection, health workers will need to be trained to accept and abide by changes, and their behavior will need to be changed, with the implementation of the standard working protocol to manage post-COVID-19 situations.
4. In large cities and relatively peripheral areas outside these cities, there are many factors that can force recovery after COVID-19. Unemployment and economic stagnation caused by the pandemic will have a negative impact on patients requiring surgery. In addition, the availability of implants and various operating materials may be hampered by international and national travel restrictions. On the other hand, the increase in demand for supply firms and the decrease in supply offered, the increase in production and costs will be reflected as the inevitable result of the surgical services offered, increasing costs to both the state and the people receiving services and/or insurance companies. Access to COVID-19 Tests should also be facilitated before starting elective operations in deprived areas and/or in extreme towns and settlements of our country. Surgery-related morbidity is still based on very little evidence; therefore, prioritizing conservative treatments if possible will help balance the morbidity and mortality of patients until experience is gained.
5. National TV channels and social media are widely needed to keep COVID-19 sensitivity alive and in order to reach patients and the community with the updated information. All healthcare professional and patients should be checked against COVID-19 symptoms before entering the hospitals. In addition, online registration and use of technology by patients are encouraged. Isolation should be managed by infection control guidelines and committee prior to surgery.
6. Measures against the possibility of a second wave - It is important not to ignore the possibility of a second wave, following the participation of workplaces and tourism areas in social life and relaxation of stay-at-home policies and occasional curfews as parts of the normalization. It may be necessary to be on constant alert to detect new COVID-19 cases between the weeks and months following the slowdown in new cases. Therefore, COVID-19 protection measures and social distance should not be waived.

Principles of Return to Elective Surgery

1. Timing of the Return to Surgery initiation - Based on the scientific literature, since incubation time of COVID-19 is reported to be 5-14 days in order to be normalized and to initiate elective operations, it can be said that there should be a continuous decrease in COVID-19 cases nationally and regionally before starting elective or partially elective operations.[19] Besides, to determine the time to start elective operations, it should be ensured that there are sufficient ventilators, PPE and ICU beds for post-operative care and that there are sufficient (at least 30 days) equipment and logistics material in the operating room. Continuing elective surgeries or reopening the hospital should be presented to the Government Health officials who are concerned with the National COVID management action plan by a commission of surgery unit representative, anesthesia and reanimation unit representative, infectious diseases unit representative, public health unit representative, and administrative unit representative in that healthcare organization and it must also be approved by the Ministry of Health.

2. As it is known, during the COVID-19 pandemic, quite experience was gained in the surgery of infected patients and many scientific papers have been presented on this subject.[2,20,21] These procedures may need to be revised for patients, healthcare professionals (such as anesthesia, surgical team, staff) and other patients within elective surgery, taking into account the procedures applied to infected patients before surgery, during the surgery and after surgery. Patients on elective surgery waiting lists and their consent forms should be re-evaluated. In addition, informed consent forms including surgical pathologies, suitability for surgery, and complications may arise due to COVID-19 pandemic, are required to be reorganized and also reviewed. Patients' desire to have surgery under these new conditions should be determined. Since it is not yet known what complications and physiological responses will be faced in a scenario of a controlled COVID-19 pandemic and after, it may be appropriate to adopt an approach which is supported with limited current literature but also

experience based. Today, the following are known as the risk factors for a patient that is worsen the COVID-19 table;

- Old age >65
- Cardiovascular disease (Hypertension, coronary artery disease, congestive heart failure)
- ASA: 3 and higher
- BMI >35
- Diabetes Mellitus
- Autoimmune diseases
- Blood transfusion history
- Hypercoagulant cases
- Immunosuppressive drugs (steroid use/rheumatology drugs/organ transplantation drugs)
- Renal Disease (Glomerulonephritis/renal failure, etc.)
- Lung Diseases (COPD, asthma, ınterstitial lung disease, pulmonary fibrosis, pulmonary hypertension)
- Obstructive sleep apnea
- Cigarettes and electronic cigarettes

It is important to evaluate these risk factors when selecting patients.[22] Serious preoperative evaluation will be required to reduce the postoperative complication risks with the medical evaluation supported by preoperative evaluation, to detect the asymptomatic transport of COVID-19, and to evaluate the surgical suitability to reduce the demand for postoperative ICU.[23] According to the suggestions of The International Society of Aesthetic Plastic Surgery, for the elective surgery at the first stage; they suggest selecting patients with <65 years of age, ASA 1-2, estimated operating time <3 hours, with no a coexistent disease.[22] Epidemiological evaluation of patients should be made before the elective surgery. Patients should be asked if they have had a close contact with a possible or confirmed case in the last 14 days, a history of coming from abroad and contact with a person from abroad. Clinical evaluation such as cough, fever, sore throat, headache, asthenia, muscle pain, dyspnea or arthralgia, diarrhea, tremor, nausea or vomiting, recent onset hyposmia or anosmia should be performed. It is recommended to include certain tests such as C-reactive protein, r(PCR) for SARS-CoV-2, specific immunoglobulin (Ig)M and IgG in routine blood tests performed before the surgery.[13] In other words, we believe that it will be useful to include in the above-mentioned tests as well as the hepatitis panel and human immunodeficiency virus panel tests which are in our routine practice when preparing the patient in the preoperative period. In their study, Luo and Zhoung[14] reported that it would be beneficial to look for influenza, serum respiratory virus, Conjoint test, *M. pneumonia* antibodies, liver function tests, creatine kinase, troponin, CRP, ESR, procalcitonin, D-Dimer/Fibrinogen degradation products as blood tests.[14] Thoracic CT imaging is not recommended as a screening test in asymptomatic cases by the Turkish Anaesthesiology and Reanimation Society. In suspicious cases, thoracic CT imaging is recommended before the operation for further evaluation in the presence of symptoms such as fever, cough and respiratory distress, and PCR testing is recommended in all non-emergency patients. According to the institution's test capacity and rapid conclusion, two negative PCR results in the last 72 hours or one in the last 24 hours should be seen in each patient.[24] Pulmonary X-ray imaging is routinely recommended. However, in one study, many surgeons expressed the opinion that low-dose pulmonary CT should be taken before the surgery. Considering the false negativity rate of the PCR test, all elective surgical patients should be evaluated as COVID-19 suspected patients and wear a surgical mask, and the approach in the operating room should be built on the same result.[24] Of course, evaluating the patients only will not be enough. Health status of surgeons, anesthesiologists, nurses (operating room, post-operative care, intensive care and service staff), technicians and all other auxiliary medical personnel will also need to be evaluated. The aim should be to provide diagnosis and treatment to COVID-19-negative patients by COVID-19-negative health personnel. Every healthcare professional should either be negative or recovered from symptomatic COVID-19 with negative reverse transcriptase-PCR tests (two negative results separated by 48 hours may be ideal) or should have specific immune test results for SARS-CoV-2 such as IgM-negative and IgG-positive. Considering the incubation period, we would like to draw a little more attention to the feasibility of the things described above. Despite taking all these precautions, the patient should be told about these situations in detail and should be told -without worrying- that there is a risk of getting COVID-19 infection, and clarified consent must be obtained. Any patient (elective or emergency) who has not developed an antibody for at least a six-month period should be treated as COVID suspect, a single room should be arranged for these patients, and patient care should be done with the PPE specified in the protocols.[24] It is important to apply respiratory physiotherapy in preoperative period to the patients scheduled for elective surgery and to start low molecular weight heparin treatment for patients at risk group, and to wash the oral and nasal cavity with povidone iodine.

3. The classification of General Surgery diseases is recommended as follows:

I. Category (A): Diseases requiring "Emergency" surgery, including diseases that may result in life/organ/limb loss if not identified and intervened within 24 hours at the latest. For example; trauma injuries, sharp object injuries, acute abdominal cases (such as perforation, mechanical intestinal obstruction, peritonitis-causing diseases)

II. Category (B): Diseases that require "Semi-Emergency" surgery, which includes diseases that are expected to progress if it is not treated within a few weeks. For example: Some colorectal diseases (semi-occlusive colon or rectal cancer, asymptomatic colon cancers, rectal cancers unresponsive to neoadjuvant therapy, early stage rectal cancers where adjuvant therapy is not appropriate), bariatric surgery (revisions for dysphagia, severe reflux, pain, dehydration/ malnutrition , slipped band, anastomosis strictures with aspiration risk), some breast diseases (patients who have completed neoadjuvant therapy, Stage T2 or N1, ER positive/PR positive/HER2 negative tumors, triple negative or HER2 positive patients, incompatible biopsies that may be malignant, malignant recurrence excisions).[25,26,27]

III. Category (C): Diseases requiring "Semi-Elective" surgery, which involves organ loss or organ dysfunction in the near future, or diseases that may make future surgery dangerous if surgery is not performed. For example; symptomatic cholelithiasis, some colorectal diseases (pre-endoscopic resection or non-resection malignant polyps, large, benign asymptomatic polyps, small, asymptomatic colon or rectal carcinoid tumors), some breast diseases (fibroadenoma, such as excision of benign lesions, incompatible biopsies that may be benign, high-risk atypical lesions, prophylactic surgery in cases with or without cancer, delayed sentinel lymph node biopsy detected by excisional biopsy, cTisN0-ER positive and negative lesions, re-excision surgeries, tumors that respond to neoadjuvant hormonal therapy, clinical stage T1N0 estrogen receptor positive/progesterone receptor positive/HER2 negative tumors, inflammatory and locally advanced breast cancers.[25,27]

IV. Category (D): Diseases which are non progressive and requiring "elective" surgery that can be operated within 1 year. For example; hernia surgery, benign tumors diagnosed with biopsy, benign thyroid diseases, symptomatic cholelithiasis, bariatric surgery, benign anorectal diseases.[26]

Surgeries aimed on improving the patient's quality of life, if the patient's quality of life has been stable for the past year, may be delayed or shifted until the intensity of operations started after COVID-19 has passed. On the other hand, a different approach should be taken in patients with diabetes mellitus, chronic organ dysfunction, or chemo/radiotherapy with associated immunosuppression. If these patients need to undergo major surgery, isolation must be mandatory at least two weeks before surgery to ensure that these patients do not carry coronavirus. First of all, we think that it is important to start elective surgeries by selecting cases who have been postponed, patients without concomitant disease, short-term cases, outpatient procedures that do not require hospitalization, under 65, ASA 1-2 patient group, and uncomplicated surgeries that do not require blood transfusion.

4. Operating room and personnel planning - Operating room staff training and PPE training should be provided. The use of PPE and isolation measures should be given great importance, especially in procedures requiring anesthesia induction and especially in procedures requiring the use of aerosol-producing surgical instruments, and in procedures where contact with the patient's body fluids is highly likely. A separate operating room complex should be allocated for emergency surgery involving patients with suspected or infected COVID-19. These complexes should have separate access, different infrastructure and a separate exit. If suspicious cases are to be operated, it is recommended to have HEPA (High-Efficiency Particulate Air) Filter/Laminar flow to provide high-frequency and rapid air exchange in the operating room to reduce viral contamination. The number of personnel and doctors required during the surgical procedure in the operating room should be kept minimum. Care should be taken to ensure that the surgical seniority and isolation training of this team is reasonable. Instruments producing aerosols such as electro-cautery, insufflator, sealing devices should be used to a minimum or should not be used in surgical procedures. After the procedure, the operating room should undergo an extensive cleaning and disinfection before it can be used for new patients. It should be ensured that equipment, such as anesthesia devices, is completely decontaminated according to the disinfection guidelines. The number of patients in the operating room list should be fewer than normal and some operating rooms should be kept as backup. The virus can remain on surfaces that have not been cleaned for up to 9 days. The virus can be eliminated with 70% ethanol, 0.1% sodium hypochlorite or 0.5% hydrogen peroxide. Nobody should enter the room for at least 15 minutes after the patient leaves the room, then cleaning should be done afterwards. The inter-operative time (at least 60 minutes) reserved for cleaning should be followed, and the number of operations performed during the day should be reduced. Disposable materials should be used as much as possible in the operating room, and instruments to be reused should be sent from the operating room to sterilization in two red bags. There should not be extra consumables in the operating room, they should be asked one by one whenever necessary. If possible, it should be ensured that there is an infection control responsible in the operating room; and under their supervision, monitoring the use of the PPE by the operating room staff is ensured.

5. Postoperative care - The length of hospital stay after surgery should be kept to a minimum and if patient needs such as postoperative dressing and venous antibiotics are

not vital, these applications should be encouraged to be done at home. It may be possible to avoid or reduce face-to-face interviews by following most of these operated patients via telephone or video calls.[28] However, separate follow-up areas can be created to assess venous thromboembolism, and vital complications such as deep surgical infections.

6. Regular and continuous control of the operated patients through telemedicine or video media is important to minimize re-hospitalization or recalls by reducing the likelihood of developing complications. Therefore, it is necessary to make more intensive use of this new formation (computer-assisted communication) that the COVID pandemic has added to our lives.

As a result, we are of the opinion that; initially, surgery for every patient as if they are COVID-19 suspect will be a precaution for the protection of both the patient and other healthcare professionals. In addition, this article presented above has been prepared under the light of the up-to-date medical literature until its publication. New publications are presented to the literature every day. After a while, the information mentioned above may need to be revised. We believe that it will be beneficial for every Healthcare Institution and doctor to follow up-to-date information provided by the Republic of Turkey Ministry of Health along with the current medical literature.

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Authorship Contributions

Concept: E.K., T.Ç., Design: E.K., T.Ç., Data Collection or Processing: E.K., T.Ç., Analysis or Interpretation: E.K., T.Ç., Literature Search: E.K., T.Ç., Writing: E.K., T.Ç.

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REVIEW

Sacral Neuromodulation: Technical Considerations

Sakral Nöromodülasyon: Teknik Değerlendirmeler

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ABSTRACT

Sacral neuromodulation is a highly effective therapy. When used in urology for urinary incontinence, refractory urgency and frequency, and non-obstructive retention, it is employed after the failure of conservative measures and considered a surgical option. When used for faecal incontinence, however, it can be considered a first-line surgical treatment. Due to advantages like minimally invasive nature, low morbity rate and availability of a highly accurate test phase, indications of this procedure expanded. Proper patient selection and optimal lead placement are the key determinants of success.Here we present all the steps and technical details for a successful implantation.

Keywords: Fecal incontinence, sacral neuromodulation, tecnique

ÖZ

Sakral nöromodülasyon konservatif tedavilerin başarısızlığı sonrasında fekal inkontinas için kullanılabilecek oldukça etkin bir tedavidir. Bu iki basamaklı işlem fekal inkontinansın tedavisinde birinci basamak cerrahi tedavi olarak kabul edilmektedir. Minimal invazif doğası, düşük morbidite oranı ve oldukça doğru sonuç veren bir test safhası olması nedeniyle bu yöntemin endikasyonları genişlemektedir. Uygun hasta seçimi ve uygun lead yerleşimi başarının ana belirleyicileridir. Bu çalışmada başarılı bir implantasyon için tüm basamaklar ve teknik detaylar sunulmuştur.

Anahtar Kelimeler: Fekal inkontinans, sakral nöromodülasyon, teknik

Introduction

Sacral neuromodulation (SNM), also termed sacral nerve stimulation, is a highly effective therapy.[1] When used in urology for urinary incontinence, refractory urgency and frequency, and non-obstructive retention, it is employed after the failure of conservative measures and considered a surgical option. When used for faecal incontinence, however, it can be regarded as a first-line surgical treatment.

This minimally invasive procedure consists of two phases. For the initial test phase, which generally takes 2-4 weeks, two techniques are available. A temporary electrode is placed in proximity to the target nerve, S3 or S4, and is connected to an external pulse generator to deliver a continuous electrical impulse. The temporary electrode is then removed. Alternatively, a tined lead electrode can be used. If the test stimulation proves clinically efficient, it can remain in place for chronic stimulation. Symptom improvement of ≥50% is accepted as a positive response, which generally predicts the therapeutic effect of chronic neuromodulation.

The second phase, during which an implantable pulse generator [(IPG); Interstim II ®] is placed in a subcutaneous pocket at the buttocks for permanent stimulation, can then be initiated.

Given the procedure's low morbidity rate, a positive test phase of proven accuracy, immediate response, and long-term durability, the possible indications have been expanded (e.g. low anterior resection syndrome is a new area of interest).

SNM had been contraindicated for patients who require regular abdominal or thoracic magnetic resonance imaging (MRIs) (except the 1.5-Tesla head coil); however, with a new generation of electrodes and IPGs entering the market, this contraindication will no longer be relevant. Sacral malformations, septic skin conditions, and bleeding diathesis must remain considerations.

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Proper patient selection and optimal electrode lead placement are the key determinants of success. Currently, minimally invasive percutaneous lead placement under fluoroscopy is the standard approach.

The optimal placement aims to position the electrode with its four equally spaced contact points close to the target nerve (generally S3 or S4) along its anatomical course. The placement of multiple electrode contact points next to the nerve offers more programming options. It reduces the intensity of stimulation, thus prolonging the battery life and lessening the risk of side effects.[2]

The procedure can be performed under either local anaesthesia with sedation or general anaesthesia. Sensory responses can be evaluated with the former, but the sacral foramen must not be infiltrated with the local anaesthetic, or all responses will be concealed. Under general anaesthesia, only motor responses can be evaluated.

Preoperative Preparation

A plain X-ray before the procedure can be useful to reveal suspected anatomic abnormalities (e.g. sacral foramen allowing no access to the target nerve[3]), as an MRI.[4,5,6] In this circumstance, lead placement can be technically challenging, and the patient should be advised of possible failure.

An enema should be administered preoperatively to empty the bowel of gas, which may cause artefacts during intraoperative imaging and reduce the visibility of the relevant anatomic structures.

A urinary catheter is placed before the operation and removed shortly thereafter.

Strict asepsis/antisepsis guidelines must be followed during all phases. Prophylactic i.v. antibiotics covering skin and enteric flora during induction of anaesthesia are recommended, as infection rates as high as 10.8% have been reported.[4,7]

Patient Positioning

Correct positioning is crucial for proper electrode placement. The prone position, with the anus, feet, and toes exposed, is necessary to observe the motor responses of the anus, pelvic floor, and feet. The patient's buttocks must also be slightly separated to see the "bellows" response. Horizontal positioning of the sacrum by the reduction of lumbar lordosis, as much as possible, provides better access to the foramina. A grounding pad must be fixed at an easily accessible location.

Operative Field Preparation

The skin is sterilised with common skin antiseptics from the posterior superior iliac crests to the thighs, extending laterally to the edges of the greater sciatic notch.

Electrode Entry Marking

After proper positioning of the patient, an A-P X-ray is obtained (Figure 1). The medial edges of the sacral foramina on both sides are marked vertically, and the line between the distal edges of the sacroiliac joints is marked horizontally on the skin, forming an "H" sign (Figure 1). The upper medial part of the third sacral foramen is located at the level of the intersection points of the "H". A C-arm rotation is needed, as the procedure will continue under the lateral imaging of the sacrum (Figure 2).

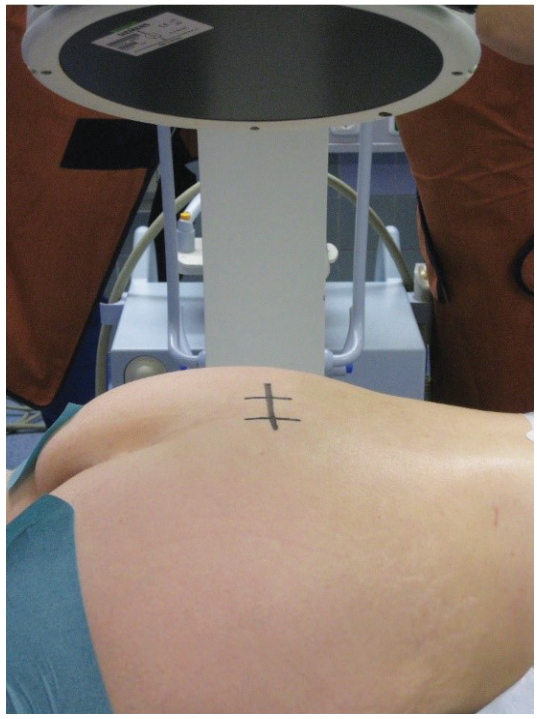

Figure 1. Patient positioning and AP fluoroscopy arrangement
AP: Anteroposterior

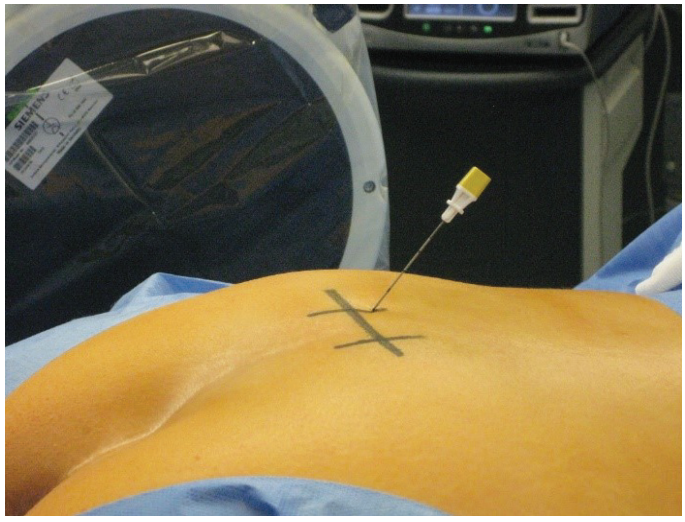

Figure 2. Patient positioning and lateral fluoroscopy arrangement: Foramen electrode positioned

Foramen Needle Placement

Needle electrode entry points are usually 1-2 cm cephalad from the intersection points of the "H" for easy access. Obtaining a lateral X-ray aids correct entry. A standard foramen needle should be advanced to the hillock of the sacrum and inclined through the S2-3 fusion plane under fluoroscopy. The two standard foramen needles are 9 and 12.5 cm (Medtronic 041828 and 041829, respectively); the latter can be used for obese patients. The uppermost medial part of the S3 foramen is the aim for entry.

Once a foraminal entry is accomplished, a test stimulation with the external pulse generator is performed (Figure 3). The bellows response (an inward movement of the perineum) and ipsilateral toe/foot response (plantar flexion of the greater toe) confirm correct positioning. Stimulation intensities below 2 mA resulting in a motor or sensory response are desirable. Minor adjustments can be made to decrease the stimulation amplitude if needed.

Once an appropriate position is achieved, the needle stylet must be removed, taking care to avoid the unintentional protrusion of the needle beyond the ventral edge of the sacrum.

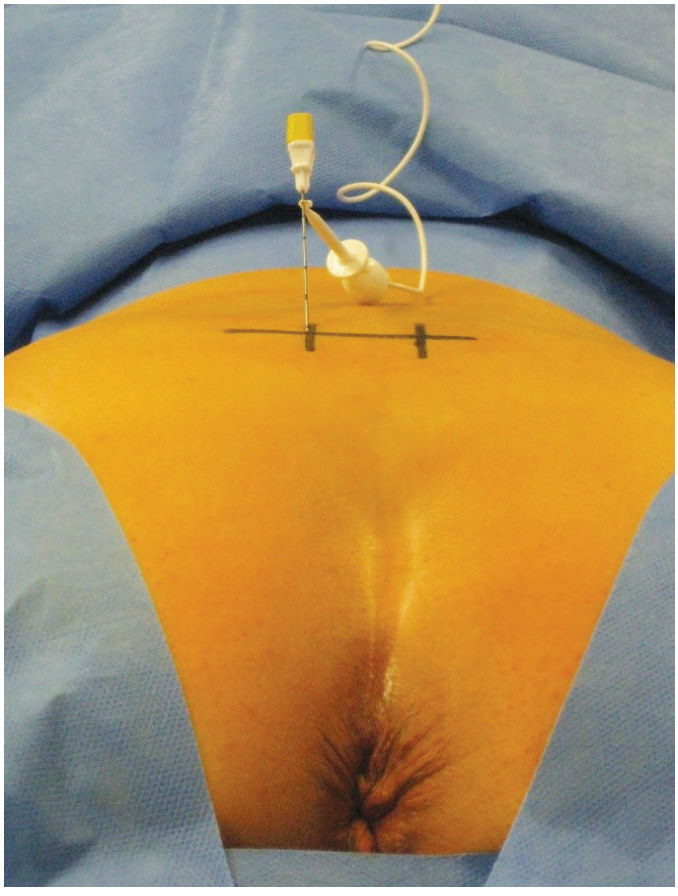

Figure 3. Foramen electrode positioned and connected to an external pulse generator

Lead Placement

Two lead placement options exist for the test phase. A temporary lead can be used. Although this is the simpler option technically, after a positive test phase, it will necessitate a second operation for the placement of a standard tined lead. This second operation can encompass both the placement of the tined lead and implantation of the permanent IPG to avoid an additional procedure. However, one must be cautious with this approach, as the temporary electrode can be easily dislodged, leading to a false-negative result.

As a second option, a tined lead can be placed initially. This is more stable and affords the opportunity to avoid a second procedure.

Temporary Lead Electrode Placement

The temporary lead is a coiled, insulated, and multistranded wire with a preloaded stylet and a single electrode contact on the distal end. After proper placement of the foramen needle and removal of the needle stylet, the lead is advanced through the needle hub. Two markers on the lead indicate the length of foramen needles, which must be considered during advancement. The test stimulation can then be initiated after connecting the lead to the external neurostimulator. After observation of a positive response, the foramen needle and stylet of the temporary electrode must be removed with care to avoid electrode displacement. Repeating the test stimulation will confirm the correct positioning. The lead is coiled and secured with a sterile adhesive drape around the exit site and connected to the external stimulator for the test phase.

Tined Lead Electrode Placement

The introducer kit (Medtronic 042294) includes a lead introducer, directional guide (Figure 4), and dilator. After placement of the directional guide through the foramen needle, a 1.0-cm skin incision is made at the entry point to facilitate the insertion of the introducer (Figure 5). Careful advancement with both hands under fluoroscopy can avoid the creation of a false or extended track. Note that the radiopaque marker of the sheath covering the introducer is 7 mm from its tip.

Three tined lead electrodes of different lengths (28, 33, and 41 cm) are available (Medtronic 3889-28, 3889-33, 3889-41). These have four contact points (numbered 0, 1, 2, and 3 from distal to proximal) and a curved tip (Figure 6). The tines to anchor the electrode in the surrounding tissue begin 10 mm proximally from the most proximal electrode (electrode 3). After confirming proper positioning under fluoroscopy, the inner part of the introducer is removed, whereas its sheath remains in place (a radiopaque marker confirms its position). The tined lead electrode is then

advanced through the sheath. During insertion, the curved tip should be directed to follow a medial to lateral course, reflecting the natural path of the sacral spinal nerve after exiting the ventral opening of the foramen. When the first white marker on the lead reaches the upper edge of the introducer sheath, the electrode is fully covered by the introducer. A further advancement to the second marker allows electrode positioning. During this stage, all the tines are still covered by the introducer sheath. Note that if electrodes are properly introduced into the foramen, they will follow the least resistant tissue, which generally is the course of the nerve. All electrodes must be placed close to the nerve; advancement under fluoroscopy will ensure correct positioning.

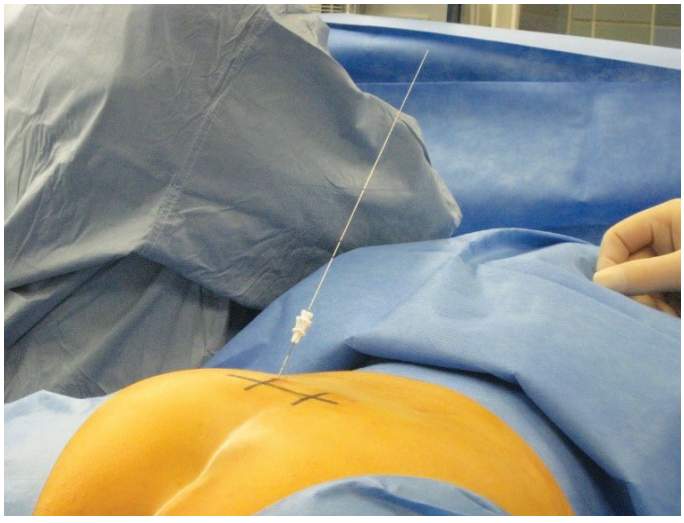

Figure 4. Foramen electrode positioned and introducer guide in place

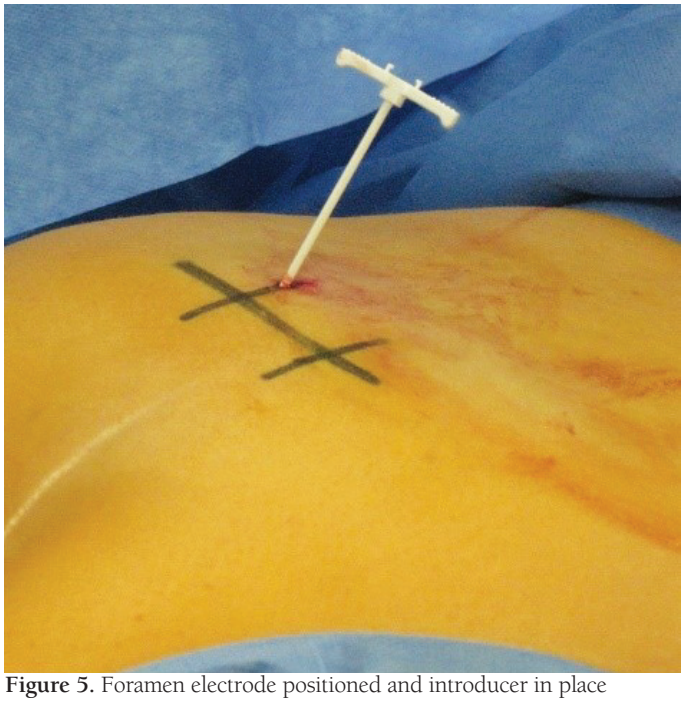

Figure 5. Foramen electrode positioned and introducer in place

Stimulation is then performed. A response to <2 mA at each contact will be confirmatory. During this phase, minor adjustments are still possible (e.g. rotation of the electrodes or re-insertion through the introducer with a different direction of the electrode tip). The introducer sheath and electrode must be held together during repositioning to avoid tine release. Fewer than four electrodes responding to low amplitude can be acceptable, at the surgeon's discretion. Once optimal positioning has been confirmed by stimulation, removal of the introducer sheath will release the tines and fix the electrodes (Figure 7). Meticulous removal under fluoroscopy avoids electrode dislodgement during this phase. Intermittent stimulation of all contacts during and after the removal process confirms proper positioning. Anteroposterior and lateral imaging to confirm and document the final electrode placement is advised.

If the tined lead electrode is used for the test phase, a subcutaneous pocket is created at the intended placement

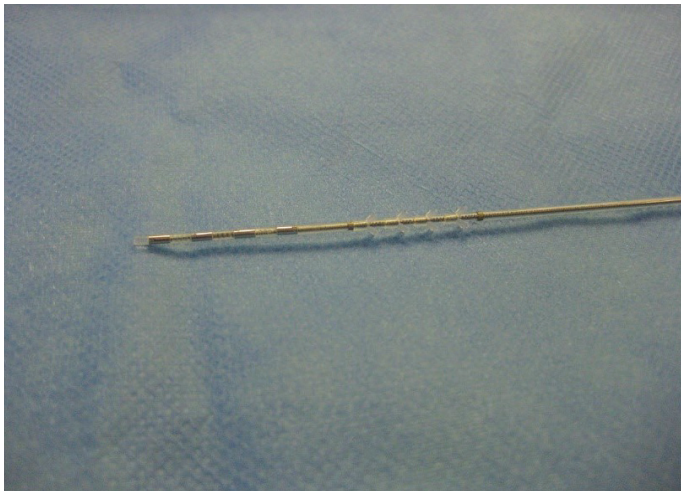

Figure 6. Tined lead electrode with a curved tip

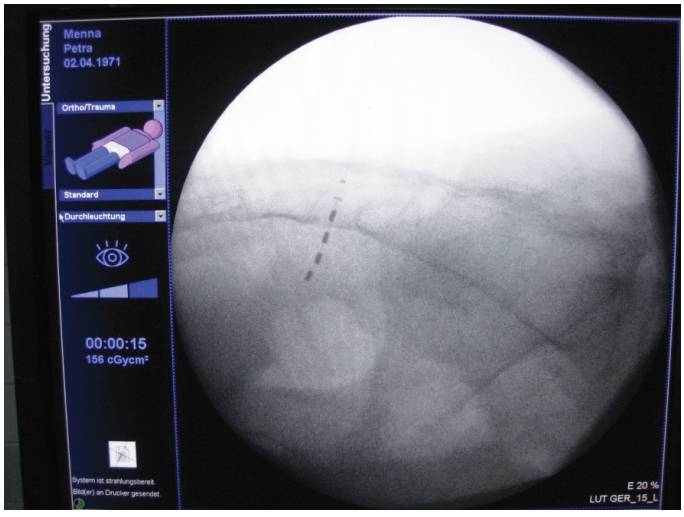

Figure 7. Tined lead electrode positioned

area of the IPG device. This must be easily accessible to the patient and away from bony structures to permit daily activity without discomfort. This small pocket above Scarpa's fascia is created for connector placement, and the tined lead is then tunnelled to the pocket. A second tunnel from this pocket to the skin, preferably across the midline, must be created for the percutaneous extension lead. The connection between lead and percutaneous extension is secured by a screw connector. A silicone boot is inserted over the connection, and two non-absorbable sutures are placed at the edges to secure it. The connector is placed in the pocket (future location of the IPG device). The subcutaneous tissue and skin are closed.

Pulse Generator Implantation

After a positive test period, the IPG (Medtronic Interstim II 3058, 22 g, 44x51 mm) can be placed into the pocket previously created to hold the connection to the percutaneous extension lead. The pocket must be tight enough to keep the IPG device stable and deep enough to avoid skin erosion/exposure. After removal of the percutaneous extension lead, the tined lead electrode is inserted into the IPG until its blue tip is visible. Then, it is fixed. Proper placement of the electrode - avoiding twisting of the IPG - is crucial. The subcutaneous tissue is closed with absorbable sutures and the skin with non-absorbable sutures. Close follow-up is needed in the early postoperative period to check for possible infection, which would require antibiotic treatment and, in most cases, device removal.

Programming

To program the IPG device, the clinician - not the patient - uses the N'Vision™ programmer. Mono- or bipolar stimulation can be set. Multiple contact points close to the nerve allow for multiple programming options. The aim is to achieve an efficient clinical response at a low amplitude, preferably below 2 mA. Trying different electrode contact points helps to find the most efficient option. Stimulation can be continuous or intermittent; the latter entails lower energy consumption and provides increased battery life. The most used (default) settings are 14-15 Hz, 210 µsec.[8,9]

For patients' access to the IPG device, the InterStim iCon™ patient programmer is used. This allows them to activate and deactivate the IPG and change programs and amplitude within pre-set limits.

Patients must be followed regularly to assess the clinical efficacy and side effects (e.g. pain, device displacement, and late infection) and to monitor battery status.

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Surgical and Medical Practices: K.E.M., Concept: T.E., K.E.M., Design: T.E., K.E.M., Data Collection or Processing: T.E., K.E.M., Analysis or Interpretation: T.E., K.E.M., Literature Search: T.E., K.E.M., Writing: T.E., K.E.M.

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RESEARCH ARTICLE

Symptomatic Efficacy of Aloe Vera 2% Cream in the Treatment of Chronic Anal Fissure

Kronik Anal Fissür Tedavisinde Aleo Vera %2 Kremin Semptomatik Etkinliği

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ABSTRACT

Aim: Chronic anal fissure (CAF) is a common disease for which various alternative treatment options exist. One of these alternatives is topical treatment with Aloe vera 2% cream (AVC), reports of which have increased in the literature over the past decade. This study aimed to analyse the efficacy of AVC in the symptomatic treatment of patients with CAF.

Method: Once informed of the treatment method, patients diagnosed with CAF who consented to receive AVC treatment and participate in the study were included in the study. We evaluated four parameters, including duration of stay in the toilet for each defecation, number of defecations per week, haemorrhage during defecation and pain during defecation according to the visual analogue scale, to measure the effectiveness of the treatment in patients with CAF. We posed the same questions to patients before and four weeks after treatment to explore the efficacy of AVC in the treatment of CAF. In all tests, a level of $p<0.05$ was considered significant.

Results: Of the patients, 79.5% (66) were female and 20.5% (17) were male. The mean age was 32.6±9 years. The median, minimum and maximum number of positively changing parameters were 1, 4 and 4, respectively. Of the 83 patients, 81.9% (68) said that the treatment was successful and 18.1% (15) stated that it was not. In all four parameters, the changes were significant ($p<0.001$).

Conclusion: We recommend AVC as a complementary or alternative treatment for CAF.

Keywords: Anal fissure, symptomatic treatment, aloe vera cream, defecation pain, haemorrhage

ÖZ

Amaç: Kronik Anal fissür (CAF) toplumda yaygın olarak görülen bir hastalıktır. Tedavisi ile ilgili birçok alternatif mevcuttur. Bunlardan biri de son on yılda gittikçe artan oranda yayınlarla karşımıza çıkan aleo vera %2 krem (AVC) ile topikal tedavidir. CAF hastalarında AVC'nin semptomatik tedavideki etkinliğini araştırmak istedik.

Yöntem: Muayenede CAF tespit ettiğimiz hastalara tedavi ile ilgili genel bilgilendirme yapıldıktan sonra, AVC tedavisini ve çalışmaya katılmayı kabul eden 83 hasta çalışmaya dahil edildi. CAF hastalarında tedavi etkinliğini tespit etmek için ölçtüğümüz, her bir defekasyon için tuvalette kalma süresi, haftalık defekasyon sayısı, defekasyon esnasındaki kanama ve visuel analog skalaya göre defekasyon esnasındaki ağrı olmak üzere toplam dört parametreyi değerlendirdik. Hastalara tedavi öncesinde ve tedaviye başlandıktan dört hafta sonrasında aynı sorular sorularak CAF tedavisinde AVC'nin etkinliğini araştırdık. Tüm testlerde anlamlılık düzeyi $p<0,05$ olarak kabul edilmiştir.

Bulgular: Hastaların %79,5'i (66) kadın, %20,5'i (17) erkekti. Yaş ortalamaları 32,6±9 yıldı. Olumlu değişen parametre sayısı medyanı 1, minimum 0, maksimum 4 olarak gözlenmiştir. Çalışmaya katılan 83 hastanın %81,9'u (68) tedavinin faydalı olduğunu, %18,1'i (15) faydalı olmadığını ifade etmiştir. Ölçtüğümüz dört parametrenin tamamında izlenen değişimler anlamlıydı ($p<0,001$).

Sonuç: CAF tedavisinde ciddi semptomatik fayda sağlayan AVC tedavisini tamamlayıcı veya alternatif tedavi seçeneği olarak önermekteyiz.

Anahtar Kelimeler: Anal fissür, semptomatik tedavi, aleo vera krem, dışkılama ağrısı, kanama

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Introduction

Anal fissure (AF) is an ulcer in the anal canal extending from the dentate line to the anal verge, which is classified either as acute or chronic. A fissure that does not regress despite treatment within 8 weeks is called a chronic anal fissure (CAF). Of all AFs, 90% are located in the posterior midline, while the majority of the rest are in the anterior midline, and a small proportion occur in regions outside the midline.[1] It would be worthwhile to look at the causes such as Crohn's disease, ulcerative colitis, tuberculosis, syphilis, human immmunodeficiency virus, colon malignancy, etc. of fissures located outside the midline.[2] CAF leads to an increase in internal anal sphincter pressure and a decrease in the blood flow of the posterior AF line.[3] As a consequence of such an increase in anal sphincter pressure, defecating would take more time and be painful. A diet of fibrous foods and hot-water bathing in hip baths would be useful. Apart from surgical treatment methods, topical therapies, including lidocaine, steroids, nifedipine, glyceryl trinitrate, Aloe vera and local BOTOX applications are included in the treatment options.[4] There exist exceptional publications on the topical effects of 2% Aloe vera powder-containing cream on the treatment of CAF.[5] Aloe vera is a cactus-type plant of African origin belonging to the *Liliaceae* family and exists in 360 varieties. The stem of the plant's leaves contains a large amount of gelatinous and highly viscous liquid. It constitutes a powerful antioxidant rich in amino acids and vitamins. Owing to its content of strong antioxidant agents, it has antifungal, antibacterial and immunomodulatory effects on wound healing.[6] Aloe vera has been traditionally used for the treatment of haemorrhoids, anal fissures and burns for many years. Studies conducted on animals have proven that Aloe vera can help accelerate wound healing.[7] We undertook this study to explore the efficacy of Aloe vera 2% cream (AVC) in the symptomatic treatment of patients with CAF.

Material and Methods

This study was conducted in Ankara in 2019. Patients who applied to the general surgery outpatient clinic and were diagnosed with CAF after examination were included in the study. However, the study excluded those who had inflammatory bowel disease, concomitant perianal region disease, diabetes mellitus, atypical fissure, colon malignancy and immunosuppressive disease. After informing patients of the treatments for CAF, a study group was formed, which consisted of 83 patients with CAF who consented to receive AVC treatment and participate in the study. Apart from their demographic information, the patients were asked questions about defecation, and their responses were recorded. The questions posed to the patients before treatment (BT) and four weeks after treatment (AT) to evaluate the treatment results included the following:

1. How long do you stay in the toilet for each defecation?

- Up to five minutes
- 6 to 10 minutes
- 11 to 15 minutes
- More than 15 minutes

2. Does haemorrhage occur during each defecation?

- Yes, it occurs during each defecation
- It often occurs
- It rarely occurs
- No, it never occurs

3. The patients were asked to score their pain from 10 to 10, "0" being indicative of no pain during defecation and "10" being indicative of an unbearable pain, according to the visual analogue scale.

4. How many times a week do you defecate?

The efficacy of AVC topical treatment was evaluated by posing the same four questions to the patients with CAF in the periods BT and AT. The AT questions were answered on the basis of the last week of the 4-week treatment. The patients were prescribed AVC and were informed on its usage. Then, the patients were advised to apply AVC to the anal area three times a day and at a volume of one cm^3 during each application.

Statistical Analysis

We used median, minimum (min) and maximum (max) values to define the discrete numeric data, and performed a Wilcoxon paired-sample test in the comparison thereof. The categorical data were shown in numbers (percentage), and the marginal homogeneity test was used in the comparison. In all tests, a level of 0.05 was considered significant.

Results

The study included a total of 83 patients, of whom 66 (79.5%) were females and 17 (20.5%) were males. The median age was 32 (min. 18 - max. 56), and the mean age was 32.6±9 years.

The number of those who had no haemorrhage during defecation was 13 BT, which reached 21 AT. The number of patients with haemorrhage during each defecation decreased from nine BT to two AT (Table 1).

The number of patients who spent 10 minutes or less in the toilet for defecation was 11 BT and reached to 24 in the period AT. The number of patients who spent more than 15 minutes in the toilet for defecation decreased from 35 (BT) to 17 (AT) (Table 2).

Table 1. Bleeding during each defecation

		Bleeding in defecation after treatment				
	Bleeding	Yes	Often yes	Rarely yes	No	Total
Bleeding in pre-treatment defecation	Yes	2 (2.4)	4 (4.8)	3 (3.6)	0 (0)	9 (10.8)
	Often yes	0 (0)	17 (20.5)	12 (14.5)	0 (0)	29 (34.9)
	Rarely yes	0 (0)	0 (0)	24 (28.9)	8 (9.6)	32 (38.6)
	No	0 (0)	0 (0)	0 (0)	13 (15.7)	13 (15.7)
	Total	2 (2.4)	21 (25.3)	39 (47.0)	21 (25.3)	83 (100)

p<0.001

Table 2. Average duration of toilet time for each defecation

		Defecation time after treatment				
	Time	0-5 minutes	6-10 minutes	11-15 minutes	≥16 minutes	Total
Defecation time before treatment	0-5 minutes	2 (2.4)	0 (0)	0 (0)	0 (0)	2 (2.4)
	6-10 minutes	3 (3.6)	6 (7.2)	0 (0)	0 (0)	9 (10.8)
	11-15 minutes	1 (1.2)	8 (9.6)	28 (33,7)	0 (0)	37 (44.6)
	≥16 minutes	0 (0)	4 (4.8)	14 (16.9)	17 (20.5)	35 (44.2)
	Total	6 (7.2)	18 (21.7)	42 (50.6)	17 (20.5)	83 (100)

p<0.001

Table 3. Weekly defecation numbers

	Before treatment	After treatment	p
Number of weekly defecations (n=83)	3 (1-7)	4 (2-14)	<0.001
Average number of defecations per week (n=83)	3.43±1.54	4.33±2.10	<0.001

Also, the number of patients who defecated four or more times a week increased from 35 in the period BT to 50 in the period AT. The number of median defecations BT increased from 3 (1-7) to 4 (2-14) per week AT (p<0.001). The median pain score during defecation decreased from 5 (1-9) to 3 (0-6) AT (p<0.001) (Table 3).

Of the 83 patients, 19 (22.9%) stated that there had been no regression in pain during defecation, while 64 (77.1%) patients reported decreased pain in the post-treatment period. Although there were no patients who reported no pain during defecation BT, 9 patients reported no pain after defecation AT. While the number of patients who reported a pain score of 6 or more before treatment, this number fell to two AT (Tables 4 and 5).

The median number of positively changing parameters AT was 1 (0-4). Of all the patients, 15 (18.1%) reported no positive changes regarding the parameters in the four questions posed to patients AT, whereas 68 (81.9%) patients

Table 4. Pain rating between 0 and 10 after defecation according to the visual analogue scale

	Before treatment number of patients (n) and %	After treatment number of patients (n) and %
No pain	0 (0%)	9 (10.8%)
1 intensity pain	1 (1.2%)	6 (7.2%)
2 intensity pain	7 (8.4%)	19 (22.9%)
3 intensity pain	13 (15.7%)	18 (21.7%)
4 intensity pain	18 (21.7%)	16 (19.3%)
5 intensity pain	18 (21.7%)	13 (15.7%)
6 intensity pain	13 (15.7%)	2 (2.4%)
7 intensity pain	5 (6%)	0 (0%)
8 intensity pain	5 (6%)	0 (0%)
9 intensity pain	3 (3.6%)	0 (0%)
10 intensity pain (unbearable pain)	0 (0%)	0 (0%)
Total	83 (100%)	83 (100%)
Pain score during defecation (n = 83)	Before treatment 5 (1-9)	After treatment 3 (0-6)

p<0.001

Table 5. Therapeutic usefulness of parameters

How many parameters have improved	Number of patients (n)	Rate (%)
No improvement in parameters	15	18.1
Improvement in 1 parameter	29	34.9
Improvement in 2 parameter	14	16.9
Improvement in 3 parameter	10	12
Improvement in 4 parameter	15	18.1
Total	83	100

stated that they had benefited from the treatment in at least one parameter. Of the 68 patients who stated that they benefited from the treatment, an improvement was reported by 29 (34.9%) in at least one parameter, by 14 (16.9%) in at least 2 parameters, by 10 (12%) in at least 3 parameters and by 15 (18.1%) in all parameters (Table 5).

Discussion

We analysed the answers given by patients with CAF to the four questions posed to evaluate the BT and AT results of AVC treatment, including the severity of pain during defecation, the time spent in the toilet for defecation, whether haemorrhage occurred during defecation and the number of defecations per week. Of the 83 patients who received AVC treatment for CAF, 68 (81.9%) stated that the treatment was useful to a certain extent, and 15 (18.1%) reported that it did not work. While patients reported a significant decrease in pain scores AT as a result of the 4-week AVC treatment, no patients reported increased pain or side effects. In their study, Gaj et al.[8] report that they administered rectal cream containing Aloe vera to AF and grade 3-4 haemorrhoids, which helped to prevent infective complications and reduced anal area discomfort associated with burning and itching in 84% of their patients. They also noted that the cream containing Aloe vera which was used during the treatment neither showed irritant and allergic effects nor caused skin damage and pharmacological toxicity.[8]

Whereas there were no patients who reported no pain during defecation BT, 9 patients stated that the pain during defecation disappeared AT. Of the 83 patients, 64 (77.1%) reported that the pain during defecation regressed partially or disappeared completely. However, 18 patients reported no change in pain during defecation AT. Eshghi et al.[9] report that they used Aloe vera gel on the anal area for four weeks after haemorrhoidectomy, and as a result thereof, the treatment showed significant success in pain relief and wound healing after defecation compared with the control group. In another study, Rahmani et al.[5] reported statistically significant differences in pain relief, haemorrhage and wound healing after defecation in patients who received AVC treatment for CAF in a comparison of the treatment group with the control group.

With the use of AVC, the median number of defecations per week increased from 3 (1-7) to 4 (2-14) AT. The number of those whose stayed in the toilet for each defecation for 10 minutes or less was 11 BT, reaching 24 in the period AT. The duration of defecation and the number of defecations per week are correlated to bowel movements, whereas the healing of the wound in the anal area is associated with the reduction of pain during defecation. We consider the improvement achieved by AVC in those parameters AT as a secondary outcome of wound healing. In their experimental study performed on rats, Brandão et al.[10] pointed out that the histological analysis performed proved the efficacy of Aloe vera in wound healing. Yet, in another study aiming to analyse the efficacy of Aloe vera in wound healing and conducted on Wistar rats to explore *transforming growth factor* -β gene expression in the wound bed in wound healing using Aloe vera gel, Takzaree et al.[11] concluded that Aloe vera is effective in wound healing.

One of the important criteria proving wound healing is the presence or absence of haemorrhage during defecation. In our study, the number of those who had no haemorrhage during defecation was 13 BT, which reached 21 AT. In their study on rats, Davis et al.[12] created skin damage on rats and administered topical Aloe vera cream in one group and oral Aloe vera in the other. They reported that wound healing was significantly better in both groups as compared with the control group.[12] In their study on lymphocyte activation in wound healing, Prakoso et al.[13] pointed out that cream containing 1% and 2% Aloe vera had wound-healing potential owing to its ability to increase the proportion of CD4 +/CD8 + lymphocytes in the wound area in their animal experiment on topical application of aloe vera.

Besides our study, many others have demonstrated the effectiveness of topical application of Aloe vera in wound healing. However, Dat et al.[14] concluded that Aloe vera had no significant efficacy in chronic wound healing in their meta-analysis of 347 cases. They reported that no high-quality clinical trial evidence exists to support the use of Aloe vera topical agents for therapeutic purposes in acute and chronic wounds. With this study, we aspire to address some of these unanswered questions.

The scarcity in the number of published studies conducted on the same subject is a limitation of our research. However, the majority of studies in the literature did not clearly

indicate whether fissures were acute or chronic. In addition, the possible effects of such diseases as inflammatory bowel diseases, diabetes and cancer, which may affect wound healing, as well as additional perianal diseases, could not be ruled out. Our study achieved a more homogenous CAF group by excluding these factors. This may be considered as an advantage in favour of our study.

Conclusion

Given that AVC leads to significant regression in patients' symptoms, has a weak potential to cause side effects, provides ease of application and incurs low costs in the treatment of CAF, we consider the results obtained to be promising. We recommend AVC as a treatment supportive of or alternative to the existing treatment methods for CAF.

Ethics

Ethics Committee Approval: This work has been approved by the Institutional Review Board. In our study, "the Principles of the Declaration of Helsinki" were complied with.

Informed Consent: Informed written consent was obtained from patients.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: M.K., U.E., F.T., Concept: M.K., T.K., Design: M.K., U.E., F.T., T.K., Data Collection or Processing: M.K., U.E., F.T., T.K., Analysis or Interpretation: M.K., U.E., F.T., T.K., Literature Search: M.K., U.E., F.T., T.K., Writing: M.K.

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RESEARCH ARTICLE

An Old Method Turnbull Cutait; Using for Middle and Distal Rectal Cancer Surgery without Ileostomy. Oncological and Fuctional Late Outcomes

Eski Bir Yöntem Turnbull Cutait; İleostomi Olmadan Orta ve Distal Rektal Kanser Cerrahisinde Kullanılması. Onkolojik ve Fonksiyonel Geç Sonuçlar

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ABSTRACT

Aim: Anastomotic leak after sphincter-preserving surgery for rectal cancer may be a disaster scenario. To reduce the severity of anastomotic leakage a prophylactic diverting ileostomy is usually used for mid or distal rectal cancer patients. However, Turnbull Cutait Abdominoperineal Pull-Through Procedure (T-C) with low anastomotic leakage rates is an old method that is applied without diverting ileostomy. We aimed to evaluate the long-term functional and oncological results of the T-C procedure performed in patients with rectum cancer refusing diverting ileostomy.

Method: Patients with middle or low rectal cancer who underwent T-C from March 2006 to December 2012 retrospectively reviewed for late results. Demographics, oncologic characteristics, postoperative complications, fuctional outcomes and overall survival (OS) time were evaluated. For functional results, Wexner Continence Grading scale scores, bladder functions, sexual functions, and SF-12 questionnaires were performed in all patients. In addition, anal manometry and defecography were performed in 7 patients.

Results: Thirteen patients (6 men) median age 55 (range 44-82) years with rectal tumors at a median distance of 4 cm (range 1.5-7) from the anal verge underwent T-C. Mean follow-up was 101.2 (standard deviation 42.7) mounts. The 5-year OS rates was 85% . Postoperative morbidity rate is 23% (3 patients) . However, pelvic sepsis, anastomotic leak and perianal fistula were not seen. Functional results were good in 90% of patients at the end of the second year. Due to ongoing fragmentation and evacuation problems, 2 patients underwent permanent stoma.

Conclusion: T-C with reasonable oncologic and functional results can be safely used sphincter-preserving procedure to treat patients with middle and distal rectal cancer without creation of diverting ileostomy.

Keywords: Late results, turnbull-cutait , abdominoperineal pull-through procedure, without diverting ileostomy

ÖZ

Amaç: Rektum kanserinde sfinkter koruyucu cerrahi sonrası anastomoz kaçağı gelişmesi felaket senaryosuna neden olabilir. Bu komplikasyonun şiddetini azaltmak için orta ve distal yerleşimli rektum tümörü olgularında genellikle koruyucu ileostomi açılmaktadır. Turnbull-Cutait abdominoperineal pull-through prosedürü (T-C) ileostomi açılmadan uygulanabilen düşük anastomoz kaçak oranlarına sahip eski bir yöntemdir. İleostomi açılmasını kabul etmeyen rektum kanseri olgularında uyguladığımız T-C prosedürünün uzun dönem onkolojik ve fonksiyonel sonuçlarını incelemeyi amaçladık.

Yöntem: Kliniğimizde Mart 2006-Aralık 2012 tarihleri arasında orta veya distal yerleşimli rektum kanseri nedeni ile T-C prosedürü uygulanan olgular geriye dönük olarak incelendi. Demografik ve onkolojik özellikler, postoperatif komplikasyonlar, fonksiyonel sonuçlar ve genel sağkalım süreleri değerlendirildi. Fonksiyonel sonuçlar; Wexner Continence Grading skala skoru, mesane, cinsel fonksiyonlar ve hayat kalitesi (SF-12) anketleri ile değerlendirildi. Ayrıca 7 hastaya anal manometri ve defakografi uygulandı.

Bulgular: Toplam on üç hastaya (6 erkek) T-C uygulandı. Olguların ortalama yaşı median 55 (44-82) yıl, tümörün anal vergeden uzaklığı ortalama 4 (1,5-7) cm idi. Olgular ortalama 101,2±42,7 ay takip edildi. Beş yıllık genel sağkalım oranı %85 olarak saptandı. Postoperatif morbidite oranı

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%23'tür (3 hasta). Pelvik sepsis, anastomoz kaçağı ve perianal fistül görülmedi. Postoperatif iki yıl sonunda hastaların %90'ında fonksiyonel sonuçların iyi olduğu saptandı. Devam eden fragmantasyon ve boşaltım problemleri nedeniyle 2 hastaya kalıcı stoma uygulandı.

Sonuç: T-C prosedürü, orta ve distal yerleşimli rektum tümörlerinin sfinkter koruyucu cerrahi tedavisinde koruyucu ileostomi açılmadan uygulanabilen, kabul edilebilir onkolojik ve fonksiyonel sonuçları ile güvenle kullanılabilen bir tekniktir.

Anahtar Kelimeler: Geç sonuçlar, turnbull-cutait, abdominoperineal pull-through, koruyucu ileostomisiz

Introduction

Anastomotic leak can be a catastrophic complication following sphincter sparing surgery for rectal cancer especially if very low anterior resection and colo-anal anastomosis is performed. A prophylactic diverting ileostomy is used up to 100% in middle and distal rectal cancer patients receiving neoadjuvant chemo radiotherapy (CRT) in order to prevent or reduce the severity of anastomotic leakage, especially when sphincter-preserving surgery is performed.

In early 1950's Turnbull in Cleveland Clinic and Cutait in Brazil introduced two staged transanal anastomosis technique simultaneously. Their indications included midrectal cancer, and children with Hirsprung's disease. They both described the operative technique as a two stage pull through procedure. First stage includes resection of the affected segment and pull through of the remaining distal colon through anus. On second stage after several days under the protection of adherencies and scar tissue colo-anal anastomosis is performed avoiding stoma procedure.[1,2]

This procedure was largely abandoned due to the introduction of stapling anastomotic devices. Later after the introduction of neoadjuvant theraphies it was reintroduced by some surgeons. It is suggested that this operation can be used on patients who do not want permanent or temporary ileostomy. Potential candidates for Turnbull-Cutait (T-C) procedure; are reoperated, who have irradiated pelvis with chronic inflammation or infection due to persistant sepsis and as a salvage procedure for complex anorectal conditions as an alternative to permanent stoma creation.[3,4,5]

In this study we evaluated the long term outcomes of patients who had T-C procedure due to mid or distal rectal cancer without diverting ileostomy.

Materials and Methods

Thirteen patients who underwent T-C after total mesorectal excision (TME) for middle and low rectal cancer between March 2006 and December 2012 were retrospectively analyzed using the patient database and most recent survival status was further confirmed by phone contact with patients or relatives.

Patients with histopathologic adenocarcinoma who had rectal carcinoma of the middle and distal location, who did not accept permanent stoma opening when not necessary, were included in the study. Patients with histopathology other than adenocarcinoma, patients with distant metastasis at admission and patients with low anal sphincter tone on digital examination and who identified incontinence at admission were excluded from the study.

The following variables were evaluated in the study: patient demographics and characteristics, oncological characteristics, early and late postoperative complications, follow-up results, and overall survival (OS) time. Early postoperative complication was defined as the occurrence of complications within 30 days after surgery. Late complication was defined as complications that developed after the first postoperative month. OS was defined as the time period between surgery and death.

Neoadjuvant therapy was recommended to clinical T3-T4 and/or N (+) patients. Two patients received preoperative radiotherapy (mean: 45Gy), eight patients received preoperative CRT (mean 45 Gy, 5-fluorouracil). Three patients did not receive neoadjuvant treatment. Neoadjuvan theraphy was not recommended in two patients with clinical T1-T2, and one of the T3 patients did not accept neoadjuvan theraphy. The mean time from radiotherapy to surgery was eight weeks (range: 6 to 10 weeks).

The study protocol was approved by the local ethics committee of our institution (date, November 21, 2019; no. ATADEK-2019-18/16). The study was conducted in accordance with the principles of the Declaration of Helsinki.

A written informed consent concerning the surgical risks was obtained from all patients. The preoperative assessment included a digital rectal examination, a colonoscopy with biopsy, a thoracic, abdominal, and pelvic computed tomography scan, and pelvic magnetic resonance imaging. The patients were classified according to the 7th edition American Joint Committee on Cancer classification system. A standardized follow-up was completed at one month after surgery, then every three months during the first two years, and every six months in the third through the fifth year.

The quality of life was evaluated using the Short-Form 12 Health Survey (Ware, Kosinski, & Keller, 1996) Questionnaire[6] (Figure 1). Faecal continence was evaluated using the Wexner continence score[7], which ranges from 0 (normal continence) to 20 (maximum incontinence) (Figure 2) Wexner scores were considered to be very good

SF-12 Health Survey

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. **Answer each question by choosing just one answer.** If you are unsure how to answer a question, please give the best answer you can.

1. **In general, would you say your health is:**

☐₁ Excellent ☐₂ Very good ☐₃ Good ☐₄ Fair ☐₅ Poor

The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

	YES, limited a lot	YES, limited a little	NO, not limited at all
2. **Moderate activities** such as moving a table, pushing a vacuum cleaner, bowling, or playing golf.	☐₁	☐₂	☐₃
3. Climbing **several** flights of stairs.	☐₁	☐₂	☐₃

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	YES	NO
4. **Accomplished less** than you would like.	☐₁	☐₂
5. Were limited in the **kind** of work or other activities.	☐₁	☐₂

During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	YES	NO
6. **Accomplished less** than you would like.	☐₁	☐₂
7. Did work or activities **less carefully than usual.**	☐₁	☐₂

8. **During the past 4 weeks, how much did pain interfere with your normal work (including work outside the home and housework)?**

☐₁ Not at all ☐₂ A little bit ☐₃ Moderately ☐₄ Quite a bit ☐₅ Extremely

These questions are about how you have been feeling during the past 4 weeks.
For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the past 4 weeks...

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
9. Have you felt calm & peaceful?	☐₁	☐₂	☐₃	☐₄	☐₅	☐₆
10. Did you have a lot of energy?	☐₁	☐₂	☐₃	☐₄	☐₅	☐₆
11. Have you felt down-hearted and blue?	☐₁	☐₂	☐₃	☐₄	☐₅	☐₆

12. **During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?**

☐₁ All of the time ☐₂ Most of the time ☐₃ Some of the time ☐₄ A little of the time ☐₅ None of the time

Figure 1. Ware J Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: construction of scales and preliminary tests of reliability and validity. Med Care 1996 Mar;34:220-233.

Type of Incontinence	Frequency				
	Never	Rarely	Some-times	Usually	Always
Solid	0	1	2	3	4
Liquid	0	1	2	3	4
Gas	0	1	2	3	4
Wears pad	0	1	2	3	4
Lifestyle alteration	0	1	2	3	4

0 = perfect.
20 = complete incontinence.
Never = 0 (never).
Rarely = <1/month.
Sometimes = <1/week, ≥1/month.
Usually = <1/day, ≥1/week.
Always = ≥1/day.

Figure 2. Jorge JM, Wexner SD. Etiology and management of fecal incontinence. Dis Colon Rectum 1993;36:77-97.

between 0-5, good between 5-10 and bad over 10. A bladder questionnaire and a sexual function questionnaire specifc to each sex. Wexner score, SF-12, bladder and sexual function questions were repeated at 6 months, 1 and 2 years. Anal manometry and defecography were performed in 7 patients in the 6th postoperative month.

Surgical Technique

The surgical procedure of TME followed by T-C involved two stages.

First Stage

The patients were placed in the Lloyd-Davis position, and an abdominoperineal approach was used. Following an abdominal incision, conventional very low anterior resection with TME was carried out in accordance with the oncological principles of no-touch technique, high vascular ligation, and nerve sparing. After complete splenic flexure mobilization, the inferior mesenteric vein was sectioned close to the ligament of Treitz. The inferior mesenteric artery was isolated, ligated, and divided 1-cm to the aorta, and dissection of the colon and sigmoid colon was finally performed along the holy plane, until the pelvic floor was reached and isolation of the distal rectal resection line (tumor free zone) was obtained. Pelvic dissection was performed down to the level of the levator ani musculature. In the perineal phase, a LoneStar retractor (Lone Star Medical Products, Stafford, TX, USA) was inserted to the anus and the internal muscle (circular and longitudinal) was cut through the dentate line and 1 cm above using the monopolar cautery and the intersphincteric plane was reached. The cranial lumen was closed through the purse string sutures and dissection was continued posteriorly. Then, the pelvic dissection plane was reached through abdomen. Before pulling the colon through the anal canal, four 3/0 polyglactic acid sutures were placed at the cardinal points of the anal canal, as high as possible, by pinching the upper edge of internal sphincter, thereby, avoiding full-thickness damage to the muscle. The rectum and sigmoid colon were, then, pulled through the anal canal and cut at the level of the ligation of the left colic artery. A colonic segment of about 10 cm was left outside. Finally, the colonic exteriorized segment was fixed to the perianal skin with 4-6 sutures and was wrapped in wet gauze. The colonic stump viability was checked once daily (Figure 3).

Second Stage

The second surgical stage was performed between postoperative days 5 and 7. During the waiting period, the patients were fasted and total parenteral nutrition was given 2000 kcal/day. During this period, movements that caused pressure in the colonic exteroised segment were restricted (they were ordered to sleep in lateral decubitus position and while lying supine both legs in abduction, without

mobilization restriction). The colonic stump viability was checked once a daily. The second procedure was performed under sedation and epidural anesthesia.

Patients were placed in the lithotomy position. No retractors were needed, and the adhesions between the anal canal and colon were preserved. After tying off the mesocolon at the level of the anal verge, the exteriorized segment was cut with cautery; a hand-sewn, colo-anal anastomosis was performed using 8-12 interrupted sutures at the dentate line level. The lumen was, then, checked with anoscopy (Figure 4).

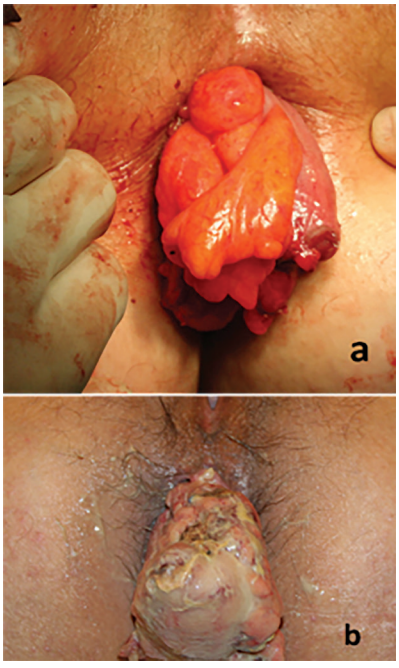

Figure 3. View of the exteriorized colon segment. **a)** intraoperative view of the colonic stump at the end of the first stage, **b)** post-operative 6th day view of the colonic stump

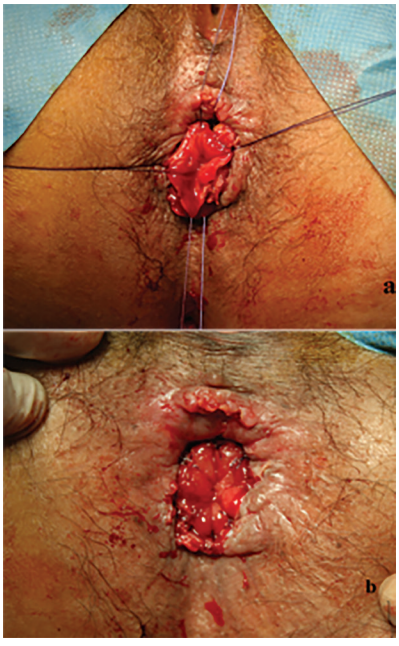

Figure 4. View of delayed coloanal anastomosis (CAA). a) During CAA, b) After the completion of CAA

CAA: Coloanal anastomosis

Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) for Windows version 21.0 (IBM Corp., Armonk, NY, USA). The data were presented in mean ± standard deviation (SD) or median (minimum-maximum) values. Qualitative variables were expressed in number and percentage. Mean OS was calculated using Kaplan-Meier test.

Results

A total of 13 patients, six were males with a median age of 55 years (range: 44 to 82 years) and mean body mass index (BMI) of 29.19±6.3 kg/m^2. All patients underwent T-C. The median distance between the inferior margin of the tumor and the anal verge was 4 cm (range: 1.5-7 cm). Histopathological findings are shown in Table 1. Using the AJCC staging, two patients were classified as Stage I, four as Stage IIA, four as Stage IIIB, and three as Stage IIIC. The median interval between first and second surgical procedure was 8 days (range 6-10) and the median length of hospital stay was nine days (range: 7 to 13 days).

The rate of postoperative morbidity was 23% (n=3). Among the early surgical morbidities, one patient was diagnosed with pelvic abscess, one with hemorrhage, and one with necrosis about 20% of the exteriorized colonic segment after the first stage of the procedure. However, no pelvic sepsis, anastomotic leak, or perianal fistula were seen. Late morbidity was observed in three patients. Two patients (15.3%) had requiring permanent colostomy and one (7.7%) had anastomotic stricture requiring balloon dilatation.

Table 1. Histopathological findings

	n=13
Histopathological type Adenocarsinom	13 (100%)
Surgical marjin Negative	13 (100%)
Differentiation	
Poor	1 (7.7%)
Moderate	8 (61.6%)
Well	4 (30.7%)
Perineural invasion	5 (38.4%)
Venous invasion	2 (15.4%)
Lymphatic invasion	1 (7.7%)
Extranodal involvement	4 (30.7%)

Oncological Outcomes

The mean follow-up was 101.2 [standard deviation (SD) 42.7] months. Three patients which was Stage III C, one patient which was Stage III B have died because of metastatic disease in follow up.

The OS was at one year 100% three years 85% and at five years 85% (Figure 5). No local recurrence was observed.

Functional Outcomes

Table 2 shows functional outcomes. The results of anal manometry (Table 3) and defecography (Table 4) are as in the tables. Two patients (15.3%) had severe rectal evacuation problem requiring permanent colostomy and one (7.7%) had anastomotic stricture requiring balloon dilatation. After 6 months 30% of the patients had frequent

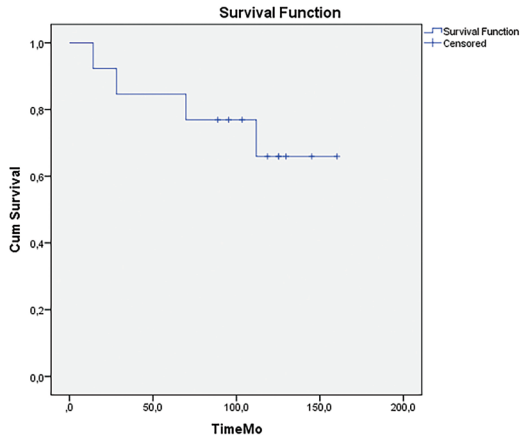

Figure 5. Kaplan-Meier survival analysis

Table 2. Functional outcomes

Functions	T-C p.o 6th months (n=13)	T-C p.o 1st year (n=13)	T-C p.o 2nd year (n=13)
Bowel function Wexner continence score*	11.5 (2.70)	9.3 (2.52)	7.3 (2.32) (n=10)
Bladder function			
Urinary incontinence	0 (0%)	0(0%)	0 (0%)
Poor stream	2 (15.4%)	1 (7.7%)	1 (7.7%)
Nocturnal micturition	3 (23.1%)	2 (15.4%)	2 (15.4%)
Sexual function			
Sexually active	6 (46.1%)	7(53.8%)	9 (69.3%)
Erection	3 of 6 (50%)	4 of 6 (66.7%)	4 of 6 (66.7%)
SF-12 score*	31.4 (5.10)	27.3 (4.83)	22.9 (4.71)

*values are mean (SD), SD: Standard deviation

Table 3. Anal manometry results

Patient	Maximum resting pressure (mmHg)	Maximum squeeze pressure (mmHg)	First sensation (cc)	Desire to defecate (cc)	Maximal tolerable volume (cc)	Rectoanal inhibitor reflex (+/-)	Maximal squeeze time (sec)	Comment
1	55	83	55	55	55	(-)	>45	EAS dysfunction, sphincter damage
2	39	137	10	50	>150	(+)	>45	IAS dysfunction
3	33	111	20	100	>150	(+)	>45	IAS dysfunction, sphincter damage
4	45	105	30	80	160	(-)	>45	Normal
5	50	110	20	60	>150	(+)	>45	Normal
6	60	120	30	90	>160	(+)	>45	Normal
7	65	140	15	75	>150	(+)	>45	Normal

EAS: External anal sphincter, IAS: Internal anal sphincter

Table 4. Defecography results

Patient	Filling Defect (+/-)	Sensation of fullness (+/-)	Resting coloanal angles	Flattening coloanal angle during strainingz (+/-)	Pelvic floor descent during straining (+/-)	Barium leak sign during straining (+/-)	Anorectal expulsion disorder (+/-)	Comment
1	(-)	(-)	Normal	(-)	(+)	(+)	(-)	Fecal incontinence
2	(-)	(-)	Normal	(-)	(+)	(+)	(-)	Fecal incontinence
3	(-)	(-)	Normal	(-)	(+)	(+)	(-)	Fecal incontinence
4	(-)	(-)	Normal	(-)	(+)	(-)	(+)	Obstuctif defecation
5	(-)	(-)	Normal	(-)	(+)	(-)	(+)	Obstuctif defecation
6	(-)	(-)	Normal	(-)	(+)	(-)	(-)	Normal
7	(-)	(-)	Normal	(-)	(+)	(-)	(-)	Normal

fecal incontinence. After 1 year, 15% of the patients had frequent fecal incontinence, but after 2 years 90% had good gas and stool continence.

Discussion

In recent years, TME after neoadjuvant CRT has become the gold standard treatment for middle and lower rectal cancers. However, the major problem in colo-anal anastomosis is the risk of anastomotic leakage. T-C, which was first described by Turnbull and Cutait, attempts to reduce the morbidity associated with colorectal anastomosis.[1,2]

In T-C, there are differences in practice regarding whether the colonic stump tip is left open or closed, how long it should be waited between the stages and how the patient will be fed during this period.[5] In our series, to prevent contamination and the mucous discharge would make it difficult to maintain the colonic stump during the waiting period and the possibility of the colonic motility could negatively affect adhesion, we closed the exteriosed colon end with stapler. The average waiting time between stages was 6 days. During this period, the patients were not fed orally in order to prevent colonic gas formation and bowel movements and total parenteral nutrition was applied.

In a recent meta-analysis of 45 randomized-controlled trials and 53 prospective cohort studies of complications following rectal resection for cancer, it was reported that the rates of anastomotic leak and pelvic sepsis were 11% and 12%, respectively.[8] In a study by Eriksen et al.[9] of 1958 patients who underwent resection for rectal cancer: 11.6% of total anastomotic leakage was detected. There were signifcantly higher rates of leakage in low anastomoses: 15.6% in anastomoses 3 cm and below, 13.7% in 4-6 cm, 7.6% in 7-9 cm and 4.8% in 10 cm and higher (p<0.001). The presence of diverting ileostomy not only deteriorates the quality of life and poses difficulties in stoma care, but also its reversal requires another operation with 17% surgery-related morbidity and 0.4% mortality.[5,10] Despite diverting ileostomy, in the literatüre[8], the rate of anastomotic leakage was reported between 3 and 20% . Furthermore, not all temporary stomas were reversed, and 3 to 25% of these stomas became permanent.[11] In a systematic review by Hallet et al.[12], seven studies including 1,124 patients were evaluated and the T-C was associated with a low rate of anastomotic leakage, pelvic morbidity, and without using stoma which are among the main advantages of this technique. Anastomotic leakage increases local recurrence[4,12,13] and found to be an independent prognostic factor for local recurrence[14] therefore, decreasing anastomotic leak rates could even result in a positive effect on T-C. Anastomotic leakage and local recurrence were not observed in our study. Pelvic abscess developed in one patient on the 16th postoperative day, antibiotic treatment was sufficient and no additional intervention was required. Current studies[4,15] have reported 67.5% OS. In our series, 5-year OS 85% was found to be similar to the literature.

Some patients develop severe pelvic dysfunction following a sphincter-preserving resection of the rectum. Studies have shown that up to 25 to 50% of all patients experience major dysfunction on a daily basis with a significant impact on quality of life.[16,17] The number of studies on functional outcomes after T-C is limited in the literature. It has been

reported that the functional outcomes may have been worse after neoadjuvant radiotherapy.[16,18] In a 85 patient series of Sage et al.[19] whom underwent T-C consecutively 71% good and very good functional outcome (Wexner score between 0-10), 29% poor functional outcome was reported. In our series, the por results in early stages showed improvement in time. In postoperative follow up mean Wexner scores were 11,5 in 6 months (SD 2.7), 9.0 in 1 year (SD 2.12) and 7.2 in 2 years (SD 2.32). In the second year 90% patients are considered to have good functional outcome. In the postoperative 6th month, defecography and anal manometry were performed on 7 patients; Three patients showed signs of impaired continence. No patient required a colostomy for major incontinence.

Lange and Van der Velde [20] reported that postoperative incontinence after TME occurred due to intraoperative injuries to the innervation of the levator ani. Therefore, this functional result appears to be independent of reconstruction. Autonomic nerve-preservation is, therefore, essential for preserving the sexual and bladder function and this situation may not be related to the reconstruction technique, but related to the surgical technique. Our series sexual and bladder functions were found to be similar to the previous studies.[1,2,3]

In previous reports[4,5,21], permanent stoma was needed in 1 to 6% of patients following T-C, however, Remzi et al.[3] reported a rate of 25% in their study. In a series of 24 patients of Maggiorin[22], 2 patients (8%) required stoma due to poor functional outcome. In our series, a permanent stoma was opened in 2 male patients (15%) due to ongoing fragmentation and evacuation problem at the end of the first year, and balloon dilatation was required in one patient due to anastomosis stenosis. Permanent stoma was performed because of the overreaction of the patients to evacuation and fragmentation. Given that functional results gradually are improving if patients could tolerate, permanent stoma could be avoided. We think that functional results are worse in male patients with high BMI and narrow pelvis.

The use of T-C depends on the surgeon's preferences according to the conditions and operations. Remzi et al.[3] recommended T-C as the appropriate procedure to use before creating a permanent stoma. Jarry et al.[4] advocated its use as a routine procedure in middle and low rectal cancer.

Nonetheless, there are some limitations to this study. First, the number of sample size is small (n=13). Second, its retrospective design led us to interpret the results with caution. Another limitation is the lack of a comparison group. On the other hand, this study is among the limited reported studies evaluating the functional outcomes in long duraiton.

In the standard treatment of rectal cancer is TME after neoadjuvant CRT. Total neoadjuvant therapy and the subsequent wait and see approach, which has recently become increasingly popular in early stage rectal cancer, provides patients with a higher quality of life beyond dispute.[23] We think that it is necessary to personalize the treatment of rectal cancer by offering the most optimal treatment according to the expectations and wishes of the patient.

Conclusion

In conclusion, despite the absence of high-grade evidences and advent of stapling devices and increasing experience with pelvic surgery, T-C with reasonable oncological and functional results can be safely used as a sphincter-preserving procedure in the treatment of patients with middle and distal rectal cancer.

We would like to emphasize that surgeons who are interested in rectum surgery should keep this method in mind which gives the patient the option of surgery without performing a stoma and they should feel obliged to extend their knowledge about this technique.

Ethics

Ethics Committee Approval: The study protocol was approved by the local ethics committee of our institution (date, November 21, 2019; no. ATADEK-2019-18/16).

Informed Consent: A written informed consent concerning the surgical risks was obtained from all patients.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: O.S.G., L.V.T., A.Z., Concept: O.S.G., A.Z., Design: O.S.G., A.Z., Data Collection or Processing: L.V.T., Literature Search: L.V.T., B.G., Writing: O.S.G., A.Z.

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RESEARCH ARTICLE

In Patients with Recurrent Pilonidal Sinus, Should the First Approach be Crystallised Phenol or Limberg Flap?

Nüks Pilonidal Sinüs Hastalarında İlk Yaklaşım Kristalize Fenol mü, Limberg Flep mi Olmalı?

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ABSTRACT

Aim: In our study, we aimed to compare the efficacy of Limberg flap and crystallised phenol treatments applied to patients with recurrent pilonidal sinus.

Method: Patients with recurrent pilonidal sinus disease who were treated with the surgical excision Limberg flap technique and crystallised phenol method in our hospital General Surgery Clinic between 2017 and 2019 were evaluated retrospectively. The patients were assessed according to age, gender, hospital stay, smoking, infection, return-to-work period and recurrence rates.

Results: A total of 25 patients who underwent Limberg flap treatment due to recurrent disease and 32 patients who were treated with the phenol method were identified retrospectively. Patients with missing data were excluded, and 40 patients were included in the study. In all, 72.5% of the patients were male. The mean age of the Limberg group was 25.25±6.12, and that of the crystallised phenol group was 24.60±6.11. While the mean hospital stay was 2.05±0.75 days in the Limberg group, all patients were discharged on the same day in the crystallised phenol group ($p<0.001$). The return-to-work period in the Limberg group was significantly higher ($p<0.001$). The cosmetic appearance was significantly better in the crystallised phenol group ($p=0.02$).

Conclusion: The less invasive method of phenol treatment may be preferred as the first treatment method in recurrent patients since it is more advantageous than the post-excision flap procedures in terms of the length of hospital stay and cosmetics.

Keywords: Recurrent pilonidal sinus, crystallised phenol, Limberg flap

ÖZ

Amaç: Çalışmamızda nüks pilonidal sinüslü hastalara uygulanan Limberg flep ve kristalize fenol tedavilerinin etkinliğini karşılaştırmayı amaçladık.

Yöntem: Hastanemiz genel cerrahi kliniğinde, 2017-2019 tarihleri arasında cerrahi eksizyon Limberg flep tekniği ve kristalize fenol yöntemi ile tedavi edilen nüks pilonidal sinüs hastalığı tanısı alan hastalar retrospektif olarak değerlendirildi. Olgular yaş, cinsiyet, hastanede kalış süresi, sigara, enfeksiyon, işe dönüş süresi ve nüks oranlarına göre değerlendirildi.

Bulgular: Nüks hastalık nedeniyle işlem yapılan hasta dosyaları arasından Limberg flep uygulanan 25 hasta ve fenol uygulaması yapılan 32 hasta geriye dönük tespit edildi. Eksik verileri olan hastalar dışlandı ve 40 hasta çalışmaya dahil edildi. Hastaların %72,5'i erkekti. Limberg grubunun yaş ortalaması 25,25±6,12, kristalize fenol grubunun ise 24,60±6,11 idi. Limberg grubunda hastanede kalış süresi 2,05±0,75 gün iken, kristalize fenol grubunda tüm olgular aynı gün taburcu edildi ($p<0,001$). Kozmetik görünüm kristalize fenol grubunda anlamlı yüksekti ($p=0,02$).

Sonuç: Daha az invaziv yöntem olan fenol tedavisinin, eksizyon sonrası flep prosedürlerine göre hastanede yatış süresi ve kozmetik acısından daha avantajlı olması nüks hastalarda ilk tedavi yöntemi olarak tercih edilebilir.

Anahtar Kelimeler: Tekrarlayan pilonidal sinüs, kristalize fenol, Limberg flep

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Introduction

Pilonidal sinus is a common disease of the sacrococcygeal region that is usually seen among young men. The incidence is reported as 26 per 100,000 population.[1] Theories are presented to explain the aetiology, but the widely accepted opinion is that the disease is acquired.[2] There are many opinions in the literature on the treatment of pilonidal sinus disease. Treatment options range from minimally invasive surgical procedures to complex flap techniques. Although some studies report that flap techniques are associated with lower recurrence rates and higher patient satisfaction compared with other surgical procedures, there are several studies suggesting that flap techniques are over-surgery.[3] The ideal treatment of pilonidal sinus disease should include simple and easy-to-apply surgery, a low recurrence rate, a short duration of hospitalisation, a rapid return to daily activity and minimal scar tissue formation.[4,5]

Today, phenol treatment, which includes these properties, is defined as a conservative method and has emerged as the initial treatment in some clinics, is another treatment method. Phenol is a monosubstituted aromatic hydrocarbon with acidic properties. It has antiseptic, anaesthetic and potent sclerosing properties. While it is in a white, crystallised solid form at room temperature, it can take on the liquid form at higher temperatures.[4,6] Both the liquid and the crystallised forms are used in treatment. There is no consensus on the treatment of pilonidal sinus disease. In our study, we aimed to compare the results of patients treated with crystalline phenol and Limberg flap in patients with recurrent pilonidal sinus.

Materials and Methods

Patients diagnosed with recurrent pilonidal sinus disease who were treated with the surgical excision Limberg flap technique and crystallised phenol method in our hospital General Surgery Clinic between 2017 and 2019 were retrospectively evaluated. Patients signed an informed consent form for the surgical procedure and subsequent treatment, and the necessary permission was obtained to use their data in our analyses. Patients who previously had a history of operation due to pilonidal sinus and who developed a pilonidal sinus were included in the study. Two groups were formed. Twenty-five patients who underwent Limberg flap treatment due to the recurrent disease and 32 patients who were treated with the phenol method, were identified retrospectively. Among the files of patients who had been treated for pilonidal sinus, 40 patients were randomly selected from both groups and included in the study. The first group included 20 patients treated with the Limberg flap method, while the second group included 20 patients treated with crystallised phenol. Phenol treatment was applied three times at most. Those who did not respond to treatment after the third application were directed to surgery. The patients' age, gender, length of hospital stay, follow-up period, smoking, return-to-work period, infection and recurrence rates were evaluated. Evaluation of application complications, infection, recurrence and cosmetic appearance was recorded in the outpatient clinic follow-up. Healing was defined as the absence of any signs of infection at the wound site and epithelialisation of the skin. Patients who missed their follow-up appointment were called by phone and rescheduled.

Crystallised Phenol Method: Phenol was applied to all patients under local anaesthesia and in the outpatient clinic. The pit was expanded with the help of the clamp, and hair and debris were removed. The cyst epithelium was curetted. After the pit edge was protected with nitrofurazone pomade, the sinus was filled with crystallised phenol with the help of a clamp from the expanded part. The wound was dressed and the procedure terminated (Figure 1).

Limberg Flap Method: All patients underwent spinal anaesthesia. A rhomboid excision including post-sacral fascia was performed to excise all of the sinus tracts. A fasciocutaneous flap was prepared from the right or the left side of the gluteal region including gluteal fascia. The flap was sutured to presacral fascia and subcutaneous skin with 1/0 polyglactin sutures. The skin was closed in interrupted 3/0 monofilament polypropylene sutures. A hemovac drain was used in all patients (Figure 2).

Statistical Analysis

Statistical analysis was performed using the SPSS (10.0, SPSS Inc., Chicago, Illinois, USA, Statistical Package for Social Sciences) computer program. Continuous variables

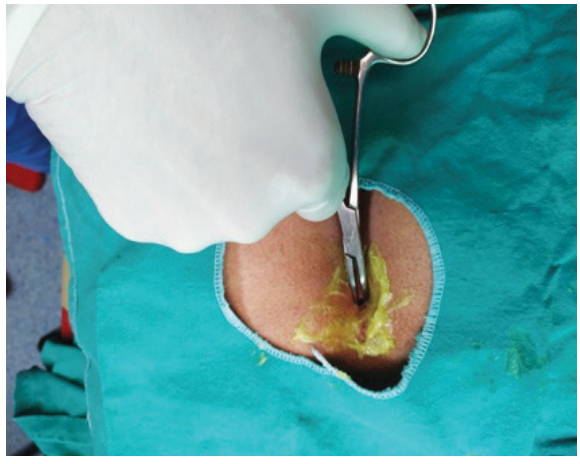

Figure 1. Phenol treatment after sinus curettage

were expressed as mean ± standard deviation. Categorical variables were expressed as percentage (%). The parametric variables that did not show a normal distribution between the groups were compared with the Mann-Whitney U test. Chi-square and Fisher's chi-square exact tests were used to compare categorical variables. P<0.05 was considered significant for all statistical analyses.

Results

In all, 72.5% of the patients were male (n=15 males in the Limberg group, n=14 males in the crystallised phenol group). The mean age of the Limberg group was 25.25±6.12 years, while the mean age of the crystallised phenol group was 24.60±6.11. There was no significant difference between the two groups in terms of age and gender. While the hospital stay was 2.05±0.75 days in the Limberg group, all patients were discharged on the same day in the crystallised phenol group (p<0.001). There was no significant difference between groups in terms of postoperative infection (p=0.69). Sixteen patients (40%) were smokers. No statistically significant difference was found between smoking and recurrence. The mean return-to-work period was 21.75±9.63 days in the first group and 2.35±0.74 days in the second group. The return-to-work period in the Limberg group was significantly higher (p<0.001). The follow-up period was 9.70±2.31 months in the Limberg group and 12.45±2.32 in the crystallised phenol group. During this follow-up period, there was one (5%) recurrence in the Limberg group and two (10%) recurrences in the crystallised phenol group. The groups did not show a statistically significant difference in terms of recurrence (p=0.50). The cosmetic appearance was significantly better in the crystallised phenol group (p=0.02) (Table 1). In their first surgery, eight patients underwent Limberg flap and 32 patients had primary repair.

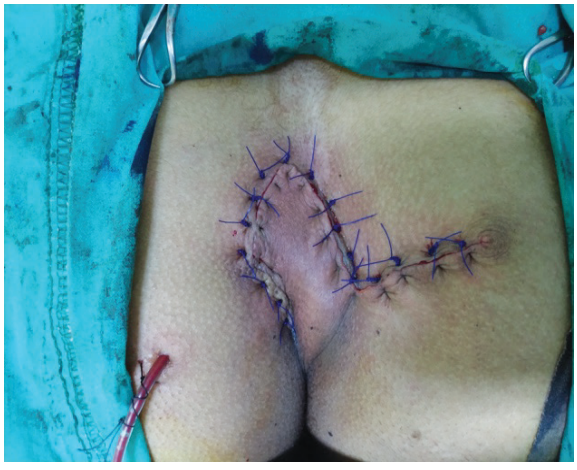

Figure 2. After modified Limberg flap reconstruction

Discussion

There are various surgical and conservative methods for the treatment of pilonidal sinus. The choice of a treatment is determined by the cost, type of anaesthesia, and return to daily life period.[7] The lay-open method was initially performed after excision. Subsequently, closure techniques were applied for reasons such as a long recovery time, post-excision defects and a long return-to-work period. Conservative methods, which have less tissue loss, reduce cosmetic problems and shorten the time to return to daily life[8], have been used in the recent times. Phenol treatment is one of them. Phenol therapy has several advantages. It is a minimally invasive and outpatient procedure, leaving minimal postoperative scarring and requiring no hospitalisation. Therefore, it has been suggested that phenol treatment improves patients' quality of life.[9] The only disadvantage is that it has higher recurrence rates than flap surgery. However, the data on phenol treatment were obtained from a single application. The success rate can be increased with subsequent phenol applications.[10] Kayaalp et al.[11] reported 70% success after a 14-month follow-up in a study that used liquid phenol as a single application. Dogru et al.[12] reported a 95.1% success rate in a series of 41 cases of crystallised phenol with recurrent cures. Aygen et al.[13] applied crystallised phenol to 36 patients with recurrent pilonidal sinus, who had previously undergone primary repair and flap procedures and reported a 91% success rate following a 54-month follow-up. In our study, following a follow-up period of approximately 11 months, our success rate was 95% in the Limberg-treated group and 90% in the crystallised phenol group, showing consistency with the literature.

Table 1. Clinical and demographic variables

	Limberg flep (Grup 1)	Crystallized phenol (Grup 2)	p value
Gender M/F	15-5 (%75 M)	14-6 (%70 M)	>0.05
Age (years)	25.25±6.12	24.60±6.11	>0.05
Cosmetic complaints	5 (%25)	0	0.24
Recurrence	2 (%10)	1 (%5)	0.50
İnfection	2 (%10)	2 (%10)	0.69
Time of commencement work	21.75±9.63	2.35±0.74	<0.001
Length of hospital stay (days)	2.05±0.75	0	<0.001
Follow - up time	9.70±2.31	12.45±2.32	-
Smoke	9 (%45)	7 (%35)	-

The treatment modality and follow-up period are two factors affecting the recurrence rate in pilonidal sinus disease. Surgical site infection and hematoma have been suggested to increase the recurrence rate in pilonidal sinus disease.[13,14] In our study, there was no statistically significant difference between recurrence and infection (p=0.27). The most common complications of phenol are pain, abscess, cellulite, and the formation of false canals caused by high pressure during treatment.[15] In the literature, there are publications stating that smoking increases the complication rate after pilonidal sinus treatment.[16] However, there was no statistically significant difference between smoking and infection in our study. Although the rate of infection was lower in patients treated with phenol, the difference between the groups was statistically insignificant.

In the group treated with phenol, there was a significant decrease in the length of hospital stay.[17] Our data support the findings previously reported in many studies. There are publications in the literature stating that the follow-up period after pilonidal sinus surgery should be 1 year or 3 years.[18] In our study, the mean follow-up period was 9.70±2.31 months in the Limberg group and 12.45±2.32 months in the crystallised phenol group. In their study that compared crystallised phenol and the Limberg flap technique, Akan et al.[19] reported an 8% recurrence rate for the flap group and 12% for the phenol group. The authors noted that the phenol group had a superior cosmetic appearance.[19] A large scar was observed after the Limberg flap was modified; the scar left after the reconstruction, phenol application, which caused a generally unpleasant aesthetic appearance, was almost unclear. In our study, five patients complained of a poor aesthetic appearance in the first group, while all patients were satisfied in the second group (p=0.02). Again, there was one (5%) recurrence in the Limberg group and two (10%) recurrences in the crystallised phenol group. Both cases share similarities with the literature. The return-to-work period was significantly higher in the phenol group (p<0.001).

The limitations of our study were its retrospective nature, relatively short follow-up period and the low number of cases. However, our results suggest that crystallised phenol may be superior to the Limberg flap. There is a need for more studies on this topic.

Compared to the Limberg flap technique, patients treated with crystallised phenol had fewer wound-healing complications, shorter hospitalisations, shorter return-to-work periods and faster wound healing. Albeit not statistically significant, the number of recurrences was low. An unpleasant scar was observed after the flap procedure, whereas after phenol administration, the scar was remarkable. Considering all these, crystallised phenol may be preferred as a first-line treatment option in patients who have been operated on as a first-line treatment and who have developed recurrence.

Ethics

Ethics Committee Approval: Obtaining the consent of an ethics committee was not necessary for this retrospective clinical study. However, consent was obtained from the hospital management for processing the data.

Informed Consent: Patients signed an informed consent form for the surgical procedure and subsequent treatment, and the necessary permission was obtained to use their data in our analyses.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: M.Ş., Y.Y., Concept: M.Ş., Design: M.Ş., Data Collection or Processing: M.Ş., Y.Y., Analysis or Interpretation: M.Ş., Y.Y., Literature Search: M.Ş., Writing: Y.Y.

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RESEARCH ARTICLE

Assessment of Monocyte/HDL Ratio in Patients with Acute Appendicitis

Akut Apandisitli Hastalarda Monosit/HDL Oranının Değerlendirilmesi

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ABSTRACT

Aim: In patients with acute appendicitis (AA), the number of monocytes increase and the level of high-density lipoprotein cholesterol (HDL-C) decrease. The monocyte/HDL-C ratio (MHR) has recently been used as a diagnostic and prognostic marker for acute inflammation. As far as we research in the literatures, there is no information about the use or alteration of MHR in patients with AA. The aim of this study was to investigate the MHR change in patients with AA and its utility for this disease.

Methods: This cross-sectional study includes 206 patients with AA and 57 healthy controls that are similar in age and sex. Serum lipid panel was measured in all patients in addition to routine history, physical examination and laboratory evaluations. Patients were divided into two groups with and without AA and all data were compared.

Results: MHR was significantly higher in patients with AA (17.5±9.9 vs 8.5±1.6 and p<0.001). Perforation was detected in 32 (15.5%) patients with AA. MHR was significantly higher in patients with perforation than non-perforated patients (16.1±8.46 vs 23.5±9.34 and p<0.001). Laboratory data showed that white blood cell count, monocyte, lymphocyte, neutrophil, triglyceride and neutrophil/lymphocyte ratio (NLR) levels were higher in patients with AA; serum HDL cholesterol levels were lower (p<0.05 for each-one). In logistic regression analysis, it was determined that MHR and NLR values independently determined AA patients. The area under the curve was most for MHR and the area under the curve was 0.865 and 0.780 for MHR and NLR, respectively. In this analysis, when the cut-off value for MHR was taken as 10, it was found that it detected the patients with AA with a sensitivity of 80.4% and a specificity of 81.8%.

Conclusion: In our study, it was found for the first time that MHR value was significantly increased in patients with AA. In addition to the classical diagnostic examinations in patients presenting to the emergency department with the diagnosis of AA; MHR can also be used in diagnostic approach as a simple, easily accessible, inexpensive and objective parameter.

Keywords: Acute appendicitis, monocyte/HDL ratio, emergency department

ÖZ

Amaç: Akut apandisit (AA) hastalarında monosit sayısı artar ve yüksek-dansiteli lipoproteyin kolesterol düzeyi (HDL) ise azalmaktadır. Monosit/HDL-C oranı (MHR) son günlerde akut inflamasyon durumda tanısal ve prognostik bir belirleyici olarak kullanılmaktadır. Literatürde araştırdığımız kadarı ile AA hastalarında MHR değişimi veya kullanımı ile ilgili bilgi yoktur. Bu çalışmada AA hastalarında MHR değişimini ve bunun bu hastalık için kullanılabilirliğinin araştırılması amaçlandı.

Yöntem: Bu cross-sectional çalışmaya AA olan 206 hasta ve yaş ile cinsiyet olarak benzer AA olmayan 57 kontrol alındı. Tüm hastalara rutin anamnez, fizik muayene ve laboratuvar değerlendirmelerine ek olarak serum lipid paneli ölçüldü. Hastalar AA olan ve olmayan olarak 2 gruba ayrılarak tüm veriler karşılaştırıldı.

Bulgular: AA olan hastalarda MHR anlamlı olarak yüksekti (17,5±9,9 ve 8,53±1,56 ve p<0,001). Otuz iki (%15,5) AA hastasında perforasyon saptandı. Perforasyon olan hastalarda perfore olmayanlara göre de MHR anlamlı olarak yüksekti (16,1±8,46 ve 23,5±9,34 and p<0,001). Laboratuvar verilerinden WBC sayısı, monosit, lenfosit ve nötrofil, trigliseride ve nötrofil/lenfosit ratio (NLR) düzeylerinin AA olan hastalarda yüksek; serum HDL kolesterol düzeyi ise düşüktü (p<0,05 her biri için). Lojistik regresyon analizinde, MHR ve NLR değerlerinin AA olan hastaları bağımsız olarak belirlediği saptandı. Buna analize göre MHR ve NLR değerlerindeki her 0,2 mm artışın AA olma riskini sırası ile 3.8 ve 1.4 kat artırdığı saptandı. Ayrıca

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AA olan hastaları belirlenmesi için ROC eğri analizi yapıldı; eğri altında kalan alan en fazla MHR olduğu ve eğri altında kalan alanın MHR ve NLR için sırası ile 0,865 ve 0,780 olduğu bulundu. Bu analizde MHR için sınır değeri 10 olarak alındığında, AA olan hastaları %80,4 duyarlılık ve %81,8 özgüllük ile belirlediği tespit edildi.

Sonuç: Çalışmamızda ilk kez AA hastalarında MHR değerinin anlamlı olarak arttığı bulundu. Acil servise AA ön tanısı ile gelen hastalarda klasik tanısal incelemelere ek olarak; basit, kolay ulaşılabilen, ucuz ve objektif bir parametre olarak MHR da tanısal yaklaşımda kullanılabilir.

Anahtar Kelimeler: Akut apandisit, monosit/HDL oranı, acil servis

Introduction

Acute appendicitis (AA) is the most common cause of acute abdomen in all age groups who present to the emergency department. Acute inflammation increases with the disease in the course; oxidative stress, endothelial dysfunction, and increased local and systemic inflammatory biomarkers.[1,2] The number of monocytes from the white blood cell (WBC) and its subtypes is also increased.[2,3,4] AA is a disease that starts locally and increases systemically with inflammation. Patients with AA have an increase in WBC, lymphocyte, neutrophil and monocyte counts.[2,3,5] The increase of lymphocyte percent is higher than neutrophil increase and therefore studies have shown that neutrophil/lymphocyte ratio (NLR) is higher in patients with AA.[2,3,4,5,6,7,8,9] It has been reported that NLR can be used for diagnostic purposes in patients with AA.[6,7,8,9] High density lipoprotein (HDL) cholesterol has anti-inflammatory and anti-oxidant effects, and serum HDL cholesterol decreases in many systemic inflammations including myocardial infarction.[5,10]

Systemic inflammation in AA leads to an increase in inflammation and a decrease in HDL cholesterol levels and activity.[11,12] Increased monocyte and decreased HDL cholesterol levels and the ratio of these two parameters to monocyte/HDL ratio (MHR) have been shown in the literature in many inflammatory diseases.[10,13,14,15,16,17,18,19,20,21] It has also been found that this parameter, such as NLR, is a diagnostic approach to many inflammatory diseases, as well as the severity of inflammation and a prognostic marker.[10,13,14,15,16,17,18,19,20,21,22,23] In patients with AA, the number of monocytes increases and the level of high-density lipoprotein cholesterol (HDL-C) decrease. The monocyte/HDL-C ratio (MHR) has recently been used as a diagnostic and prognostic marker for acute inflammation. To the best of our knowledge, there is no information about the MHR change or diagnostic use in AA patients and whether it is a prognostic marker. We have hypothesized that MHR will increase with increasing monocyte and decreasing HDL cholesterol levels in AA patients.

Therefore, the aim of this study was to investigate the MHR change in AA patients and its use for this disease.

Materials and Methods

Study Populations

This cross-sectional study included 263 patients who presented to our emergency department with abdominal pain. A total of 206 patients (mean age: 35.2±13.5 years, male/female: 129/77) who were operated for AA and diagnosed as AA in the pathological diagnosis, and 57 controls who were discharged from the emergency department with similar abdominal pain in age and sex but not diagnosed with AA (mean age: 50.2±10.1 years, male/female: 31/26). The patients who were screened to the control group were excluded from the study if they did not apply to emergency or general surgery clinics with abdominal pain for at least 1 month after discharge from the emergency department. In patients with a pre-diagnosis of AA, 14 patients whose pathological diagnosis was not associated with AA were excluded from the study. Those with active infection, recent acute coronary syndrome, secondary or malignant hypertension, pulmonary HT, abdominal aneurysm and dissection, congestive heart failure, cerebrovascular disease, moderate-severe heart valve disease, inflammatory diseases, hematological diseases, cancer and thyroid dysfunction, Moderate-severe hepatic and renal failure was excluded from the study due to the fact that MHR could increase. In addition, patients <18 years of age, pregnancy or suspicion of pregnancy, <18 years of age and who did not accept the study were excluded from the study. The study was approved by the regional ethics committee, all patients included in the study were informed about the study and a revised consent form was obtained.

Firstly, a detailed history was taken and physical examinations of all patients were performed. Demographic characteristics and clinical parameters of the all patients were recorded. Height and weight were measured and body mass index was calculated. AA was initially diagnosed clinically. In addition, the ALVARADO and RIPASA scoring systems were used for all patients in the emergency department.[24,25] However, ultrasound (US) and computerized tomography (CT) support was also obtained from radiological evaluations in patients who could not be diagnosed clinically. However, these two examinations were not evaluated because they were not present in all cases.

Biochemical Measurements

Venous blood samples were obtained at polyclinic admission. Samples were taken from cubital vein into blood tubes. Blood counts were measured by a Sysmex K-1000 (Block Scientific, Bohemia, New York) auto analyzer within 5 min of sampling. Serum glucose, blood urea nitrogen, creatinine, total cholesterol, low-density lipoprotein cholesterol, high-density lipoprotein (HDL) cholesterol, triglyceride, hs-CRP and uric acid concentrations were measured with an automated chemistry analyzer (Abbott Aeroset, Minnesota, USA) using commercial kits (Abbott).

Statistical Analysis

All analyzes were performed using SPSS 22.0 (Chicago, IL, USA) statistical software package. Kolmogorov-Smirnov test was used to determine whether the distribution of continuous variables was normal. Continuous variables in the group data were expressed as mean ± standard deviation. Categorical variables were expressed as numbers and percentages. Student's t-test was used for the comparison of continuous variables between groups. However, Mann-Whitney U test was used for the evaluation of non-normal distribution parameters. Chi-square test was used to compare categorical variables. Logistic regression analysis was used to determine the parameters that independently identified patients with AA. In addition, ROC curve analysis was performed for MHR to identify patients with AA. Multivariate linear regression analysis was performed for the association of MHR with Alvarado and RIPASA. Statistical significance was accepted if $p<0.05$.

Results

Mean, median, minimum and maximum MHR values of all patients with AA were 17.5±9.9, 15.6, 4.61 and 47.5 respectively. The mean, median, minimum and maximum MHR values of the non-AA control group were 8.53±1.56, 8.78, 4.61 and 10.9 respectively. The study population was divided into two groups with and without AA and all parameters were compared. Thirty-two (15.5%) of the patients with AA included in the study had perforation. Demographic, clinical and laboratory findings of the study groups were compared. When the demographic and clinical data of both groups were examined, all demographic and clinical parameters were found to be similar between the two groups (Table 1). Laboratory data showed that WBC

Table 1. Demographic, clinic and laboratory findings in patients with acute appendicitis and controls

	Acute appendicitis n=206	Controls n=57	p
Age (year)	35.2±13.5	34.3±10.2	0.629
Gender (male)	129	31	0.202
Body mass index (kg/m^2)	25.1±2.8	25.0±3.1	0.987
Hospitalization day	3.27±1.81	-	-
ALVARADO	7.31±2.23	-	-
RIPASA	10.01±2.96	-	-
White blood cell count ()	13.5±6.5	8.04±1.45	<0.001
Red blood cell count	4.76±0.60	4.63±0.60	0.220
Hemoglobin	14.8±2.7	13.2±2.1	0.265
Platelet (×10^9/L)	252±81	247±99	0.820
Monocyte (×10^9/L)	661±228	402±72	0.001
Lymphocyte (10^3/µL)	1.74±0.98	2.11±0.62	0.465
Neutrophil (10^3/µL)	9.3±4.7	3.6±1.1	0.001
Mean platelet volume (fL)	9.21±1.38	8.42±0.97	0.413
Total Cholesterol (mg/dL)	203±41	198±44	0.392
LDL Cholesterol (mg/dL)	135±35	133±33	0.638
HDL Cholesterol (mg/dL)	41.4±6.23	48.3±1.68	<0.001
Trigliserid (mg/dL)	200±101	159±77	0.005
Neutrophil/ Lymphocyte ratio	9.1±9.1	1.8±0.67	<0.001
Monocyte/HDL ratio	17.5±9.9	8.53±1.56	<0.001

HDL: High density lipoprotein, LDL: Low density lipoprotein

counts, monocyte, lymphocyte and neutrophil, triglyceride, NLR and MHR levels were higher in patients with AA; serum HDL cholesterol level was low (Table 1). Other laboratory parameters were similar between the two groups (Table 1).

Logistic regression analysis was performed to determine the most effective parameters determining the presence of AA among the different parameters in AA and non-AA patient groups. Among these parameters, only MHR and NLR values independently determined patients with AA (Table 2). According to this analysis, each 0.2 mm increase in MHR and NLR values increased the risk of AA to 3.8 and 1.4 times, respectively (Table 2). Also in the linear regression analysis, only MHR was independently associated with the Alvarado and RIPASA scores of the diagnostic scores for AA ($p<0.001$ and $\beta=0.420$ and $p<0.001$ and $\beta=0.382$). In the same analysis, NLR and Alvarado and RIPASA scores were not independently related. MHR was significantly higher in patients with perforated AA than in non-perforated AA group (16.1±8.46 vs. 23.5±9.34 and $p<0.001$).

ROC curve analysis was also performed to identify patients with AA; the parameters under the curve >0.700 are shown in Table 3. The area under the ROC curve was found to be the most MHR and the area under the curve was 0.865 and 0.780 for MHR and NLR, respectively. In this analysis, when the cut-off value for MHR was taken as 10, it was found that it identified patients with AA with a sensitivity of 80.4% and a specificity of 81.8%. When the cut-off value for NLR was taken as 12.4, it was found that it determined the patients with AA with 71.2% sensitivity and 70.4% specificity.

Discussion

The most important finding of our study was that the MHR value in patients with AA was higher than in non-AA controls. According to our research, this is the first study to demonstrate increased MHR in patients with AA. Another important finding is that in patients with AA, MHR is more significantly associated with ALVARADO and RIPASA scores than AA. When the MHR cut-off value is taken as 10, it determined the patients with advanced AA with acceptable sensitivity and specificity. In addition, MHR was significantly higher in AA patients than in non-perforated patients.

In inflammatory diseases, elevated local and systemic inflammation biomarkers and their amount are used both in the diagnosis and prognosis of these diseases. WBC and its subtypes increase in diseases leading to acute local and systemic infection and inflammation. They cause an increase in the activation of inflammatory cells in these cells, and then increase the activity of each other through a vicious cycle. With the diagnosis and subsequent treatment, this inflammatory cell and its markers decrease and change in time depending on the course of the disease. Many recent studies have shown that NLR is increased in cardiovascular and systemic diseases such as atrial fibrillation, diabetes mellitus, atherosclerosis, and myocardial infarction.[26,27,28] A similar situation has been shown in several studies involving patients with AA.[6,7,8,9] In patients with AA, NLR is significantly more pronounced in this disease than lymphocyte count is higher than the neutrophil count, but both cell groups are significantly increased.[2,3,4] The results of NLR in patients with AA were supportive of previous studies in the literature. It was once again shown that NLR was significantly increased in patients with AA and that it could be used as an auxiliary laboratory parameter in the diagnosis of AA. However, diagnostic strength for AA was lower than MHR.

Another increasing blood cell in patients with AA was monocytes.[2,3,4] Monocytes are indicators of inflammatory reactions because monocytes are responsible for the secretion of proinflammatory and pro-oxidant cytokines.[2]

HDL cholesterol reduces the accumulation of macrophages by sweat interaction with monocytes, increases NO synthase from the endothelium, and inhibits monocyte transmission

Table 2. According to multivariate regression analysis, independent risk factors for occurrence of acute appendicitis

	Odds ratio	95% Confidence interval	p
Monocyte/HDL ratio (each 0.2)	3.802	1.468-9.844	0.006
Neutrophil/ Lymphocyte ratio (each 0.2)	1.408	1.072-1.849	0.014

HDL: High density lipoprotein

Table 3. ROC curve analysis of monocyte/HDL and neutrophil/lymphocyte ratios for acute appendicitis

Variable	Area under ROC curve	p	Cut-off value	Sensitivity	Specificity
Monocyte/HDL ratio	0.865 (0.823-0.907)	<0.001	10.0	80.4%	81.8%
Neutrophil/Lymphocyte ratio	0.780 (0.700-0.859)	<0.001	12.4	71.2%	70.4%

HDL: High density lipoprotein, ROC: Receiver operating characteristic

from the endothelium and has an anti-inflammatory and anti-oxidant effect.[5] Unfortunately, although the exact cause is unknown, HDL cholesterol levels and activity are reduced in inflammatory diseases.[5,10] This is the case in patients with AA and HDL cholesterol levels decrease.[11,12] In our study, HDL cholesterol decreased, while triglyceride level increased. Reduction of HDL cholesterol in inflammation as well as the reduction of both inflammation and cytokines synthesis from the liver, HDL can be used indirectly to suppress inflammation. MHR is a recently introduced parameter that can be measured simply by correlating inflammation and oxidative stress in the body.[10,13,14,15,16,17,18,19,20,21,29] It is also a prognostic parameter.[16,20,22,23] Because of this condition, a lot of studies have been made on MHR in acute coronary syndrome, stroke, hypertension, renal failure, heart failure, infective endocarditis, obstructive sleep apnea, atherosclerotic processes, coronary artery disease, myocardial infarction, cardiovascular prognosis, but MHR has not been studied in AA.[16]

However, AA also monocyte and HDL are inversely changing and it is evident that there may be an increase in MHR. For the first time in our study, MHR is more clearly diagnosed by MHR than both WBC and related blood cells and NLR. When the MHR is taken as a cut-off value of >10 for the diagnosis of AA, it makes the diagnosis of AA with acceptable sensitivity and specificity. In addition, every 0.2 unit increase in MHR increases the risk of AA being 3.8 times.

Traditionally, AA is diagnosed clinically. However, in many studies, some formulas have been developed for difficult cases and scenarios.[30] Some surgeons use scoring systems such as Alvarado and RIPASA.[24,25] In addition, US and CT support is also support is also obtained from routine radiological evaluations.[31] The fact that CT expose ionizing radiation and is expensive, and US is operator dependent, are the major disadvantage of radiological evaluations. Therefore, most surgeons are currently using anamnesis, physical examination, laboratory results and clinical scoring systems. According to the results of our study, WBC, NLR and MHR can be used in the emergency department in the diagnosis of AA.

In patients with AA, perforation is in the range of 18-34%.[32] Early diagnosis is important in this condition, which may cause mortality, especially in the elderly.[33] Both total WBC count and NLR have been significantly increased in patients with perforated AA compared to non-perforated patients.[3,34,35] Similarly, in our study, MHR was also increased in patients with perforated AA.

Study Limitations

In this study, MHR was studied cross-sectionally in patients with AA. We included a relatively small number of patients, but showed that MHR was significantly increased in patients with AA. The study could have been more meaningful if it was performed prospectively and with more patients. In our study, due to the first use of MHR, there were no limit values in previous studies. Therefore, it should be supported by more randomized, multicenter studies involving different patients. US and CT imaging methods are used in the diagnosis of AA.[8] However, we did not evaluate this technique and its results in our study due to the absence of these two examinations to all patients in our study. In addition, no correlation was found between CT and US findings and MHR.

Conclusion

As a result of our study, it was concluded that the ratio of HDL cholesterol levels, WBC parameters, HDL cholesterol levels are simple, inexpensive and objective MHR values in patients diagnosed with AA in Emergency department as an adjunct to other diagnostic methods in the diagnosis of AA and the severity of the disease. However, our study was the first to evaluate MHR in patients with AA. Therefore, the data in our study should be supported by new and more multicenter studies.

Ethics

Ethics Committee Approval: Adana City Training and Research Hospital, Clinical Research Ethics Committee (24.04.2019).

Informed Consent: All patients included in the study were informed about the study and a revised consent form was obtained.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: A.K., Concept: A.K., H.E.S., M.K., Design: A.K., H.E.S., M.K., Data Collection or Processing: A.K., H.E.S., M.K., Analysis or Interpretation: M.K., A.K., Literature Search: A.K., M.K., Writing: A.K.

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RESEARCH ARTICLE

Prospective Comparison of the Efficacy of Two Common Appendicitis Scoring Systems: Is Combination a Solution?

İki Apandisit Skorlama Sisteminin Etkinliğinin Prospektif Olarak Karşılaştırılması: Kombinasyon Bir Çözüm mü?

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ABSTRACT

Aim: The diagnosis of acute appendicitis mostly relies on history taking and physical examination findings supported by laboratory and imaging studies. A number of different diagnostic scoring systems have been developed to facilitate diagnosis, and their accuracies vary among patient populations. This prospective study aims to evaluate the accuracy of the two most frequently used scoring systems in the Turkish patient population and to analyse the possible diagnostic advantage of using these two systems in combination.

Method: Patients admitted to the emergency department of a tertiary healthcare centre with acute abdominal pain who eventually underwent appendectomy between July 2018 and January 2019 were enrolled in the study. Alvarado and Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) scores, as well as other laboratory parameters, were recorded for each patient. Using histopathologic examination as the gold standard, the sensitivity, specificity and positive and negative predictive values of each scoring system were calculated and combined using McNemar's x2 test.

Results: Data from a total of 203 patients were analysed. The sensitivity of the RIPASA system (95%) was far superior to that of the Alvarado system (35.6%). However, the Alvarado scoring system had much higher diagnostic specificity than the RIPASA system (80% vs 33.3%). The combined sensitivity and specificity of the tests rose to 88% and 62.5%, respectively.

Conclusion: The RIPASA system has high sensitivity; however, the Alvarado system has high specificity for the Turkish population. Both the Alvarado and RIPASA scoring systems are useful clinical tools with different strengths. Using these two systems in combination increases diagnostic power by combining the strongest aspects of both tests.

Keywords: Alvarado, RIPASA, appendicitis, diagnosis

ÖZ

Amaç: Akut apandisit tanısı çoğunlukla laboratuar ve görüntüleme çalışmalarıyla desteklenen anamnez ve fizik muayene bulgularına dayanır. Teşhisi kolaylaştırmak için bir dizi farklı teşhis skorlama sistemi geliştirilmiştir ve bunların doğrulukları hasta popülasyonları arasında değişmektedir. Bu prospektif çalışma, Türk hasta popülasyonunda en sık kullanılan iki skorlama sisteminin doğruluğunu değerlendirmeyi ve bu iki sistemi birlikte kullanmanın olası tanısal avantajını incelemeyi amaçlamaktadır.

Yöntem: Temmuz 2018 ile Ocak 2019 tarihleri arasında, 3. basamak sağlık hizmeti veren kuruluşun acil servisine akut karın ağrısı ile başvuran ve ardından apandisit ameliyatı geçiren hastalar çalışmaya alındı. Her hasta için Alvarado ve Raja Isteri Pengiran Anak Saleha Apandisit (RIPASA) skorları ve diğer laboratuar parametreleri kaydedildi. Histopatolojik inceleme altın standart tanı yöntemi olarak kullanılarak, her puanlama sisteminin duyarlılığı, özgüllüğü ve pozitif-negatif prediktif değerleri McNemar'ın x2 testi kullanılarak hesaplandı.

Bulgular: Toplam 203 hastanın verileri analiz edildi. RIPASA sisteminin duyarlılığı (%95) Alvarado sistemininkinden (%35,6) çok daha üstündü. Ancak Alvarado skorlama sistemi, RIPASA sisteminden çok daha yüksek tanısal özgüllüğe sahipti (%80'e karşı %33,3). Testlerin birleşik duyarlılığı ve özgüllüğü sırasıyla %88 ve %62,5'e yükseldi.

Sonuç: RIPASA sistemi yüksek hassasiyete sahiptir; ancak Alvarado sistemi Türk nüfusu için yüksek özgüllüğe sahiptir. Alvarado ve RIPASA skorlama sistemleri, farklı güçlü yönlere sahip faydalı klinik araçlardır. Bu iki sistemi birlikte kullanmak, her iki testin en güçlü yönlerini birleştirerek teşhis gücünü artıracaktır.

Anahtar Kelimeler: Alvarado, RIPASA, apandisit, teşhis

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Introduction

Acute appendicitis (AA) remains one of the most common cause of abdominal emergencies, with a lifetime risk of approximately 7%.[1] The diagnosis of AA mostly relies on history taking and physical examination findings supported by laboratory and imaging studies. Not surprisingly, a number of different scoring systems facilitating the diagnosis of AA are suggested in the literature. Among them, the scoring system created by Alvarado in 1986[2] and later modified is one of the most accepted and commonly used around the world. However, an article by Chong et al.[3] in 2010 emphasised the low sensitivity and specificity of the Alvarado scoring system in Asian and Middle Eastern populations and suggested a substitute. The Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) scoring system was then quickly adopted, and a number of validation studies, especially from Asia and the Middle East, followed its publication.[4] However, to the best of our knowledge, there are only three studies evaluating the efficacy of the RIPASA scoring system from Turkey, the largest covering 113 patients.[5,6,7]

With this prospective study, we aimed to compare the efficacy of these commonly used scoring systems on a larger patient population, widening the projection of validation, and to propose different applications of both scoring systems.

Materials and Methods

Patients admitted to the emergency department of a tertiary healthcare centre with acute abdominal pain who eventually underwent appendectomy between July 2018 and January 2019 were enrolled in the study. The exclusion criteria were pregnancy and refusal to consent. Regardless of the initial differential diagnosis, demographics, as well as Body Mass index (BMI), findings from physical examination and imaging studies and laboratory results were recorded, and Alvarado and RIPASA scores were calculated for each patient, using the scale charts given in Table 1.

Attending surgeons who carried out surgeries were blinded to the patients' scores; hence, all operation indications were established on the basis of findings of physical examinations and laboratory results. Data from patients with pathologies other than appendicitis on histopathologic examination were omitted. In concordance with the current literature, patients with Alvarado scores equal to and higher than 7 and RIPASA scores equal to or higher than 7.5 were classified as having "clinical appendicitis".

Table 1. Components and points used in the diagnostic scoring systems

Alvarado scoring system		**RIPASA scoring system**	
Component	**Points**	**Component**	**Points**
Migrating pain	1	Male sex	1
Anorexia	1	Female sex	0.5
Nausea or vomiting	1	Age <40 years	1
Tenderness in RLQ	2	Age >40 years	0.5
Rebound tenderness	1	Foreigner	1
Elevated body temperature (>38 °C)	1	Pain in RLQ	0.5
Leucocytosis (>10,000/mm^3)	2	Nausea or vomiting	1
Neutrophilia (>70%)	1	Migrating pain	0.5
		Anorexia	1
		Symptom duration <48 hours	1
		Symptom duration >48 hours	0.5
		Hypersensitivity in RLQ	1
		Guarding	2
		Rebound tenderness	1
		Positive Rovsing's sign	2
		Fever	1
		Leucocytosis	1
		Negative urine findings	1

RLQ: Right lower quadrant

Using these patients' histopathologic examination results as the gold standard, the sensitivity, specificity, positive and negative likelihood ratios and predictive values of each diagnostic test were calculated using McNemar's x^2 test. Confidence intervals for sensitivity and specificity were calculated as exact Clopper-Pearson confidence intervals. Confidence intervals for likelihood ratios were calculated using the "Log method", and predictive values were taken as the standard logit confidence intervals.[8,9] Approval from the institutional research ethics board was obtained (decision number 2018/8-1).

Results

A total of 203 patients were enrolled in the study. There were slightly more female patients (n=104) than male patients (n=99). The mean patient age was 36.4 (range: 18-78, standard deviation: 14.15). The calculated average score was 6.75 (range: 3-9) for the Alvarado and 9.84 (range: 5-16.5) for the RIPASA scale. The average BMI of the patient group was 26, ranging from 17.7 to 49.3. Open surgery was the procedure of choice, with 83.3% (n=169) of the patients undergoing laparotomy and 16.7% (n=34) undergoing laparoscopy. The negative appendectomy rate was 7.4% (n=15) of the 203 appendectomies performed. Computer tomography (CT) was utilised as a diagnostic test in the majority of patients (82.8% n=168), and imaging findings were coherent with AA in 154 (91%). Of these 168 CT studies, there were 10 false-positive and 10 false-negative evaluations, making the sensitivity of CT 93.5% and the specificity 28.5% in the diagnosis of appendicitis. The Alvarado score was 7 or higher in 34.5% (n=70) patients, suggesting a strong probability of appendicitis in these patients. There were three false-positive and 121 false-negative predictions of AA when 7 points was used as the cut-off value for the Alvarado scoring system. The sensitivity of the Alvarado scoring system was 35.6%, and the specificity was 80%. The positive and negative likelihood ratios were 1.78 and 0.80, respectively. Table 2 shows contingency tables and details of these values in terms of the 95% confidence interval (CI) for the Alvarado scoring system. Among the 203 analysed patients, there were 189 patients (93%) with RIPASA scores of 7.5 or higher. There were 10 false-positive and 9 false-negative predictions of AA when 7.5 points was used as a cut-off value for the RIPASA scoring system. The sensitivity of the RIPASA scoring system was 95.2%, and the specificity was 33.3%. The positive and negative likelihood ratios were 1.43 and 0.14, respectively. Table 3 shows contingency tables and details of these values in terms of the 95% CI for the RIPASA scoring system. The effect of BMI on the sensitivity and specificity of the diagnostic scoring systems was analysed. Patients were classified as either overweight (BMI ≥25) or normal weight. The sensitivity and specificity of the Alvarado scoring system was changed to 31.5% and 100%, respectively, in normal weight patients. These values were calculated as 37.8% and 62.5% in overweight individuals. Similarly, the sensitivity and specificity of the RIPASA scoring system was affected by BMI. These values were 98.6% and 57.1% in normal weight patients; however, they decreased to 94% and 12.5% in overweight individuals. The combined accuracy of the two tests was also investigated. A subgroup of 84 patients in whom the predictions of the two scoring systems coincided (both of the tests agreed on the prediction) was created from the patient population, and the accuracy for this subgroup was also analysed. The combined sensitivity and specificity of the tests were 88.1%

Table 2. Contingency table and details for the statistical accuracy of the Alvarado scoring system

	Pathologic examination		
Alvarado Score	**Not appendicitis**	**Appendicitis**	**Total**
<7	12	121	133
7	3	67	70
	Value	95% CI	
Sensitivity	35.64%	28.80%-42.93%	
Specificity	80.00 %	51.91%-95.67%	
Positive LR	1.78	0.64-4.99	
Negative LR	0.80	0.61-1.06	
Positive PV	95.71%	88.85%-98.43%	
Negative PV	9.02%	7.01%-11.54%	
Accuracy	38.92%	32.17%-45.99%	

LR: Like hood ratio, PV: Predictive value, CI: Confidence interval

and 62.5%, respectively. Details of this subgroup of patients are summarised in Table 4.

Discussion

As AA is a very common cause of abdominal emergencies, its diagnosis has been studied frequently, and the literature contains multiple validation and comparison studies of the two most commonly utilised diagnostic scoring systems: the Alvarado and the RIPASA systems. A recent meta-analysis on the subject clearly shows that, although it varies among studies, the sensitivity of the Alvarado scoring system is consistently lower than that of the RIPASA scoring system.[4] This phenomenon was also validated in the current study: the calculated sensitivity of the Alvarado scoring system was markedly lower (35.6%) than the 95% sensitivity rate of the RIPASA system. Similar sensitivity rates have also been reported from different Turkish patient populations.[5]

In contrast, when the specificities of the two tests were compared, the Alvarado scoring system seemed to be much more precise than the RIPASA system for diagnosing AA (80% vs 33.3% specificity). With a few exceptions, the literature is also in agreement on the lower specificity provided by the RIPASA system.[4]

CT imaging has been used frequently (82.8%) as a diagnostic tool in this patient population. A retrospective reanalysis of the data revealed that the majority of CT imaging studies had been ordered by the attending physician in the emergency department before the patient had been seen by a specialist. The frequent utilisation of CT imaging could also be attributed to the study design, since the patients were

Table 3. Contingency table and details for the statistical accuracy of the RIPASA scoring system

	Pathologic examination		
RIPASA score	**Not appendicitis**	**Appendicitis**	**Total**
<7.5	5	9	14
7.5	10	179	189
	Value	95% CI	
Sensitivity	95.21%	91.11%-97.79%	
Specificity	33.33%	11.82%-61.62%	
Positive LR	1.43	1.00-2.05	
Negative LR	0.14	0.06-0.37	
Positive PV	94.71%	92.59%-96.25%	
Negative PV	35.71%	17.56%-59.16%	
Accuracy	90.64%	85.77%-94.27%	

LR: Like hood ratio, PV: Predictive value, CI: Confidence interval

Table 4. Contingency table and details for the statistical accuracy of the scoring systems combined

	Pathologic examination		
Combined Prediction	**Not appendicitis**	**Appendicitis**	**Total**
Negative	5	9	14
Positive	3	67	70
	Value	95% CI	
Sensitivity	88.16%	78.71%-94.44%	
Specificity	62.50%	24.49%-91.48%	
Positive LR	2.35	0.96-5.77	
Negative LR	0.19	0.08-0.43	
Positive PV	95.71%	90.09%-98.21%	
Negative PV	35.71%	19.74%-55.66%	
Accuracy	85.71%	76.38%-92.39%	

LR: Like hood ratio, PV: Preddictive value, CI: Confidence interval

immediately included in the study as they were admitted to the emergency department with findings of acute abdominal pain before a diagnosis of AA had been established. Nonetheless, the 93.5% sensitivity of CT imaging clearly has no apparent diagnostic advantage over the 95% sensitivity provided by the RIPASA scoring system. This being said, the influence of BMI on the sensitivity of these diagnostic tests should always be kept in mind, and imaging studies are potentially helpful in those situations.

In addition, oversensitivity of a diagnostic tool is not always a desired outcome, since it can eventually lead to an increased number of unnecessary appendectomies. In fact, the literature advocates keeping negative appendectomy rates lower than 15% but simultaneously reducing the incidence of late diagnoses.[10] The RIPASA system has high sensitivity (95%); however, the Alvarado system has high specificity (80%). Therefore, using these two scoring systems in combination can pose an alternative solution by harnessing the synergistic diagnostic power of the successful aspects of both tests together. Indeed, when a subgroup of 84 patients with exact coinciding predictions on both tests was analysed, the combined sensitivity and specificity of the tests came to 88% and 62.5%, respectively. This rate of sensitivity covers the suggested limit rate of 15% negative appendectomies found in the literature.

Study Limitations

The limitation of this study is that it was performed in a single centre, and the number of patients was insufficient to reflect the characteristics of a society.

Conclusion

Both the Alvarado and RIPASA scoring systems are useful clinical tools with different strengths. Using these two systems in combination increases diagnostic power by combining strongest aspects of both tests.

Ethics

Ethics Committee Approval: Approval from the institutional research ethics board was obtained (decision number 2018/8-1).

Informed Consent: Written informed consent was obtained from each patient who participated in this study.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: M.Ü., A.C.K., S.D.A., G.A., C.K., Concept: M.Ü., A.C.K., Design: M.Ü., A.C.K., Data Collection or Processing: S.D.A., G.A., Analysis or Interpretation: M.Ü., A.C.K., C.K., Literature Search: M.Ü., A.C.K., G.A., C.K., Writing: M.Ü.

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RESEARCH ARTICLE

Determination of Nursing Practices Related to Drain Care

Dren Bakımına İlişkin Hemşirelik Uygulamalarının Belirlenmesi

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ABSTRACT

Aim: Drains are frequently used for both therapeutic and prophylactic purposes during surgical procedures. Nurses have important duties in the process from insertion to removal of drain. The aim of this study was to determine the nursing practices related to drain care and to determine the problems experienced by nurses related to drain care.

Method: The study was conducted as descriptive and cross-sectional. The sample of the study consisted of 120 nurses working in surgical clinics who accepted to participate in the study. The data collection form, which was created by the researchers by searching the literature, was used in the data collection. The purpose of the study was explained to the participants and their verbal and written informed consents were obtained. The nurses were asked to complete the data collection form by using face to face interview method. Statistical Package for Social Sciences version 21.0 for Windows was used in the analysis of the data collected within the scope of the study. Statistical data were expressed as mean ± standard deviation and percentage (%).

Results: Of the nurses participated in the study, 98.3% were woman. The mean age of nurses was 35.90±6.38, 65% of them were married, 71.7% were undergraduates, and 38.3% had worked for 11-20 years. All of the nurses stated that they performed active and passive drain monitoring. The nurses stated that they performed drain monitoring at a frequency ranging from 10 minutes to 24 hours. The most difficult situation for the nurses was that the patients and their relatives and other healthcare personnel emptied the drains without recording. The nurses stated that the most undesirable situation in drain care was the displacement of the drain. In order to ensure the safety of the drain, 41.6% (n=50) of the nurses gave education to the patients and 23.3% stated that they performed appropriate fixation applications. Nurses are actively involved in drain care and encounter many problems in performing their duties.

Conclusion: Finding solutions to problems will positively affect the quality of nursing care and patient outcomes.

Keywords: Drainage, nursing care, monitoring

ÖZ

Amaç: Drenler cerrahi işlemler sırasında sıklıkla hem tedavi edici hem de profilaktik amaçla kullanılmaktadır. Drenin takılmasından çıkarılmasına kadar geçen süreçte hemşirelere önemli görevler düşmektedir. Bu çalışmanın amacı; dren bakımına ilişkin yapılan hemşirelik uygulamalarının belirlenmesine ek olarak dren bakımı ile ilgili hemşirelerin yaşadıkları problemleri de belirlemektir.

Yöntem: Araştırma tanımlayıcı ve kesitsel olarak yürütülmüştür. Araştırmanın örneklemini cerrahi kliniklerde çalışan ve araştırmaya katılmayı kabul eden 120 hemşire oluşturmuştur. Verilerin toplanmasında araştırmacılar tarafından literatür taraması yapılarak oluşturulmuş veri toplama formu kullanılmıştır. Katılımcılara araştırmanın amacı açıklanmıştır ve katılımcıların sözlü ve yazılı onamları alınmıştır. Hemşirelerle yüz yüze görüşme yöntemi kullanılmıştır ve hemşirelerden veri toplama formunu doldurmaları istenmiştir. Çalışma kapsamında toplanılan verilerin analizinde, Statistical Package for Social Sciences, Windows için sürüm 21.0 bilgisayar paket programı kullanılmıştır. İstatistiksel veriler ortalama ± standart sapma ve yüzde (%) olarak ifade edilmiştir.

Bulgular: Araştırmaya katılan hemşirelerin %98,3'ü kadındır. Hemşirelerin yaş ortalaması 35,90±6,38 idi. Hemşirelerin %65'i evliydi, %71,7'si lisans mezunuydu ve %38,3'ü 11-20 yıl arası çalışma yılına sahipti. Hemşirelerin tamamı aktif ve pasif dren takibi yaptıklarını ifade etmişlerdir. Hemşireler 10 dakika ile 24 saat aralığında değişen sıklıkta dren takibi yaptıklarını ifade etmişlerdir. Hemşirelerin en fazla zorluk çektiği durum hasta ve yakınları

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ile diğer sağlık elemanlarının drenleri kayıtsız olarak boşaltmasıdır. Hemşireler dren bakımında en fazla gerçekleşen istenmeyen durumun drenin yerinden çıkması olduğunu belirtmişlerdir. Dren güvenliğini sağlamak için hemşirelerin %41,6'sı (n=50) hastalara eğitim verdiğini, %23,3'ü ise uygun sabitleme uygulamalarını yaptıklarını ifade etmişlerdir. Hemşireler dren bakımında aktif olarak görev almakta ve görevlerini yerine getirirken de birçok problemle karşılaşmaktadır.

Sonuç: Problemlere yönelik çözümlerin bulunması hemşirelik bakım kalitesini ve hasta çıktılarını olumlu etkileyecektir.

Anahtar Kelimeler: Drenaj, hemşirelik bakımı, takip

Introduction

Surgical wound drainage is an integral part of modern surgical practices used to evacuate air and fluid that are likely to collect in the wound bed in the postoperative period.[1] Surgical procedures create dead spaces in the areas where they are applied. The body tends to fill these spaces with air or fluid. The drains used for the discharge of air or fluid accumulating in these spaces can generally be grouped into two groups: Active drains use negative pressure to drain the collection that has accumulated in a wound site. Examples include hemovac drains and chest drainage tubes. Passive drains provided the movement of the liquid or air inside the wound from the high pressure area to the region where the pressure is lower, by making use of the pressure difference between the inside and outside of the wound. Penrose drains and nasogastric tubes are examples of these drains.[2,3] The purposes of use of drainage catheters are to decrease the infection rates by preventing accumulation of fluid or air, to prevent seroma accumulation in the surgical area, to identify and evaluate anastomosis leaks, and to provide abscess drainage that can also be performed percutaneously for therapeutic purposes. There are studies showing that the use of drains reduces the rate of infection.[4,8] In contrast, there are also studies that do not recommend the routine use of drainage catheters because they increase the risk of retrograde infection.[9,10] The generally accepted view when drain is used in patients undergoing surgery is carefully monitoring the amount of drainage to determine the most appropriate time for removing the drainage tubes.[1,11] This situation may affect the length of hospital stay, postoperative clinical status, health care cost and infection formation.[1]

A wide range of drainage systems are used in surgical clinics such as hemovac drain, chest drainage tube, nasogastric tube, penrose drain and lumbar drain. Drains used in this wide range can also have complications. These can be breaking, difficulty in removing, unwanted removal, infection, occlusion, pain, ugly scar and visceral perforation. Breaking is a rare complication that can develop due to the quality of the material used. Difficulty in removing is a complication that additional surgery may be required to remove the drain due to adhesion during the healing process of the tissue in the entrance area as a result of the long drain placed. Unwanted removal may be caused by the healthcare personnel by removing the wrong drain or by the patient or it can remove spontaneously.[12] Although one of the purposes of placing the drains is to prevent infection, retrograde infections may develop as the length of stay of the drain increases.[2] Drain tubes may become occluded due to tissue, blood clots, or mechanical compression. This can increase the risk of infection by preparing the ground for hematoma formation. Although pain varies depending on the location of the drain and the patient, it can reach levels that may affect patients at a serious level, from mild to inhibition of mobilization. Ugly scar is a cosmetically bad scar tissue formation, especially when the drain needs to stay for a long time. Drains placed for a long time can cause rupture of the internal organs and membranes (Visceral perforation). In light of all this information, it is seen that nurses working in surgical clinics have important duties in drain care. Careful follow-up of the drain in terms of color, odor and quantity, follow-up in terms of signs of infection, performing evidence-based practices to prevent infection, follow-up of the drain in terms of complications, taking measures to prevent unwanted events, training of patients and their relatives are among the duties of the nurse. Drain care constitutes a small but important part of the health care offered by surgical nurses.[13,14] In the literature, no study evaluating the practices of nurses on drain care has been found. Therefore, with this study, it is planned to discuss with the evidence based information about drain care and to determine the practices of nurses about drain care in the current system and the problems they experience while doing drain care and to guide nursing practices in drain care, which is an important part of nursing care.

Materials and Methods

The research was carried out descriptively and cross-sectionally in order to determine the practices and problems experienced by nurses about drain care. The research was conducted between 01-31 May 2019 with nurses who worked in the General Surgery, Cardiovascular Surgery, Urology, Orthopedics and Traumatology, Plastic and Reconstructive Surgery and Thoracic Surgery clinics in a Training and Research Hospital in Ankara, and volunteered to participate in the study. The universe of the study consisted of 141 nurses working in surgical clinics. No

sample selection was made in the study, and 120 nurses who met the study inclusion criteria and agreed to participate in the study constituted the sample of the study. In the study, 85.1% of the nurses were reached. Inclusion criteria were; working as a nurse in surgical clinics, knowing Turkish, being 18 years old or older, accepting to participate in the research. Exclusion criteria were; not having the criteria of being included in the research and refusing to participate in the research at any stage. The ethical committee (Ethics Committee Project/Decision No: 19/164, xxxxx 2019) and institutional approvals were taken to conduct the research. Written and verbal consents of those who volunteered to participate in the study were obtained by informing the participants about the research. The data collection form was developed by the researchers by making use of the articles published on drain care in the literature.[2,12,13,14,15,17] Opinions of 2 medical doctors who had expertise in the field of surgery and 2 nurses working as faculty members in the department of surgical diseases nursing were taken while preparing the questions. To test the clarity of the questions, pre-application was made with 10 nurses. Nurses were asked to fill in the data collection form using face-to-face interview technique. Nurses answered all the questions in the data collection form by writing. The data collection form consisted of a total of 16 questions to determine the identifying data of nurses (such as age, gender, educational status) and nursing practices performed in the care of patients with drains.

Statistical Analysis

Statistical Package for Social Sciences (SPSS), version 21.0 for Windows was used in the statistical analysis of the data obtained. Descriptive statistics were used in the analysis of the data collected as mean ± standard deviation (X ± SD) and median or percentage (%). The answers given to the open-ended questions were recorded by writing tally in Microsoft Word. The answers were read twice independently by the researchers. Expressions that pointed to the same subject were combined. Then, the researchers came together and categorized the statements. Statements categorized were corrected by consulting the health professionals who were asked for preparing the questions. The results obtained from the study were reviewed with 10 nurses included in the study and it was evaluated whether the categorized statements overlapped with what they said.

Results

The sociodemographic characteristics of the participants are given in Table 1. Of the nurses participating in the research, 98.3% were women. The average age of nurses was 35.90±6.38, 65% were married, 71.7% were undergraduate, 38.3% had a working year of 11-20 years.

All of the nurses stated that they followed up active and passive drains. The nurses stated that they followed up drains at 10 to 30 minutes and at 1, 2, 4, 12 to 24 hours intervals. Problems and complications faced by nurses in drain care are given in Table 2. The problem that nurses faced most was emptying the drain without recording by the patient, relatives and other health personnel (64.9%, n=78).

The applications of nurses regarding drain care are given in Table 3. It was determined that the nurses carried out applications such as training of patients and fixing the drain in order to ensure drain safety. The nurses stated that they carried out applications such as draining the drain entrance site, paying attention to aseptic conditions, applying antibiotic treatment according to the request and following up the drain entrance site in terms of signs of infection to prevent drain related infections.

Nursing practices for the continuation of negative pressure were; attaching the cover after emptying the drain and emptying the air inside the drain (13.3%, n=16), draining when the drain is filled (5%, n=6), informing the patient about that (13.3%, n=16), and milking and controlling the

Table 1. Characteristics of the nurses (n=120)

Characteristics	n	%
Gender		
Female	118	98.3
Male	2	1.7
Marital status		
Married	78	65
Single	42	35
Education status		
High school	2	1.7
Undergraduate	4	3.3
Graduate	86	71.7
Postgradute	24	20
Doctorate	4	3.3
Occupation years		
0-1	6	5
2-5	12	10
6-10	28	23.3
11-20	46	38.3
21 years or over	28	23.3
Unit Worked		
General Surgery	45	37.5
Orthopedics	15	12.5
Plastic Surgery	10	8.3
Chest Surgery	7	5.8
Urology	12	10
Cardiovascular Surgery	31	25.8
Mean age 35.90±6.38	Total=120	Total=100

drain (21.6%, n=26). Of the nurses, 75% (n=90) answered "yes" to the question "Are you doing milking?" and 25% (n=30) answered "no". All the nurses stated that they decided based on the amount and color of the drain content for the question of "How is the drain removal time determined ?".

Discussion

Although it is not necessary to use it in some surgical procedures, drain use is an integral part of modern surgical applications in patients undergoing surgery. Nurses providing patient care services in surgical clinics have important duties related to drain care. In our study, it was observed that the nurses followed up the drain with a frequency ranging from 10 minutes to 24 hours. Knowing the patient's surgical history can provide information about how often the drain should be followed up. According to the location of the drain and the bleeding risk of the patient, the medical team's frequent follow-up of the patients will allow

Table 2. Problems and complications faced by nurses in drain care

Nurses' expressions	n	%
Emptying drain by patient, relatives and other health personnel without recording	78	64.9
Spilling of the drain contents	70	58.3
Blockage of the drain	66	55
The level indicators of drains do not fully reflect the amount of drainage	64	53.3
Dislocation of the drain	58	48.3
Bending of the drain	40	33.3
Failure to fully discharge drains	36	30
Having more than one drain	30	25
Infection in the drain entrance site	30	25
Drain hoses cannot be milked because they are too hard	26	21.6
Patients have pain during milking	26	21.6
Bleeding	22	18.3
Air leak in a patient with a chest drain tube	20	16.6
Rupture of the drain	12	10
Smell and density of drain	10	8.3
Failure to maintain negative pressure	10	8.3

Table 3. Practices of nurses on drain care

Practices of nurses	n	%
Making dressing in the drain inlet area	106	88.3
Paying attention to aseptic conditions in drain care	54	45
Giving training to the patient on drain care	50	41.6
Applying antibiotic treatment according to request in the presence of drain-related infection	42	35
Preventing the drain from bending and getting under pressure	38	31,6
Monitoring the drain entrance area for signs of infection	34	28.3
Fixing the drain	28	23.3
Ensure daily emptying of the drain	28	23.3
Protecting drains while positioning	22	18.3
Milking the drain using clamp and powder	16	13.3
Numbering if the number of drains is more than one	10	8.3
Holding the drain below the drain inlet zone	4	3.3

the complications that may develop to be detected early and intervene.[15]

Simple or large surgical procedures are performed in a very wide population ranging from newborn patients to elderly patients with conscious sedation or general anesthesia. In the vast majority of these operations, the use of drains is inevitable. In our study, it was seen that nurses performed many applications to ensure drain safety. In our study, nurses stated that they performed patient training and fixing the drain practices for drain care among the applications related to the subject. In the study by Yılmaz et al.[12], the reasons for the displacement of the drain were as follows: Of the patients, 66.67% removed the drain by themselves; in 16.67% of them, the drain was removed spontaneously or the wrong drain was removed during follow-up. In our study, 8.9% of the nurses (n=10) stated that they enumerated when there was more than one drain. With this application, drains were not mixed. In order to ensure drain safety in this large population, nurses should include the drain safety in the nursing care plan by considering the patient's medical history in detail. In addition to the training of patients and their relatives, it is important to be careful about health personnel, especially during patient transfer, to prevent unwanted removal of the drain. It is important for nurses to provide training for assistant health personnel to ensure drain safety in order to prevent unwanted events. One of the applications that cause unwanted removal of the drain is the milking the drain process performed by the healthcare personnel.[2] In our study, 75% of the nurses stated that they performed milking. Of the nurses, 13.3% (n=16) stated that they performed milking by using clamp and powder. Although it is preferred by most surgeons in clinical practice to prevent clogging of the drain, it requires attention because it can negatively affect the tissue healing process due to its high negative pressure, causing bleeding and tissue trauma.[2] Nurses are advised to do milking whenever it is suspected of occlusion and to perform the procedure by limiting it as much as possible. If this application is to be done, it is recommended to carefully hold the drain close to the entrance to the patient with one hand, and to perform the milking process with an alcohol gauze to increase the slipperiness with the other hand.[2]

Another issue that can be considered within the scope of drain safety is to ensure the continuity of the negative pressure of the drain for active drains. In our study, a low number of nurses stated that to ensure the continuity of the negative pressure of the drain they carried out the practices of draining the air inside the drain and then attaching the cover and draining the drain as long as it filled. In addition to the effective functioning of the drain, it is necessary to ensure the continuity of the negative pressure of the drain to prevent surgical site infections.[2] When Carruthers et al.[16] compared the pulling force applied by the Jackson-Pratt drain with 100 mL reservoir with the pulling force applied by the Jackson-Pratt drain with 400 ml reservoir, they found that the small reservoir was more successful. In the same study, when negative pressure was created by pressing from the side, it was determined that it was more effective than that created by pressing from the top and bottom.[16] Khansa et al.[17] found similar results in their study. In clinical practice, while the surgeon decides on the size and type of the drain, the use of research results in practicing drain care by nurses and other health professionals may shorten the duration of drain by ensuring effective drainage. Therefore, this situation may affect patient outcomes positively.

One of the main purposes of inserting a drain is to prevent infection that may develop depending on the collection after surgery. To prevent infections related to the drain, in addition to standard measures (hand hygiene, using gloves), using prophylactic antibiotics, evaluation of the drain (type of the drain, location of the drain, color, odor, density, evaluation of the skin around the drain), selection of drain closure (drain selection of dressing material for the drain closure according to the amount of exudate), washing with 3-5 cc 0.9% NaCl to ensure the continuity of the drain opening, milking the drain tube when it is suspected it is clogged, preventing the bending of the catheter, and following the content carefully and correctly to remove the drain when it is not necessary are required. The accepted general opinion is to remove the drain when drainage falls below 25 cc per day.[2,15] In our study, nurses stated that they performed many applications mentioned in the literature to prevent the development of infection related to the drain. All of the nurses stated that the time of drain removal was decided according to the content and color of the drain. In clinical practice, it is important that nurses follow the drain content accurately and carefully. An important detail that nurses have difficulty in drain care is that the patient, relatives and other healthcare personnel empty the drain content without recording. For any reason, errors in the records related to the drain follow-up may lead to premature or delayed removal of drain, which may adversely affect patient outcomes. According to the undesired situations detected in our study: The entire healthcare team including the patient and their relatives should behave sensitive about the subject. Communication should be kept without any problems about the drain content. Every patient with drain and their relatives should be trained about drain care and the nurses should follow up the drain carefully.

Conclusion

In conclusion, it could be said that the practices of nurses regarding drain care in our study were in parallel with

the practices reported in the literature, but our rates of administration were lower. It is considered that inclusion of drain care in in-service training programs and planning of attempts to solve problems encountered in care in order to increase the use of evidence-based practices of nurses related to drain care will increase the quality of nursing care services and contribute positively to patient outcomes.

Ethics

Ethics Committee Approval: The ethical committee (Ethics Committee Project/Decision No: 19/164, 30.04.2019).

Informed Consent: Written informed consents were obtained.

Peer-review: Externally peer reviewed.

Authorship Contributions

Concept: B.Ö., M.Ö., Design: B.Ö., M.Ö., Data Collection or Processing: S.D., Analysis or Interpretation: B.Ö., M.Ö., Literature Search: B.Ö., M.Ö., S.D., Writing: B.Ö., M.Ö., S.D.

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RESEARCH ARTICLE

Approach to Appendiceal Masses Due to Acute Appendicitis: Analysis of 126 Cases

Akut Apandisite Bağlı Gelişen Apendiks Kitlelerine Yaklaşım: 126 Olgunun Analizi

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ABSTRACT

Aim: This study aimed to present our clinical approach in patients with clinical manifestations of delayed appendicitis and appendiceal mass.

Method: Data of 126 patients with appendiceal mass and admitted to our clinic between January 2008 and December 2018 were retrospectively analyzed. Diagnoses were made by physical examination, laboratory examination, and imaging methods.

Results: Of the 126 patients, 43 (34.1%) underwent emergency surgery. Of those emergent cases, 36 patients underwent appendectomy and seven had right hemicolectomy. The pathological finding was adenocarcinoma in three patients (2.4%) who underwent right hemicolectomy. Twenty-nine patients (23%) underwent interval appendectomy. The mean duration of interval appendectomy was 6.2 (range, 2-10) months. The pathological finding was appendicitis in all patients. The mean follow-up period of the 54 patients (42.9%) who did not undergo surgery was 32.6±2.4 months. During this follow-up period, three patients were diagnosed with appendix tumours and two patients with Crohn's disease. Appendectomy was performed in two (1.3%) patients.

Conclusion: Appendiceal masses may be treated conservatively without delayed appendectomy. Patients can undergo surgery only in case of recurrence of appendicitis. Computed tomography and colonoscopy within 4-6 weeks after completing the conservative treatment is recommended in all patients. However, this treatment protocol should be supported by larger prospective studies with long-term follow-up.

Keywords: Appendiceal mass, emergency appendectomy, interval appendectomy, appendicitis

ÖZ

Amaç: Gecikmiş apandisit ve apandisiyel kitle klinik bulguları olan hastalarda klinik yaklaşımımızı sunuyoruz.

Yöntem: Ocak 2008-Aralık 2018 tarihleri arasında kliniğimize apandiseal kitle tanısı ile başvuran 126 hasta retrospektif olarak incelendi. Tanı, fizik muayene, laboratuvar ve görüntüleme yöntemleri ile konuldu.

Bulgular: Kırk üç hastaya (%34,1) acil cerrahi uygulandı. Ortaya çıkan bu olgulardan 36'sına apendektomi ve 7 sağ hemikolektomi uygulandı. Sağ hemikolektomi yapılan 3 hastada (%2,4) patoloji adenokarsinom idi. Yirmi dokuz hastaya (%23) aralıklı apendektomi uygulandı. Ortalama aralık apendektomi süresi 6,2 (aralık, 2-10) aydı. Tüm hastalarda patoloji apandisit olarak bildirildi. Ameliyat edilmeyen 54 hastanın (%42,9) ortalama takip süresi 32,6±2,4 aydı. Bu takip süresi boyunca 3 hastaya tümör ve 2 hasta Crohn hastalığı tanısı konuldu.

Sonuç: Apendiks kitleleri, gecikmiş apandisit ameliyatı olmadan konservatif olarak tedavi edilebilir. Bu hastalar sadece apandisit nüksü durumunda ameliyat edilebilir. Konservatif olarak tedavi edilen tüm hastalara, konservatif tedaviyi tamamladıktan sonra 4-6 hafta içinde bilgisayarlı tomografi ve kolonoskopi yapılması önerilir. Ancak bu tedavi protokolü uzun süreli takip ile daha geniş prospektif çalışmalarla desteklenmelidir.

Anahtar Kelimeler: Apendiks kitlesi, acil apendektomi, aralıklı apendektomi, apandisit

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Introduction

Acute appendicitis is still the most common surgical pathology worldwide and may present with a clinical spectrum ranging from oedematous appendicitis to perforation or appendiceal mass.[1] These complications occur in 2%-7% of the cases.[2,3] Appendiceal mass due to acute appendicitis occurs when the omentum and intestinal organs adhere to the perforation area following appendix wall perforation.[2,3,4]

Three approaches to appendiceal masses exist. First is immediate appendectomy. If the appendix cannot be found during the operation, fistula formation and similar complications may occur because of excessive tissue oedema and fragility of the structures forming the mass. Second is delayed appendectomy performed 2 months following conservative treatment. The third approach defined recently is widely accepted and is completely conservative.[5,6,7] Each method has its own limitation and there is no consensus yet.

In this study, we aimed to present our clinical approach to patients admitted with clinical manifestations of delayed appendicitis diagnosed as appendiceal mass.

Materials and Methods

The study was carried out in accordance with the principles of the Helsinki Declaration and was approved by the local Institutional Review Board (approval no. 531 dated 01/2020).

Medical records of 140 patients diagnosed with appendiceal mass and admitted to our clinic between January 2008 and December 2018 were retrospectively reviewed. Diagnosis was made by physical examination, laboratory examination, and imaging methods. Patients with percutaneous abscess drainage on admission and had exploratory laparotomy without resection were excluded from the study. Moreover, 14 were excluded because their follow-up data were not accessible.

Patients were classified into groups according to the treatment received: emergent appendectomy (group 1); interval appendectomy, that is, patients were conservatively followed for 8-10 weeks with antibiotics and then underwent appendectomy (group 2), and conservative treatment, that is, antibiotherapy alone without appendectomy (group 3).

Outcome parameters were age, sex, pathology, interval appendectomy time, and recurrent episodes. Morbidity includes postoperative infectious complications, intestinal fistula, small bowel obstruction, and recurrence after initially successful nonsurgical management.

Statistical Analysis

Statistical analyses were performed using SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Continuous variables with normal distribution were expressed as mean ± standard deviation, and those with not normal distribution as median (minimum-maximum) values. Categorical variables are expressed as n (%) values.

Results

The mean age of the patients was 43.75±2.4 (range, 16-84) years. The mean hospital length of stay was 6.6±1.3 days. The mean duration between admission and onset of symptoms was 5 days.

The mean white blood cell count upon admission was 15,200/mm^3 (8,000-30,130), while the mean C-reactive protein level was 8.6±2.1 mg/dL. Abdominal ultrasonography (US) was performed in all patients, and abdominal computed tomography (CT) was performed in 68.3% of the patients Figure 1.

In this study, 43 (34.1%) underwent emergent appendectomy, of which 36 underwent appendectomy alone and seven had concomitant right hemicolectomy. Adenocarcinoma was detected in three patients (2.4%) in whom right hemicolectomy was performed. In addition, 29 patients (23%) underwent interval appendectomy. The mean interval between admission and surgery was 6.2 (range, 2-10) months. Eight of these patients underwent laparoscopic appendectomy. The pathological finding was appendicitis in all patients.

The conservative group consisted of 54 (42.9%) patients. These patients were given antibiotherapy without surgery alone and then discharged. The mean time of antibiotherapy was 2 weeks. The decrease in body temperature, normalisation of heart rate, regression of abdominal pain, cessation of gastric content from the nasogastric catheter, and decrease in white blood cell count were considered in the evaluation of response to conservative treatment.

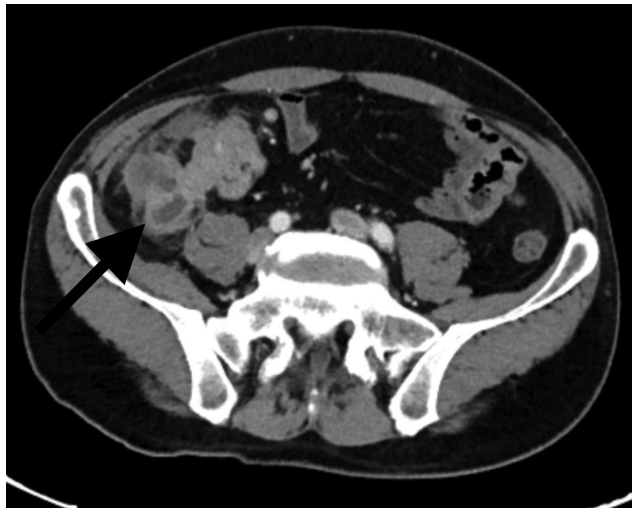

Figure 1. Computed tomography image showing appendiceal mass

Histopathologic examination of the sectioned preparations confirmed appendix tumours in three patients who underwent right hemicolectomy. These patients were followed for 32.6±2.4 months. During this follow-up period, two patients were diagnosed with Crohn's disease. One patient reported right lower quadrant pain for once and the other twice. Appendectomy was performed in both patients.

Discussion

Appendiceal mass is defined as a pathology that occurs when the omentum and intestinal organs adhere to the perforation area as a result of appendix wall perforation. The methods used in the management of appendiceal masses have inherent limitations and there is no consensus yet.

Advocates of emergent appendectomy argue that this will eliminate the long-term conservative treatment process and prevent mission of malignancies and re-hospitalisations.[8,9] Those who oppose assert that intervention to these inflamed tissues will increase complications and cause unnecessary intestinal resection.[10] In our study, 43 patients underwent emergent surgery, of which 36 had undergone appendectomy alone and seven had concomitant right hemicolectomy.

Routine interval appendectomy was reported to increase morbidity by 19% and costs by 38%.[11] Barnes et al.[12] did not detect any pathology related to previous inflammation in appendices extracted during elective appendectomies. No appendix was found in 0%-16% of the cases in laparotomies performed for elective appendectomies.[13,14] In our study, 29 patients underwent interval appendectomy. The mean duration of interval appendectomy was 6.2 (range, 2-10) months. Eight underwent laparoscopic appendectomy.

Non-operative or conservative treatment of plastron appendicitis in adult patients was first reported in the 1920s.[1] The recurrence rate in conservative treatment ranges from 0 to 80%, but recurrences usually occur in the first 6 months.[2,3,6,7] In our study, 54 patients underwent successful conservative treatment with broad-spectrum combined antibiotherapy, analgesics, and hydration and were routinely followed. Despite differences, antibiotherapy should cover Gram (+), Gram (-), and anaerobic bacteria.[15] The mean follow-up period in our conservative group was 32.6±2.4 months. Two of those patients (1.6%) had relapse after discharge. This rate is lower than the published rates of 13%.[6]

Patients with appendiceal mass usually present themselves 1 week after symptom onset.[2,3,6,7] In our study, the interval between onset of symptoms and admission was 1 week. The mean hospital length of stay was 6.6±1.3 days in our study.

Appendiceal mass can be diagnosed by US in 70% of the patients, but CT is still the gold standard.[16] Appendectomy can be performed in cases where no mass is detected in abdominal examination or abdominal CT.[16] In this study, abdominal US and CT were performed in 68.3% of the patients.

One of the issues in appendiceal masses is whether the mass is malignant or not. The probability of other pathologies in appendiceal masses due to acute appendicitis has been reported as 0%-12 %.[17,18] Malignancy should be ruled out by colonoscopic examination in patients aged >40 years who showed favourable responses to conservative treatment.[18,19] Malignancy was detected in 3 (2.4%) patients in our study, and all were adenocarcinomas.

Supporters of delayed appendectomy state that a significant proportion of conservatively monitored patients may be candidates for recurrent appendicitis in the future at a rate of 10%-46%.[20,21,22] This rate is very low in our series (1.6%) compared with published rates. Another suggestion regarding the necessity of delayed appendectomy is the suspicion of carcinoid tumour that may be overlooked. However, this tumour has a very low incidence (0.1-0.5) and is not clinically manifested in most cases. Therefore, it should not be a rationale for delayed appendectomy.[23]

This study has some limitations. First, our study had retrospective design and small sample size that may cause a high probability of a type 1 error. Second, the experience was restricted to the outcomes of a single institution. Third, detailed history and some possible factors that may influence the outcome were not completely documented. Given these restrictions, associations should be interpreted with caution.

Conclusion

Our findings support the opinion that cases with appendiceal mass may be treated conservatively without delayed appendectomy. Conservative treatment without interval surgery seems to be the preferred method for treatment of appendiceal mass and abscess. Patients can undergo surgery only in case of recurrence of appendicitis. US or CT of appendiceal abscess can detect risk factors for recurrence of appendicitis. CT and colonoscopy within 4-6 weeks after conservative treatment is recommended in all patients. However, this treatment protocol should be supported by larger series with longer follow-up.

Ethics

Ethics Committee Approval: The study was carried out in accordance with the principles of the Helsinki Declaration and was approved by the local Institutional Review Board (approval no. 531 dated 01/2020).

Informed Consent: Informed consent was not received due to the retrospective nature of the study.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: Y.Y., E.K., M.N.E., H.G., H.K., Concept: Y.Y., E.K., Design: Y.Y., E.K., Data Collection or Processing: N.A., M.N.E., H.K., Analysis or Interpretation: K.A., M.H., Literature Search: Y.Y., N.A., M.N.E., Writing: Y.Y., E.K.

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CASE REPORT

A Rare Cause of Intestinal Obstruction: Mesodiverticular Band

İntestinal Obstrüksiyonun Nadir Bir Nedeni: Mezodivertiküler Band

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ABSTRACT

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract. Some of the major complications of MD are bleeding, intestinal obstruction and diverticulitis. So, we aim to indicate in this case report that intestinal obstruction can occur secondarily to the MD and mesodiverticular band.

A 63-year-old male patient with no known previous history of medical problem or abdominal surgery came to the emergency department with a severe abdominal pain, nausea and vomiting that had started the previous day. Physical exam showed an increase in bowel sounds, distention and generalised sensitivity largely on the epigastric region. An Erect abdominal plain radiograph revealed a few distended small bowel loops and multiple air-fluid levels. Even though the patient was initially thought to suffer from a mechanical intestinal obstruction, the subsequent abdomen CT of the patient, which was taken urgently, showed fluid accumulation in the intestinal loops and local dilatation, favouring an obstruction. The patient who developed acute abdomen in the follow-up was taken to the surgery immediately. It was observed that small intestine was strangled 60 cm proximity to the ileocecal valve. This strangulation was observed to be resulted from the mesodiverticular band of the inflamed MD. The mesodiverticular band extended from the vertex of the MD to the mesentery and significantly compressed the distal ileum. Once the mesodiverticular band was detached from the mesentery by electrocautery, the ileal loop became free. Since the free ileal bowel loop was observed to be ischemic, 15 cm segmental small intestine was resected including the MD and the inflamed, fragile mesentery of the intestinal loop. Histologic analyses confirmed that the diverticulum was MD.

As the preoperative diagnosis of intestinal obstruction which is caused by mesodiverticular band is difficult, it is associated with high mortality and morbidity. Early diagnosis and immediate surgery will prevent the strangulation and bowel gangrene therefore, mesodiverticular band which is one of the complications of MD should be kept in mind in the differential diagnosis of the patients referring with the symptoms of an intestinal obstruction.

Keywords: Intestinal obstruction, meckel's diverticulum, mesodiverticular band

ÖZ

Meckel divertikülü (MD) gerçek bir divertiküldür ve intestinal duvarın tüm katlarını içerir. MD gastrointestinal sistemin en sık görülen konjenital anomalisidir. Popülasyonun %1 ile 4'ü arasında görülür. MD'nin sık görülen komplikasyonlarının başlıcaları kanama, intestinal obstrüksiyon ve divertikülittir. Biz de bu olgu sunumunda; intestinal obstrüksiyonun MD'ye ve mezodivertiküler banda sekonder oluşabileceğini sunmayı amaçladık. Daha önceden bilinen bir hastalığı ve abdominal cerrahi öyküsü olmayan 63 yaşında erkek hasta acil servise bir gün önce başlayan şiddetli karın ağrısı, bulantı, kusma şikayetiyle başvurdu. Fiziksel muayenede barsak seslerinde artış, distansiyon ve epigastrik bölgede daha fazla olmak üzere yaygın hassasiyet vardı. Ayakta düz batın grafisinde birkaç adet distandü ince barsak ansı ve multiple hava sıvı seviyeleri izlenmişti. Mekanik intestinal obstrüksiyon düşünülen hastanın çekilen acil bilgisayarlı tomografisinde obstrüksiyonu işaret eden intestinal anslarda sıvı akümülasyonu ve yer yer dilatasyon saptandı. Takiplerinde akut batın gelişen hasta acil operasyona alındı. Genel anestezi altında göbek üstü median ve göbek altı median insizyonla eksploratif laparotomi gerçekleştirildi. Eksplorasyonda ileoçekal valfin 60 cm proksimalinde ince barsağın strangüle olduğu görüldü. Mekanik obstrüksiyonun süperiorunda dilate anslar izlendi. Bu strangülasyonun inflame MD'nin mezodivertiküler bandı nedeniyle oluştuğu görüldü. Mezodivertiküler band MD'nin tepe noktasından mezentere doğru uzanıyordu ve distal ileumu belirgin derecede komprese ediyordu. Mezodivertiküler band mezenterden elektrokoter yardımıyla ayrıldıktan sonra ileal ans serbestleştirildi. Serbestleştirilen ileal barsak ansının iskemik olarak izlenmesi üzerine MD ve barsak ansına ait inflame, frajil mezenteri de içerecek şekilde 15 cm segmental ince barsak rezeke edildi. Sonrasında

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elle çift kat uç uca anastomoz yapıldı. Histolojik çalışmalar ile divertikülün inflame MD olduğu doğrulandı. Komplike MD'nin tanısını cerrahiden önce koymak çoğunlukla zordur çünkü akut apandisit, enflamatuvar barsak hastalığı ve intestinal obstrüksiyonunun diğer nedenleriyle klinik olarak karışabilmektedir. Mezodivertiküler bandın neden olduğu intestinal obstrüksiyon preoperatif tanısının zorluğu nedeniyle yüksek mortalite ve morbidite ile ilişkilidir. Erken tanı ve acil cerrahi, strangülasyonu ve barsağın gangrene olmasını engellediği için MD komplikasyonlarından mezodivertiküler band,intestinal obstrüksiyon tablosuyla başvuran hastaların ayırıcı tanısında akılda tutulmalıdır.
Anahtar Kelimeler: İntestinal obstrüksiyon, meckel divertikülü, mezodivertiküler band

Introduction

Meckel's diverticulum (MD) is the most common congenital anomaly of the gastrointestinal tract. It develops due to the incomplete closure of the vitelline or omphalomesenteric duct in 5th-7th weeks of fetal development and usually settles on the antimesenteric edge of the ileum. MD is a true diverticulum and includes all layers of the intestinal wall. Meckel diverticulum develops in 1-4% of the population and equally in both sexes. It is generally clinically silent. It is most often detected incidentally during autopsy or surgery. Complications are more common in men. The main complications of MD are bleeding, intestinal obstruction and diverticulitis.[1,2,3,4,5] In this case report, we aimed to present that small bowel obstruction might develop secondary to the MD and mesodiverticular band.

Case Report

A 63-year-old male patient, who did not have a previously known disease and a history of abdominal surgery, was admitted to the emergency department with the complaint of severe abdominal pain, nausea and vomiting. On physical examination, fever was 36.8 °C, arterial blood pressure was 110/70 mm Hg and pulse was 94/min. In the abdominal examination, there was increase in the bowel sounds, distension and widespread tenderness which was more in the epigastric region. Rectal examination was natural. Leukocyte count was 12.090/mm^3, hemoglobin level was 15.4 g/dL and platelet count was 301.000/mm^3 in the complete blood count. Renal and liver function tests were normal. On erect abdominal plain film, several distended small bowel loops and multiple air-fluid levels were observed. Abdominal USG revealed intra-abdominal free fluid and hyperperistaltic dilated small bowel loops. In the emergency computed tomography (CT) of the patient who was considered to have mechanical intestinal obstruction, fluid accumulation and local dilatation were detected in intestinal loops indicating obstruction (Figure 1, 2). In the follow-up, the patient developed acute abdomen and underwent emergency surgery. Under general anesthesia, exploratory laparotomy was performed with incisions below and above the belly button. In exploration, the small intestine was strangulated at 60 cm proximal to the ileocecal valve. Dilated loops were observed superior to mechanical obstruction. It was seen that this strangulation developed due to the mesodiverticular band of the inflamed MD. The mesodiverticular band extended from the vertex of the MD to the mesentery and significantly compressed the distal ileum (Figure 3, 4). After the mesodiverticular band was separated from the mesentery with the help of an electrocautery, the ileal lobe was released. Upon ischemic monitoring of the released ileal bowel loops, a 15 cm segmental small intestine was resected, including the MD and the inflammatory and fragile mesentery of the bowel loops. Then, double end-to-end anastomosis was performed manually. Following the bleeding control, a drainage catheter was placed in the pelvis.

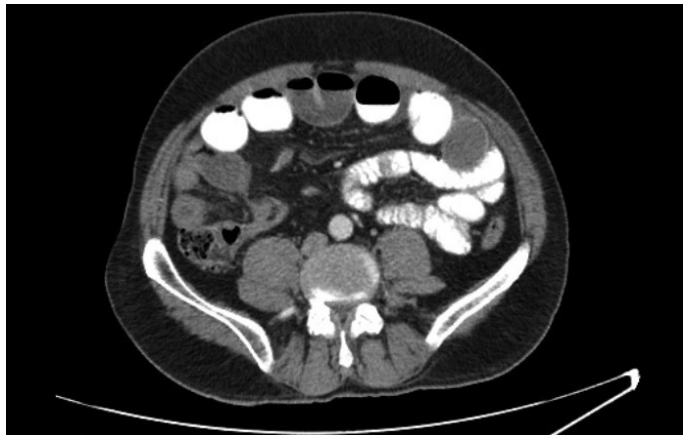

Figure 1. Air fluid levels in small intestine

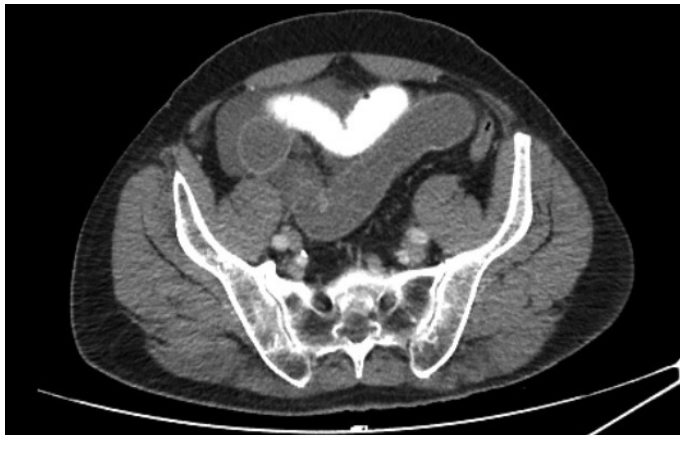

Figure 2. Dilated small bowel loops

Histological studies confirmed that the diverticulum was an inflamed MD. The patient with a normal postoperative course was discharged 7 days later and no complication was observed during the 3-month follow-up period.

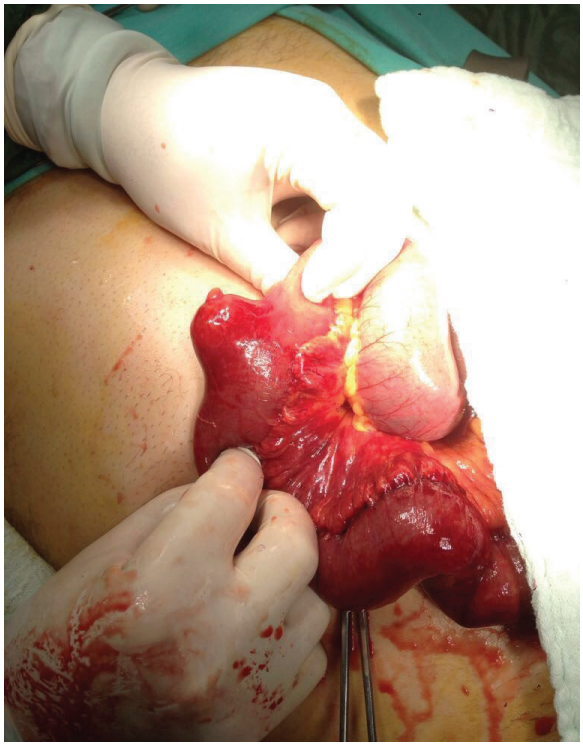

Figure 3. View during operation

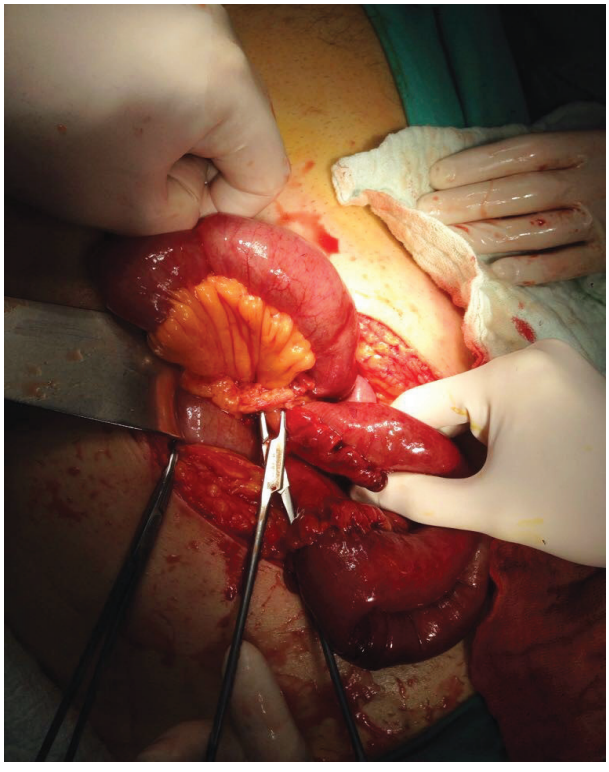

Figure 4. Mesodiverticular band view during operation

Discussion

MD develops due to the incomplete closure of the vitelline or omphalomesenteric duct in 5th-7th weeks of fetal development. It is a true diverticulum that contains all the layers of the intestinal wall and is usually located at the antimesenteric edge of the terminal ileum at a distance of 60-100 cm from the ileocecal valve.[1,2,5,7] The distance to ileocecal valve varies depending on age. In children under 2 years of age, the distance is known as an average of 34 cm, and in adults, an average of 67 cm. Although its size is variable, it is mostly short and it has wide rim. It is approximately 2.9 cm long and 1.9 cm wide. These features cause it to be called ileal appendix.[1,2]

MD rarely causes symptoms, but is usually detected incidentally. The risk of lifelong complications of MD is between 4-6%.[1,2,3,6] Symptomatic MD is more common in men (2: 1 in men, 5: 1 in women). In symptomatic patients, the diverticulum may include heterotopic gastric mucosa (50%) pancreatic mucosa (5%) and to a lesser extent colonic, endometrial and hepatobiliary tissues. These tissues are responsible for complications such as gastrointestinal bleeding, inflammation, intestinal obstruction, intussusception, hernial involvement, umbilical sinus, fistula or tumor.[4,6] The most common complications are bleeding, intestinal obstruction and diverticulitis. While bleeding and intussusception are more common under 2 years of age, obstruction and diverticulitis are more common in adults.[2,4] Elsayes et al.[8] detected intestinal obstruction in 40% of symptomatic MDs. In our patient, ileus was observed clinically.

The most common mechanisms causing intestinal obstruction are as follows: Volvulus of the small intestine around the fibrous band extending from the meckel diverticulum to the umbilical lumen; sagging of MD into the small intestine lumen and intertwining of the small intestine segment with the distal ileum and then with the large intestine resulting in ileoileal and ileocolic intussusception; the formation of intestinal obstruction with Littre hernia as a result of the incarceration of the diverticulum into the hernia; the formation of obstruction as a result of trapping of the small bowel loops between the veins of the diverticulum and the mesodiverticular band; the band that extends between the diverticulum and the base of the mesentery forms a loop, strangling part of the ileum and causing obstruction; and MD stone.[1,2,3,4,5,6] The ileus was secondary to the mesodiverticular band in our patient.

Other rare mechanisms include tumors (lipomas, carcinoid tumors and others), volvulus due to inflammatory adhesions caused by the meconium impaction in the MD in neonatals, cecal volvulus which develops around a band extending from

the MD to the umbilicus, gallstone ileus, and obstruction in the MD due to phytobezoar formation.[9,10]

Yolk sac is fed from two different vitelline arteries. One of them undergoes degeneration while the other forms the superior mesenteric artery. The degenerated vitelline artery turns into a fibrous band surrounded by a peritoneum or mesodiverticular band. This band usually extends from the vertex of the MD to the ileal mesentery and sometimes causes ileal obstruction by trapping the bowel loops.[7,11] Intestinal obstruction caused by mesodiverticular band is associated with high mortality due to the difficulty of preoperative diagnosis.[1,2,3]

It is often difficult to diagnose complicated meckel's diverticulum before surgery because it can be clinically confused by acute appendicitis, inflammatory bowel disease, and other causes of small bowel obstruction.[12]

Various imaging tests are used in the diagnosis of MD. Conventional radiological examinations have limited value in diagnosis. In general, findings of complication can be radiologically viewed. Small bowel obstruction can often be detected on plain abdominal x-ray. Nonspecific findings such as enlarged bowel loops and multiple air-fluid levels are usually seen. Despite its limited utility, ultrasonography (USG) is used in the diagnosis of MD. In the USG, a blind-ended fluid-filled structure and a thin-walled intestine segment can be seen in the lower right quadrant.[13] In our patient, free fluid inside the abdomen and hyperperistaltic dilated small bowel loops were observed in USG. It is difficult to distinguish MD from normal small intestine in patients that are not complicated by tomography. Abdominal CT helps diagnosis in complicated patients such as intussusception. Nevertheless, seeing structures filled with fluid or air that are associated with the small intestine that ends up blind can help in diagnosis.[2,4,6,7] In our patient, fluid accumulation and local dilatation were detected in intestinal loops indicating obstruction in CT. Arteriography and technetium pertechnetate are useful methods when there is massive bleeding or ectopic gastric mucosa.[4,14]

Treatment of symptomatic MD is surgical resection.[2,4,7] Generally, wedge resection of the MD is sufficient, but in some patients, segmental ileal resection and end-to-end anastomosis may be required, as in our patient. The results of surgical resection are generally good. The frequency of early postoperative complications in patients operated on due to complications of MD is 12%. These early complications are wound infection (3%), prolonged ileus (3%) and anastomosis leak (2%).[12]

When asymptomatic MD is detected incidentally, resection is controversial.[2] Resection of MD detected incidentally is safer with 2% morbidity and 1% mortality rates.[12] Due to the difficult preoperative diagnosis of complicated MD, most surgeons recommend prophylactic diverticulectomy in MD detected by chance. This recommendation stands out due to lower morbidity rates compared to complicated MD resection.[15]

Today, laparoscopy is accepted as the diagnosis and treatment method in small bowel obstruction with unknown etiology. Intestinal obstruction caused by the mesodiverticular band can also be treated with a laparoscopic approach.[4,5,7] In our patient, we could have preferred a laparoscopic approach instead of emergency exploratory laparotomy, so that the patient's hospitalization period could be shortened. However, we could not perform laparoscopy because the operation was planned under emergency conditions and the necessary equipment could not be provided.

Conclusion

As a result, delays due to the difficulty in preoperative diagnosis of intestinal obstruction caused by mesodiverticular band may cause an increase in morbidity and mortality rates. Since early diagnosis and emergency surgery prevent strangulation and intestinal gangrene, mesodiverticular band, which is one of the complications of MD, should be kept in mind in the differential diagnosis of patients presenting with small bowel obstruction.

Ethics

Informed Consent: Written informed consent was obtained from the patient for publication and any accompanying images.

Peer-review: Internally and externally peer reviwed.

Authorship Contributions

Surgical and Medical Practices: H.E.A., S.Z., Concept: H.E.A., M.C.A., Design: S.Z., M.C.A., Data Collection or Processing: M.F.E., Analysis or Interpretation: M.C.A., Literature Search: S.Z., M.F.E., Writing: H.E.A., M.F.E.

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CASE REPORT

A Rare Cause of Acute Abdomen; A Case of Intra-abdominal Actinomycosis Mimicking The Omental Cake Finding

Nadir Bir Akut Batın Nedeni; Omental Kek Bulgusunu Taklit Eden Batın İçi Aktinomikoz Olgusu

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ABSTRACT

Actinomycosis is a rare infectious disease characterized by endogenous, chronic and suppurative inflammation in various mucosa caused by Gram-positive anaerobic bacilli from the actinomycetaceace family, which are a member of the gastrointestinal and genital system flora. There are multiple possible focuses. The most frequently identified focuses are oro-cervicofacial (55%) and abdominal pelvic (20%) focuses. Formation of abdominopelvic focuses is often associated with a history of perforated appendicitis or long-term use of the intrauterine device.

Here, a 48-year-old woman presenting with abdominal pain who had acute abdominal findings, had a 7 cm mass in the hepatic flexure of the colon and whose pathology report was reported as actinomycosis after a laparotomy and omentectomy were performed, was presented. Omental cake appearance is a condition that occurs due to involvement of omentum by a malignancy that develops in any organ or due to the malignancies of the omentum that develop from their own tissues, especially the peritoneum. By presenting this case, we wanted to emphasize that the omental cake finding might also be related to infectious causes besides malignancies and should be brought to mind in differential diagnosis.

Keywords: Actinomyces, omentum, abdominal pain

ÖZ

Aktinomikoz; actinomycetaceace familyasından Gram-pozitif anaerob özellikte basiller olan ve gastrointestinal ve genital sistem florasının bir elemanı olan actinomiçeslerin yol açtığı, çeşitli mukozalarda endojen kaynaklı kronik ve süpüratif inflamasyonla karakterize nadir görülen enfeksiyoz bir hastalıktır. Birden fazla olası odaklanma vardır; en sık tanımlananları oro-servikofasiyal (%55) ve abdominopelvik odaklanmadır (%20). Abdominopelvik odaklanma sıklıkla perfore apandisit öyküsü veya rahim içi araç uzun süreli kullanımı ile ilişkilidir. Burada, karın ağrısı ile başvuran, akut batın bulguları olması ve kolon hepatik fleksurada 7 cm'lik kitle etkisi oluşturan alan saptanması üzerine yapılan laparotomi ve omentektomi sonrasında; patoloji raporu aktinomikoz olarak raporlanan 48 yaşında bir kadın hasta sunulmuştur. Omental kek görüntüsü, herhangi bir organda gelişen malignitenin omentum tulumu veya omentumun başta periton olmak üzere kendi dokularından gelişen maligniteleri sonrası oluşan bir durumdur. Bu olguyu sunarak, omental kek bulgusunun maligniteler dışında enfeksiyöz nedenlere de bağlı olabileceğini ve ayırıcı tanıda akla getirilmesi gerektiğini vurgulamak istedik.

Anahtar Kelimeler: Aktinomiçes, omentum, karın ağrısı

Introduction

Actinomyces, which are an element of the flora of the gastrointestinal and genital tract, are characterized by Gram-positive anaerobic bacilli from the actinomycetaceace family. Actinomycosis is a rare infectious disease causing endogenous chronic, suppurative inflammation in many tissues.[1,2] Actinomyces are located in the normal flora of the oral cavity, gastrointestinal and genital system and cannot

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cross the normal mucosal barrier. If there is a foreign body that will penetrate the mucosa, such as a trauma, a history of surgical operation, or an intrauterine device (IUD), the bacteria can cross the mucosal barrier and cause infection.[3] Although actinomyces in the normal microflora in humans are seen in both sexes, they are observed 2-4 times more frequently in men than in women.[4]

Treatment options are surgical excision of the affected area, drainage of the abscess and antibiotherapy. The first option in antibiotherapy is penicillin. However, in patients in whom severe side effects such as allergies, presence of negative laboratory findings despite treatment, and convulsions develop; tetracycline, chloramphenicol, erythromycin, clindamycin and imipenem can be used.[5,6] Here, a 48-year-old woman presenting with abdominal pain who had acute abdominal findings, had a 7 cm mass in the hepatic flexure of the colon and whose pathology report was reported as actinomycosis after a laparotomy and omentectomy were performed, was presented.

Case Report

A 48-year-old woman presented to our hospital with complaints of upper quadrant pain, which was increasing for 5 days. She had no history of additional disease and abdominal surgery. It was learned that she had IUD for contraception for 7 years. On physical examination, there was voluntary guarding and tenderness in the upper quadrant of the abdomen. C-reactive protein (CRP) was 10 mg/dL (reference range: 0-0.5 mg/dL), white blood cell count was 14.00 10^9/L in the blood test. In her computed tomography (Figure 1, 2: A 7 cm heterogeneous area on the omentum) there was approximately 7 cm heterogeneous area adjacent to the hepatic flexure of the colon. The patient underwent laparotomy with a preliminary diagnosis of acute abdomen. A mass lesion of approximately 7 cm on the hepatic flexura of the colon, giving the appearance of an omental cake, was detected. (Figure 3, 4: Omentectomy material). No additional intraabdominal pathology was detected. Omentectomy was performed. The patient with no additional complaint who could take oral food on the 1st postoperative day was discharged on the 2nd postoperative day. The pathology result was reported as active chronic inflammation, fat necrosis and actinomyces colonies (Figure 5, 6: Actinomyces colonies, pathology preparation). The patient was directed to the infectious diseases outpatient clinic for follow-up of the and penicillin [(Penicillin G 20 million units/daily, intravenous (iv) + clindamycin (1x500 mg/d oral for 4 weeks followed by amoxicillin 3x1000 mg/d oral for 5 months)] treatment was started. In the abdominal computed tomography performed in the 6th postoperative month, no actinomyces focus and additional pathology were detected in the abdomen.

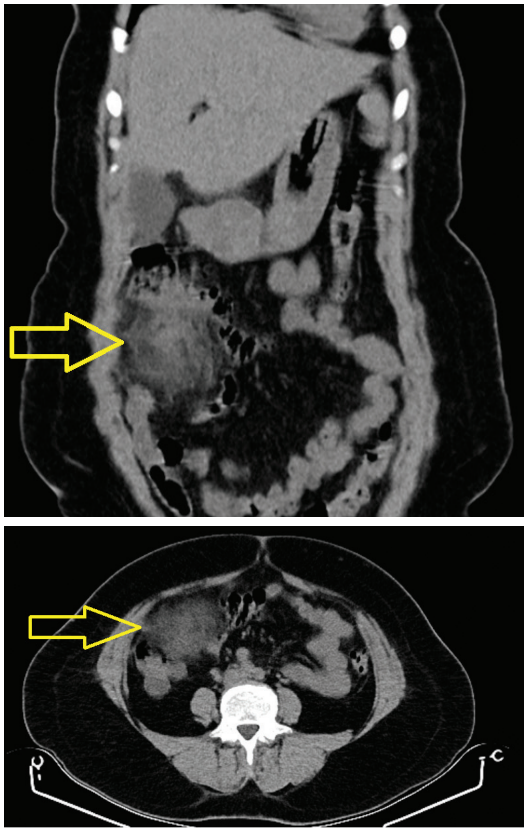

Figure 1, 2. A 7 cm heterogeneous area on the omentum

Discussion

The diagnosis of actinomycosis was first made by Ponfick in 1879.[7] Actinomyces, which was initially considered as a

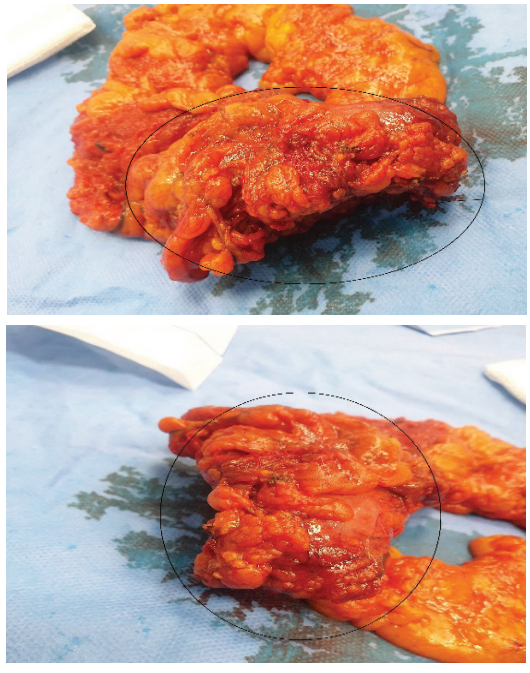

Figure 3, 4. Omentectomy material

fungus due to its branched fibrillated structure, was actually understood to be a gram-positive bacterium.[8] There are multiple possible focuses. The most frequently identified focuses are oro-cervicofacial (55%) and abdominal pelvic (20%) focuses.[9] Abdominal actinomycosis can occur as a result of any acute appendicitis, colon diverticulum, foreign body such as fishbone, peptic ulcer or punctures caused by the removal of the stomach. Appendicitis is the most common triggering event in abdominal actinomycosis and is mostly responsible for 65% of cases of abdominal actinomycosis.[10] Long-term use of IUD is also associated with formation of focuses in the abdominopelvic region.[9] In the presence of a foreign body such as IUD, tissue redox potential decreases due to the damage to the surface of the tissue and regional protection weakens. Accordingly, actinomyces species may have the opportunity to reproduce and invade tissue. It has been reported that the incidence of Actinomycosis among women using IUD is related with the duration of use of IUD and type of IUD. It has been determined that 85% of patients with pelvic actinomycosis have used IUD for more than 3 years.[11] IUD, which had existed for 7 years, was thought to be a possible cause due to the absence of another focus in our patient and was withdrawn after the consultation with the gynecologist.

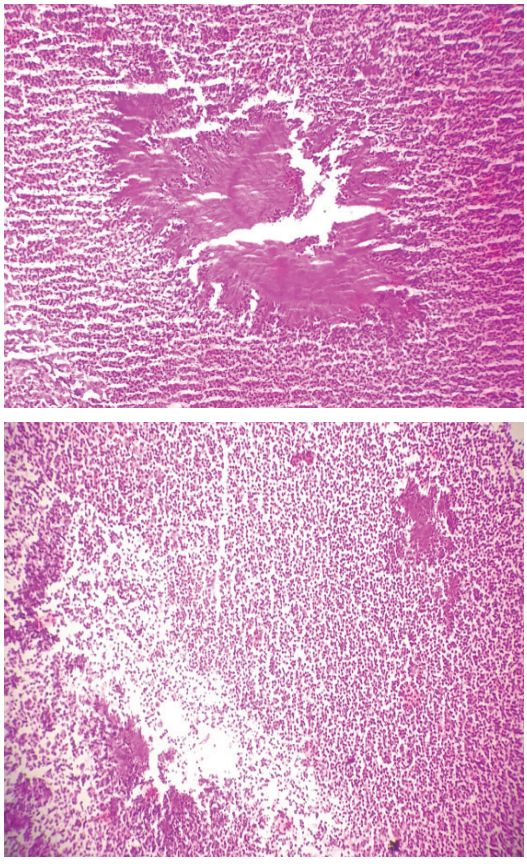

Figure 5, 6. Actinomyces colonies, pathology preparation

Since clinical and radiological findings are not specific for abdominal actinomycosis and are very diverse, diagnosis can be made only after surgical procedure in 90% of patients. The disease is usually painless and the first symptoms may appear 2 years after the onset of infection.[10] Our patient stated that she did not have any complaints until the last five days, and the definitive diagnosis was made after surgical excision.

The biochemical profile is not specific. Although anemia, high CRP level and/or changes in sedimentation rate and mild leukocytosis are common, they vary according to the clinical symptoms of the disease. Radiological findings may include the presence of masses, abscesses, or fistulas, depending on the time period and disease progression.[9] In our patient, the decision for operation was taken due to leukocytosis, elevation in CRP level, detection of an area that had a mass effect in the neighborhood of the colon in tomography and the presence of acute abdomen findings. In the literature, patients with actinomycosis in omentum, lungs, abdomen, abdominal wall, small intestines, stomach, adrenal gland, pelvis, tonsils, dental root, oral mucosa, cervical region, tongue, femur, ischium, mandible, maxilla, central nervous system, eye, skin and urogenital system have been described. A comorbid condition such as Human Immmunodeficiency Virus infection, malignancy, immune suppression, obesity, diabetes, chronic alcoholism or age> 65 has been reported in the vast majority of these patients.[9,10,11,12] Our patient had omental involvement resembling malignancy and there were no comorbid diseases. The prognosis of the disease depends on localization (central nervous system, etc.), prolonged infection, initial comorbidities of the patient and delay in diagnosis. Current mortality rates are reported to range from 0 to 28%.[9] In the treatment of deeply located infections, 10-20 million U/day penicillin G for 4-6 weeks intravenously, followed by 4-6 g oral penicillin V per day is recommended. It is also reported that oral treatment should continue for 6-18 months depending on the condition of the patient or until the lesions disappear completely.[11] Our patient was treated with iv penicillin G + oral clindamycin for 4 weeks and then oral penicillin for 5 months. Since no pathology was detected in computed tomography performed in the postoperative sixth month, the treatment was terminated.

Omental cake appearance is a condition that occurs due to involvement of omentum by a malignancy that develops in any organ or due to the malignancies of the omentum that develop from their own tissues, especially the peritoneum. Although abdominal actinomycosis is a rare condition, it is important to distinguish it from malignancy due to its aggressive involvement. In addition, it is important to use special antibiotics and to distinguish it from other intraabdominal pathologies in case of acute abdomen. By

presenting this patient, we aimed to emphasize that omental cake finding might be related to infectious causes besides malignancies and should be brought to mind in differential diagnosis.

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Ethics

Informed Consent: Informed consent was obtained from the patient.

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Authorship Contributions

Surgical and Medical Practices: R.G., U.U., Concept: R.G., Design: R.G., K.G., Data Collection or Processing: R.G., K.G., U.U., Analysis or Interpretation: R.G., Literature Search: R.G., K.G., U.U., Writing: R.G., K.G., U.U.

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CASE REPORT

Solitary Juvenile Colonic Polyp Presenting Anaemia in Patients with Neurofibromatosis Type 1: A Case Report

Nörofibromatozis Tip 1 Hastasında Anemi ile Seyreden İzole Kolon Juvenil Polip: Olgu Sunumu

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ABSTRACT

Gastrointestinal lesions are seen in 10-25% of NF1 patients, but generally they are underestimated by physicians because of their asymptomatic course. A thirtythree-year old male patient reffered to our hospital for anemia evaluation. NF1 physical findings; Lisch Nodules, Cafe u lait macules and neurofibromas were present. Colonoscopy reveled a 5x3x2 cm sized hemorrhagicpolyp in proximal transvers colon and laparoscopic right hemicolectomy was performed. Histopathological diagnosis was juvenile polyp with low-grade dysplasia. Molecular genetic testing detected *NF1* gene mutation. Upper and lower gastrointestinal endoscopy should be performed for all NF1 patients to determine gastrointestinal involvement.

Keywords: Anemia, juvenile colonic polyp, neurofibromatosis type 1

ÖZ

NF1 hastalarının %10-25'inde gastrointestinal tutulum saptansada, asemptomatik klinik seyirleri nedeniyle genellikle gözardı edilirler. Hastanemize anemi nedeni araştırılmak üzere 33 yaşında erkek hasta sevk edildi. Hastanın ilk muayenesinde; NF1 bulguları; Lisch nodülleri, Cafe u lait lekeleri ve nörofibromlar tespit edildi. Kolonoskopide; transvers kolon proksimalinde 5x3x2 cm boyutlarında hemorajik polip tespit edildi ve laparoskopik sağ hemikolektomi ameliyatı uygulandı. Histopatolojik olarak düşük displazili juvenil polip saptandı. *NF1* gen mutasyonu moleküler gen testi ile saptandı. NF1 hastaların hepsinde üst ve alt gastrointestinal sistem endoskopisi gastrointestinal tutulumu değerlendirmek için yapılmalıdır.

Anahtar Kelimeler: Anemi, kolon juvenil polip, nörofibromatozis tip 1

Introduction

Neurofibromatosis type 1 (NF1) is an autosomal dominant inherited disease, and among the tumour suppressor genes, the *NF1* gene has a role in the pathogenesis.[1,2] Approximately, 50% of patients have a first-degree relative diagnosed with NF1 and others have sporadic mutations.[3] NF1 occurs in 1 of 3000-4000 individuals worldwide, and its diagnosis is based on clinical features declared by the National Institutes of Health in 1988[4]: 1) six or more café au lait macules (>0.5 cm for children, >1.5 cm for adults), 2) two or more neurofibromas of any type or one plexiform neurofibroma, 3) axillary or inguinal freckling, 4) optic glioma, 5) two or more Lisch nodules (iris hamartomas), 6) osteodysplasia (pseudoarthrosis, sphenoid dysplasia), and 7) one first-degree relative diagnosed with NF1. The presence of two or more of the aforementioned clinical findings is adequate for NF1 diagnosis.[4] Molecular genetic testing of NF1 is rarely essential, but single gene testing and chromosomal microarray analysis can be performed for pathogenic variants of NF1.

Gastrointestinal lesions are seen in 10%-25% of NF1 patients, but generally, they are underestimated by physicians because

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of their asymptomatic course. Gastrointestinal stromal tumours (GIST) are the most common gastrointestinal lesions of NF1 patients.[5]

Herein, we present a case of NF1 with solitary juvenile colonic polyp to draw attention on NF1 gastrointestinal lesions.

Case Report

A 33-year-old male patient referred to a primary care physician for fatigue, pallor, and dizziness. He was diagnosed with anaemia (haemoglobin 7.2 g/dL) and was transferred to our hospital for further evaluation.

The patient did not have a family history of NF1. Physical examination revealed mild pectus excavatum and numerous café au lait macules 0.5-2 cm in size and located on the thorax (Figure 1). Numerous submucosal lesions were found, which were diagnosed as neurofibromas histopathologically, on the back and upper extremities; the largest was 2 cm in size (Figure 1).

Esophagogastroduodenoscopy findings were unremarkable, but colonoscopy showed an ulcerated 5-cm polyp in the ascending colon, and it was a hamartomatous polyp on the colonoscopic biopsy. Molecular genetic testing detected *NF1* gene mutation. Iris hamartomas (Lisch nodule) were detected in both eyes (Figure 2). Results of bone radiography and abdominal computed tomography were unremarkable. Cranial magnetic resonance imaging showed an 8.5-mm nodular mass located in the midbrain tectum (glioma?) and nodular lesions at the right centrum ovale (demyelinating plaque?).

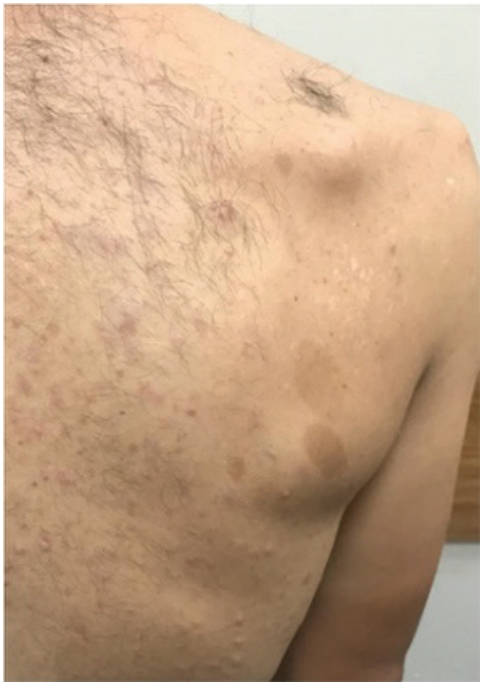

Figure 1. Cafu late macules and neurofibromas

Following three units of red blood cell as replacement, the patient underwent laparoscopic right hemicolectomy. Histopathological examination of the specimen showed a juvenile polyp (5×3×2 cm in size) with haemorrhagic surface in the proximal transvers colon and low-grade dysplasia and interlacing bundles of spindle cells extending into the lamina propria with comma-shaped nuclei, which is a specific finding of NF1 (Figure 3).

The patient was discharged on postoperative day 7 without any complication, and 3-month follow-up continued smoothly.

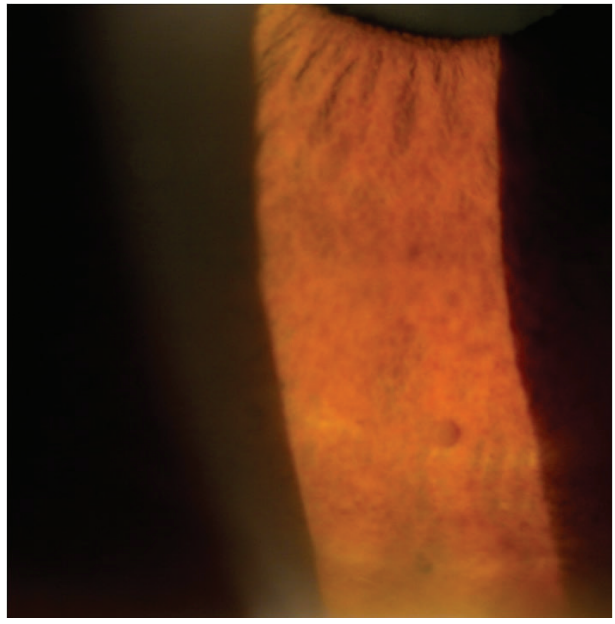

Figure 2. Lisch nodules

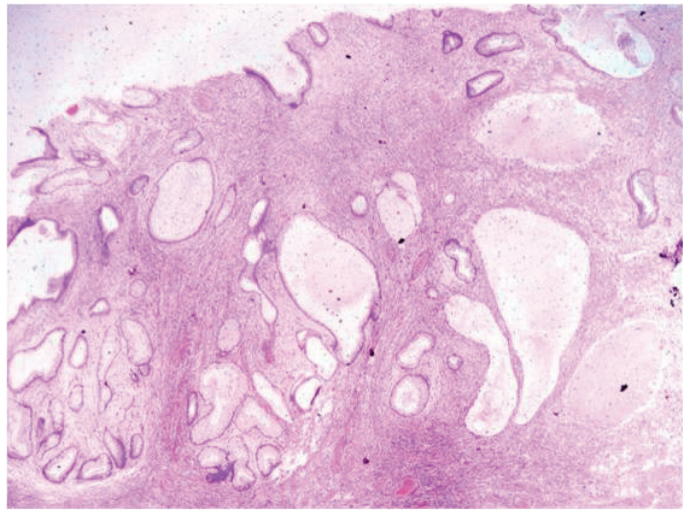

Figure 3. Enlarged irregular crypt structures in inflammatory and edemataous stroma

Discussion

NF is one of the phacomatous diseases or neurocutaneous syndromes. NF 2 affects the central nervous system, while NF1 involves the cardiovascular, gastrointestinal, or skeletal system.[5] Gastrointestinal NF1 neoplasms vary from benign and intermediate to rare aggressive malignant neoplasms.[6] NF1 is frequently located at the upper gastrointestinal system, and colon involvement is rare. Gastrointestinal clinical findings occur sooner than cutaneous findings because of their asymptomatic nature.[7] In the presented case, cutaneous lesions were more remarkable than gastrointestinal findings.

The level of mucosal involvement and localisation of the lesions determine the gastrointestinal symptoms, which present mostly as bleeding.[8] In the present case, the patient was referred to our hospital for examination of anaemia, which was due to a haemorrhagic colonic polyp of NF1. Rarely, gastrointestinal lesions can cause volvulus or intussusception, resulting in mechanical bowel obstruction.[9]

GIST, neurogenic neoplasms (neurofibroma or ganglioneuroma), and neuroendocrine tumours are the three main forms of NF1 gastrointestinal neoplasms.[7,10] Agaime et al.[10] have described inflammatory polyps (non-adenomatous, juvenile-like polyps) which were not listed as NF1-related gastrointestinal lesions. These lesions are characterised by multiple mucosal protrusions, vasculopathic changes, hypervascularity, intense inflammatory infiltration, and histopathological fibroblastic proliferations which differed from NF1 histopathologic findings and classified as inflammatory polyps.[10] Juvenile polyps should be considered in the differential diagnosis of NF1 inflammatory polyps. NF1 juvenile polyps are rare clinicopathological conditions, and cases of coexistence of inflammatory and juvenile polyps in NF1 were reported.[10,11] In the present case, the patient presented with occult gastrointestinal bleeding due to ascending colonic juvenile polyp with NF1. The absence of reactive inflammatory changes and neural structures histopathologically prompted diagnosis of juvenile polyp.

Juvenile polyps are hamartomatous polyps and contribute to a small portion of colorectal polyps. While the malignancy potential of solitary juvenile polyp is low, juvenile polyposis syndromes are at risk for colorectal malignancies.[12] Although co-occurrence of NF1 and hamartomatous polyposis syndromes is described in the literature, solitary juvenile polyp co-occurrence has not been well described yet.

The overlapping findings and co-occurrence of hamartomatous and neurocutaneous syndromes can be result from the interaction of cellular signal transduction pathways at the molecular level. Therefore, genetic and molecular studies showing this interaction are needed to determine and monitor at-risk groups.

Screening, follow-up, and management of these lesions are still undetermined because of their rarity. We established that colonoscopic polypectomy and annual colonoscopy should be sufficient for management and follow-up. During follow-up, if malignant transformation occurs, colon resection should be performed according to oncological principles.

Conclusion

NF1 colonic involvement is a very rare clinical condition whose clinical findings will later present as gastrointestinal bleeding or mechanical bowel obstruction. Upper and lower gastrointestinal endoscopy are necessary for all NF1 patients to determine gastrointestinal involvement.

Ethics

Informed Consent: Written informed consent was obtained from the patient.

Peer-review: Internally and externally peer reviewed.

Authorship Contributions

Surgical and Medical Practices: M.T.B., A.S., Concept: M.T.B., A.S., Design: M.T.B., İ.Y., Data Collection or Processing: M.T.B., M.S., Analysis or Interpretation: M.T.B., M.S., Literature Search: İ.Y., A.S., Writing: İ.Y.

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