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RESEARCH ARTICLE

Partial Versus Total Mesorectal Excision for the Surgical Treatment of Mid-Rectal Cancer: An Assessment from the Turkish Society of Colon and Rectal Surgery's Colorectal Cancer Database

Volkan Özben[1], Nuri Okkabaz[2], Turkish Colorectal Cancer Database Study Group*

[1]Acıbadem Mehmet Ali Aydınlar University, Acıbadem Maslak Hospital, Clinic of General Surgery, İstanbul, Turkey
[2]Atlas University Faculty of Medicine, Department of General Surgery, İstanbul, Turkey

ABSTRACT

Aim: Although total mesorectal excision (TME) is standard, partial mesorectal excision (PME) is increasingly performed in upper rectal cancer to preserve a longer rectal stump, potentially improving outcomes. However, data on the role of PME in mid-rectal cancer are limited. This study aims to assess the short-term clinicopathological outcomes of PME in mid-rectal cancer.

Method: The Turkish Society of Colon and Rectal Surgery's colorectal cancer database was searched for patients undergoing surgery for mid-rectal cancer between July 2018 and December 2022. The patients were divided into PME and TME groups and histopathological and 30-day clinical outcomes were compared.

Results: The study included 158 patients: 24 (15%) in the PME group and 134 (85%) in the TME group. There were no significant differences in perioperative data, except for tumor stage, neoadjuvant treatment, and stoma creation (58.3% in PME vs. 85.8% in TME, p=0.004). No differences were observed in nodal harvest (18.6±8.5 in PME vs. 15.6±9.2 in TME), quality of mesorectal excision, or positivity of radial and distal margins (8.3% in PME vs. 5.2% in TME). Multivariate analysis showed that PME was associated with a similar likelihood of distal margin positivity [odds ratio (OR): 0.77, 95% confidence interval (CI): 0.02-19.08, p=0.88], radial margin positivity (OR: 9.95, 95% CI: 0.22-522.17, p=0.22), nodal harvest (1.28, 95% CI: -1.62-7.70, p=0.20), anastomotic leak (OR: 0.30, 95% CI: 0.01-2.60, p=0.33), and stoma formation (OR: 0.67, 95% CI: 0.19-2.44, p=0.53).

Conclusion: PME does not compromise surgical resection margins or short-term outcomes in patients with mid-rectal cancer. These findings need confirmation with larger cohorts, and additional studies are necessary to evaluate functional outcomes.

Keywords: Mid-rectal cancer, partial mesorectal excision, pathological outcomes, morbidity

Introduction

Since Heald first introduced total mesorectal excision (TME),[1] it has been widely adopted as the standard surgical technique for all rectal cancers, including those in the upper and mid-rectum. The rationale for completely excising the mesorectum stemmed from addressing local recurrences, which were thought to occur due to distal extramural cancer spread, such as lymph node metastasis and mesorectal tumor deposits not removed with conventional surgery. To date, most research has focused on low rectal cancer and assessing the oncological adequacy of sphincter-saving surgery. With the increasing use of neoadjuvant chemoradiotherapy, which provides improved oncological outcomes and better local disease control,[2,3] the required length for a clear distal surgical margin has been successfully reduced from 5 to 1 cm.[4-6]

The standards for the distal resection margin for upper- and mid-rectal cancers are still based on older studies conducted before the introduction of neoadjuvant chemoradiation and the widespread use of modern magnetic resonance imaging.[5-8] Current guidelines continue to recommend partial mesorectal excision (PME) for upper rectal cancer, involving division of the mesorectum 5 cm below the tumor level. For mid-rectal

Address for Correspondence: Volkan Özben, MD,
Acıbadem Mehmet Ali Aydınlar University, Acıbadem Maslak Hospital, Clinic of General Surgery, İstanbul, Turkey
E-mail: volkanozben@yahoo.co.uk **ORCID ID:** orcid.org/0000-0002-9620-5080
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cancers, TME with dissection down to the pelvic floor is recommended in most studies, regardless of the specific tumor location.[9]

Recent research by Guedj et al.[10] on mid-rectal tumors post-chemoradiotherapy indicated that mesorectal tumor invasion below the tumor's lower edge, including lymph node metastasis, is fairly rare. In light of these findings, several studies have suggested that PME, with a shorter distal resection margin, could also be a viable option for mid-rectal cancer to preserve a longer rectal stump and thereby ensure better rectal function. Nonetheless, the data supporting this approach remain limited.

Therefore, this study aims to investigate the impact of PME versus TME on surgical margins and short-term perioperative outcomes in patients with mid-rectal cancer, utilizing the national colorectal cancer database.

Materials and Methods

Ethical approval was granted by the Acıbadem University Ethic Committee (approval number: ATADEK 2023-05/150, date: 24.03.2023), and a comprehensive review of the Turkish Society of Colon and Rectal Surgery (TSCRS) colorectal cancer database was conducted. This review covered all individuals who underwent rectal cancer surgery between July 2018 and December 2022. The TSCRS database provides extensive data on patients requiring colorectal surgery, encompassing preoperative and intraoperative information and postoperative 30-day clinicopathological outcomes across 20 centers in Turkey. The retrospective nature of the study negated the need for informed consent.

The study included patients with (y)pTNM stage I-IV mid-rectal adenocarcinoma who had undergone sphincter-saving procedures. Mid-rectal cancer was specifically identified as cancer located between 5 and 10 cm from the anal verge. Exclusion criteria encompassed emergency surgeries, an American Society of Anesthesiologists (ASA) score exceeding 3, abdominoperineal resection, indeterminate tumor distance from the anal verge, and either synchronous colorectal lesions or recurrent tumors that necessitated additional or reoperative interventions.

Patients were categorized into two cohorts based on the surgical method employed: The PME group and the TME group, with the choice of the procedure largely influenced by the attending surgeon's preference. Collected data included patient demographics, comorbidities, tumor distance from the anal verge, tumor staging, use of neoadjuvant chemoradiotherapy, surgical approach, anastomotic techniques, tumor proximity to resection margins, formation of diverting stomas, number of lymph nodes harvested, mesorectal excision quality, and outcomes 30-days post-surgery.

Primary outcomes were assessed based on the positivity of the distal and radial resection margins. Secondary outcomes focused on the harvest of lymph nodes, the incidence of anastomotic leaks, and the creation of diverting stomas. Clinical and pathological outcomes were systematically compared between the PME and TME groups to evaluate any potential associations with preoperative and intraoperative factors.

Statistical Analysis

In this study, two primary analyses were conducted. Initially, univariate analyses were utilized to explore the perioperative and postoperative variables between the PME and TME groups. Following this, similar univariate analyses were performed to discern statistically significant factors associated with the study outcomes. Subsequently, both statistically significant and clinically important but statistically non-significant preoperative and intraoperative risk factors were included in a multivariate analysis to determine independent predictors of the study outcomes.

Categorical variables were expressed as frequencies and percentages, whereas continuous variables were reported as means and standard deviations. Univariate comparisons between the groups were conducted. For categorical data, a chi-square test or Fisher's exact test was employed, depending on the expected frequencies in each cell. Continuous variables were analyzed using the Student's t-test for normally distributed data or the Wilcoxon rank-sum test for data not following a normal distribution.

Logistic regression analysis was performed to evaluate the multivariable relationships between the risk factors and the outcomes. All potential risk factors were entered into the logistic regression model simultaneously. Odds ratios (OR) and their 95% confidence intervals (CI) were calculated to estimate the association strength between each risk factor and the outcome. Statistical analyses were carried out using the R programming language, with a significance level set at 0.05 for all tests to determine statistical significance.

Results

The database identified a total of 432 patients who underwent rectal cancer surgery during the study period. Among these, 158 patients (men: 99, women: 59) with mid-rectal cancer met the inclusion criteria. The distribution between the PME and TME groups was 24 (15%) and 134 (85%) patients, respectively. The mean tumor distance from the anal verge was 8.9±1.4 cm in the PME group and 7.8±1.3 cm in the TME group (p=0.0004).

The preoperative characteristics are detailed in Table 1. No substantial differences were observed between the groups concerning age, gender, ASA scores, body mass index,

Table 1. Comparison of preoperative characteristics between the PME and TME groups

Preoperative characteristics	PME group (n=24)	TME group (n=134)	p
Age, years, mean ± SD	62.5±14.5	61.2±11.5	0.42
Gender, M/F, n (%)	14 (58.3)/10 (41.7)	85 (63.4)/49 (36.6)	0.81
ASA score, n (%)			0.49
1	8 (33.3)	33 (24.6)	
2	11 (45.8)	79 (58.9)	
3	5 (20.8)	22 (16.4)	
BMI (kg/m^2), mean ± SD	25.4±2.7	25.9±3.6	0.46
Tobacco use, n (%)	3 (12.5)	23 (17.2)	0.79
Hypertension, n (%)	7 (29.2)	48 (35.8)	0.69
Diabetes mellitus, n (%)	1 (4.2)	26 (19.4)	0.13
Coronary heart disease, n (%)	5 (20.8)	12 (8.9)	0.17
Congestive heart disease, n (%)	1 (4.2)	0 (0)	0.33
Chronic obstructive pulmonary disease, n (%)	1 (4.2)	7 (5.2)	>0.99
Cerebrovascular disease, n (%)	1 (4.2)	3 (2.2)	>0.99
Chronic kidney disease, n (%)	0 (0)	0 (0)	NS
Other diseases, n (%)	2 (8.3)	14 (10.5)	>0.99
Previous abdominal surgery, n (%)	4 (16.7)	24 (17.9)	>0.99
Distance of tumor from the anal verge (cm), mean ± SD	8.9±1.4	7.8±1.3	0.0004
cT stage, n (%)			0.71
1 and 2	7 (29.2)	31 (23.1)	
3 and 4	17 (70.8)	103 (76.9)	
cN stage, n (%)			0.03
Negative	14 (58.3)	44 (32.8)	
Positive	10 (41.7)	90 (67.2)	
cM stage, n (%)			0.59
Negative	19 (79.2)	115 (85.8)	
Positive	5 (20.8)	19 (14.2)	
cTNM stage, n (%)			0.016
1 and 2	14 (58.3)	41 (30.6)	
3 and 4	10 (41.7)	93 (69.4)	
Hepatic metastasis, n (%)	3 (12.5)	18 (13.4)	>0.99
Lung metastasis, n (%)	0 (0)	5 (3.7)	0.74
Other organ metastasis, n (%)	2 (8.3)	1 (0.8)	0.09
Neoadjuvant treatment, n (%)	9 (37.5)	117 (87.3)	<0.001
The time between neoadjuvant treatment and surgery; weeks, mean ± SD	6.9±4.3	8.8±3.3	0.23

TME: Total mesorectal excision, PME: Partial mesorectal excision, SD: Standard deviation, M/F: Male/female, ASA: American Society of Anesthesiologists, BMI: Body mass index, NS: Not significant

preoperative comorbidities, prior abdominal surgery, cT stage, and cM stage. However, the rate of cN positivity (41.7% vs. 67.2%) and cTNM stage were significantly higher in the TME group ($p<0.05$). Neoadjuvant chemoradiotherapy usage was also more prevalent in the TME group (37.5% vs. 87.3%, $p<0.001$).

Intraoperative findings, as presented in Table 2, showed no substantial differences in terms of the operative approach (open vs. minimally invasive), anastomotic technique and configuration, additional organ resection, operative time (187.3±68.2 vs. 214±82.3 minutes), conversion to open surgery, estimated blood loss, and intraoperative complications (0% vs. 5.2%). Notably, the mean distance of the anastomosis from the anal verge was longer (5.2±1.5 cm vs. 3.7±1.1 cm, p=0.001), and the rate of diverting stoma formation was lower (58.3% vs. 85.8%, p=0.004) in the PME group.

The postoperative morbidity distributions are shown in Table 3. There were no substantial differences in the rates of anastomotic leak (4.2% vs. 8.9%), surgical site infections, prolonged ileus, mechanical bowel obstruction, bleeding, blood transfusion, cardiopulmonary and urinary complications, reoperation, readmission, and mortality (0% vs. 0.8%). The mean hospital stay was 7.3±4.9 days in the PME group and 8.1±5.0 days in the TME group (p=0.13).

Table 4 presents the pathological results. There were no substantial differences in pT stage, nodal positivity, pTNM stage, quality of mesorectal excision, or rates of distal resection margin positivity (4.2% vs. 2.2%) and radial resection margin positivity (4.2% vs. 2.9%). The mean lengths of the distal resection margins were comparable between the groups (3.3±1.4 cm vs. 3.3±1.6 cm, p=0.76). Similarly, the mean numbers of lymph nodes harvested were not significantly different (18.6±8.5 vs. 15.6±9.2, p=0.09).

Table 2. Comparison of intraoperative characteristics between the PME and TME groups

Intraoperative characteristics	PME group (n=24)	TME group (n=134)	p
Operative procedure, n (%)			0.16
Open	16 (66.7)	65 (48.5)	
Minimally invasive	8 (33.3)	69 (51.5)	
Anastomotic technique, n (%)			>0.99
Hand-sewn	0 (0)	2 (1.5)	
Stapled	24 (100)	132 (98.5)	
Anastomotic configuration, n (%)			
End-to-end	20 (83.3)	101 (75.4)	
Side-to-end	4 (16.7)	33 (24.6)	
Distance of anastomosis from the anal verge (cm), mean ± SD	5.2±1.5	3.7±1.1	<0.001
Stoma creation, n (%)	14 (58.3)	115 (85.8)	0.004
Additional organ resection, n (%)	0 (0)	10 (7.5)	0.35
Operative time (minute), mean ± SD	187.3±68.2	214±82.3	0.12
Conversion to open surgery, n (%)	0 (0)	2 (2.9)	>0.99
Estimated blood loss (mL), mean ± SD	126.3±80.4	141.6±174.9	0.58
Intraoperative complication, n (%)	0 (0)	7 (5.2)	0.54

TME: Total mesorectal excision, PME: Partial mesorectal excision, SD: Standard deviation

Table 3. Comparison of postoperative outcomes between the PME and TME groups

Postoperative outcomes	PME group (n=24)	TME group (n=134)	p
Anastomotic leak, n (%)	1 (4.2)	12 (8.9)	0.70
Surgical site infection, n (%)			0.17
Superficial	0 (0)	12 (8.9)	
Deep	0 (0)	2 (1.5)	
Organ/space	0 (0)	10 (7.5)	
Prolonged ileus, n (%)	2 (8.3)	7 (5.2)	0.89
Mechanical bowel obstruction, n (%)	1 (4.2)	0 (0)	0.33
Bleeding, n (%)	0 (0)	2 (1.5)	>0.99

Table 3. Continued

Postoperative outcomes	PME group (n=24)	TME group (n=134)	p
Red blood cell transfusion, n (%)	7 (29.2)	25 (18.7)	0.37
Cardiac complications, n (%)	0 (0)	1 (0.8)	>0.99
Pulmonary complications, n (%)	0 (0)	2 (1.5)	>0.99
Urinary complications, n (%)	1 (4.2)	3 (2.2)	>0.99
Other complications, n (%)	0 (0)	2 (1.5)	>0.99
Reoperation, n (%)	1 (4.2)	9 (6.7)	0.98
Readmission, n (%)	1 (4.2)	11 (8.2)	0.79
Hospital stay (days), mean ± SD	7.3±4.9	8.1±5.0	0.13
Mortality, n (%)	0 (0)	1 (0.8)	>0.99

TME: Total mesorectal excision, PME: Partial mesorectal excision, SD: Standard deviation

Table 4. Comparison of pathologic characteristics between the PME and TME groups

Pathologic characteristics	PME group (n=24)	TME group (n=134)	p
pT stage, n (%)			0.76
0, 1 and 2	9 (37.5)	58 (43.3)	
3 and 4	15 (62.5)	76 (56.7)	
pN stage, n (%)			0.45
0	14 (58.3)	92 (68.7)	
Positive	10 (41.7)	42 (31.3)	
pTNM stage, n (%)			0.76
0, 1 and 2	13 (54.2)	87 (64.9)	
3 and 4	11 (45.8)	47 (35.1)	
Number of harvested lymph nodes, mean ± SD	18.6±8.5	15.6±9.2	0.09
Number of positive lymph nodes, mean ± SD	2.6±4.9	1.3±3.9	0.31
Tumor perforation, n (%)	1 (4.2)	4 (2.9)	>0.99
Quality of mesorectal excision, n (%)			
Complete	19 (86.4)	118 (88.1)	
Near complete	3 (13.6)	16 (11.9)	
Incomplete	0 (0)	0 (0)	
Not reported	2	0	
Distal resection margin positivity, n (%)	1 (4.2)	3 (2.2)	>0.99
Radial resection margin positivity, n (%)	1 (4.2)	4 (2.9)	>0.99
Length of distal resection margin (cm), mean ± SD	3.3±1.4	3.3±1.6	0.76

TME: Total mesorectal excision, PME: Partial mesorectal excision, SD: Standard deviation

Regarding the primary study outcomes, the results from multivariable logistic regression analyses are detailed in Tables 5, 6. Compared with TME, PME did not significantly increase the risk of positivity for either distal resection margins (OR: 0.77, 95% CI: 0.02-19.08, p=0.88) or radial resection margins (OR: 9.95, 95% CI: 0.22-522.17, p=0.22). In terms of secondary outcomes, PME compared with TME showed no significant difference in the number of lymph nodes harvested (OR: 1.28, 95% CI: -1.62-7.70, p=0.20) or the likelihood of an anastomotic leak (OR: 0.3, 95% CI: 0.01-2.60, p=0.33) and diverting stoma formation (OR: 0.67, 95% CI: 0.19-2.44, p=0.53), as indicated in Tables 7-9.

Table 5. Multivariate logistic regression analysis evaluating possible risk factors associated with distal resection margin positivity

Risk factors	OR	95% CI	p
Groups (PME vs. TME)	0.77	0.02-19.08	0.88
BMI (1 kg/m^2 increase)	1.07	0.78-1.50	0.65
pT stage (0+1+2 vs. 3+4)	2.28	0.20-56.08	0.53
pN stage (positive vs. negative)	0.56	0.02-6.69	0.67
Neoadjuvant treatment (yes vs. no)	0.23	0.01-4.28	0.29
Operative approach (open vs. minimally invasive)	0.60	0.02-7.74	0.69
Anastomotic technique (hand-sewn vs. stapled)	N/A	0.0-N/A	>0.99
Quality of mesorectal excision (complete vs. near complete)	8.87	0.84-125.25	0.06
Distance of tumor from the anal verge (1 cm increase)	0.52	0.15-1.36	0.22
Distance of anastomosis from the anal verge (1 cm increase)	1.47	0.51-4.69	0.47

TME: Total mesorectal excision, PME: Partial mesorectal excision, BMI: Body mass index, OR: Odds ratio, CI: Confidence interval, N/A: Non-applicable

Table 6. Multivariate logistic regression analysis evaluating possible risk factors associated with radial resection margin positivity

Risk factors	OR	95% CI	p
Groups (PME vs. TME)	9.95	0.22-522.17	0.22
BMI (1 kg/m^2 increase)	0.66	0.78-1.50	0.65
pT stage (0+1+2 vs. 3+4)	N/A	0.0-N/A	>0.99
pN stage (positive vs. negative)	13.31	0.46-2007.8	>0.99
Neoadjuvant treatment (yes vs. no)	N/A	0.00-N/A	>0.99
Operative approach (open vs. minimally invasive)	1.16	0.05-27.1	0.92
Anastomotic technique (hand-sewn vs. stapled)	0.0	0.0-N/A	>0.99
Quality of mesorectal excision (complete vs. near complete)	0.0	N/A	>0.99
Distance of tumor from the anal verge (1 cm increase)	0.11	0.0-0.70	0.096
Distance of anastomosis from the anal verge (1 cm increase)	6.67	1.42-84.47	0.048

TME: Total mesorectal excision, PME: Partial mesorectal excision, BMI: Body mass index, OR: Odds ratio, CI: Confidence interval, N/A: Non-applicable

Discussion

The present study provides a risk-adjusted comparison of PME versus TME in patients with mid-rectal cancer using a national colorectal cancer database. The results suggest that PME neither increases the risk of distal resection margin positivity nor radial margin positivity. Furthermore, PME does not affect the number of lymph nodes harvested or the rates of anastomotic leak and diverting stoma creation.

The description of TME by Heald revolutionized the surgical treatment of rectal cancer, leading to a substantial reduction in the local recurrence rate-from 30% to <10%.[11] Heald proposed that since rectal cancer might spread below the tumor level, an optimal cancer dissection should include the entire mesorectum, hence the term TME, for all rectal cancers.[1] However, TME is associated with a high incidence of morbidity, including anorectal and urogenital dysfunctions, due to the extensive pelvic dissection performed.[12,13] Consequently, in the management of upper rectal cancer, improved oncological outcomes-particularly in the era of neoadjuvant chemoradiation-have prompted surgeons to prioritize functional outcomes, adopting a tailored approach known as PME. This approach preserves a longer rectal stump, ensuring better functional outcomes. Currently, PME is considered oncologically adequate for upper rectal cancers in many institutions.

This paradigm shift in the management of upper rectal cancer prompted us to question the rationale of continuing TME surgery for all mid-rectal cancers. A recent pathological and radiological study reported by Guedj et al.[10] showed that in 49 consecutive patients undergoing neoadjuvant chemoradiotherapy followed by PME for mid-rectal cancer, none of the 98 examined nodes were positive (N$^+$), and only one mesorectal tumor deposit was noted 2 cm below the tumor

Table 7. Multivariate logistic regression analysis evaluating possible risk factors associated with the number of lymph nodes harvested

Risk factors	OR	95% CI	p
Groups (PME vs. TME)	1.28	-1.62-7.72	0.20
pT stage (0+1+2 vs. 3+4)	2.04	0.94-5.03	0.18
pTNM stage (0+1+2 vs. 3+4)	4.92	1.87-7.96	0.002
Neoadjuvant treatment (yes vs. no)	-1.37	-5.27-2.52	0.49
Distance of tumor from the anal verge (1 cm increase)	0.02	-1.07-1.10	0.98
Operative approach (open vs. minimally invasive)	3.11	0.34-5.88	0.03
Quality of mesorectal excision (complete vs. near complete)	-1.06	-5.34-3.23	0.63

TME: Total mesorectal excision, PME: Partial mesorectal excision, OR: Odds ratio, CI: Confidence interval

Table 8. Multivariate logistic regression analysis evaluating possible risk factors associated with anastomotic leak

Risk factors	OR	95% CI	p
Groups (PME vs. TME)	0.30	0.01-2.60	0.33
ASA score (1+2 vs. 3)	1.69	0.30-8.13	0.53
BMI (1 kg/m^2 increase)	1.11	0.93-1.34	0.25
pT stage (0+1+2 vs. 3+4)	1.29	0.26-6.88	0.75
pTNM stage (0+1+2 vs. 3+4)	1.28	0.26-6.21	0.76
Neoadjuvant treatment (yes vs. no)	0.86	0.17-5.14	0.86
Distance of tumor from the anal verge (1 cm increase)	0.70	0.36-1.30	0.27
Operative time (1-minute increase)	1.00	0.99-1.01	0.14
Operative approach (open vs. minimally invasive)	0.33	0.07-1.40	0.92
Anastomotic technique (hand-sewn vs. stapled)	N/A	0.0-N/A	>0.99
Anastomotic configuration (end-to-end vs. side-to-end)	0.39	0.05-1.92	0.29
Distance of anastomosis from the anal verge (1 cm increase)	0.93	0.46-1.79	0.83
Diverting stoma (yes vs. no)	0.19	0.03-1.00	0.047
Estimated blood loss (1 mL increase)	1.00	0.99-1.00	0.73
Blood transfusion (yes vs. no)	4.73	1.04-22.96	0.045

TME: Total mesorectal excision, PME: Partial mesorectal excision, ASA: American Society of Anesthesiologists, BMI: Body mass index, OR: Odds ratio, CI: Confidence interval, N/A: Non-applicable

Table 9. Multivariate logistic regression analysis evaluating possible risk factors associated with diverting stoma formation

Risk factors	OR	95% CI	p
Groups (PME vs. TME)	0.67	0.19-2.44	0.53
ASA score (1+2 vs. 3)	0.94	0.28-3.60	0.93
BMI (1 kg/m^2 increase)	1.00	0.87-1.15	>0.99
pTNM stage (0+1+2 vs. 3+4)	0.95	0.35-2.71	0.93
Neoadjuvant treatment (yes vs. no)	2.83	0.94-8.48	0.06
Operative approach (open vs. minimally invasive)	0.65	0.22-1.85	0.42
Distance of tumor from the anal verge (1 cm increase)	0.64	0.42-0.94	0.03
Distance of anastomosis from the anal verge (1 cm increase)	0.92	0.62-1.38	0.67
Anastomotic technique (hand-sewn vs. stapled)	0.00	N/A-1.04	>0.99
Anastomotic configuration (end-to-end vs. side-to-end)	2.13	0.62-8.87	0.26
Estimated blood loss (1 mL increase)	1.00	1.00-1.01	0.54
Operative time (1-minute increase)	1.00	1.00-1.01	0.19

TME: Total mesorectal excision, PME: Partial mesorectal excision, ASA: American Society of Anesthesiologists, BMI: Body mass index, OR: Odds ratio, CI: Confidence interval, N/A: Non-applicable

level. Another study involving 124 patients with mid- or low rectal cancers from the same institution also indicated that distal intramural and mesorectal cancer spread is rare, with only three (2.4%) mid-rectal cancers showing distal viable cancer spread and only one tumor deposit 2 cm below the inferior tumor edge. In any of these patients, no viable metastatic lymph nodes were described below the tumor level.[14] Additionally, a more recent study from Turkey suggests that a sufficient distal resection margin following preoperative chemoradiation is 1 cm for most rectal cancers located 2-12 cm from the anal verge.[15]

In the present study, the mean length of the distal resection margin was 3.3 cm in the PME group, which is considered adequate for proper oncologic resection. There was no substantial difference in the mean length of the distal resection margin between the groups (3.3±1.4 cm for PME vs. 3.3±1.6 cm for TME). The rate of tumoral involvement in the distal resection margin was extremely low and similar between the groups, with only 1 patient in the PME group and 3 patients in the TME group showing involvement (4.2% vs. 2.2%, respectively). Additionally, no substantial differences were detected regarding radial resection margin involvement (4.2% vs. 2.9%). Regarding the harvested lymph node status, the mean number of total and positive lymph nodes was similar between the groups. These findings align with those reported by Guedj et al.[10,14]

Further risk-adjusted analyses were performed to determine whether PME negatively impacted these pathological outcomes, considering substantial differences between the groups in perioperative factors such as tumor stage, distance of the tumor from the anal verge, and use of neoadjuvant chemoradiotherapy. Even after these analyses, PME was not found to be a risk factor for distal and radial resection margin positivity and did not adversely affect the nodal harvest.

Since neoadjuvant chemoradiotherapy is associated with a lower lymph node yield,[16] the higher usage of this treatment in the TME group (87.3% vs. 37.5%) may account for the lack of differences in lymph node counts between the groups in our study. Another crucial factor in rectal cancer surgery is the quality of the mesorectal excision. Jiménez-Toscano et al.[17] suggest focusing on the quality of the surgical procedure to preserve an intact mesorectum, as the integrity of the mesorectum is associated with local and distal recurrences and survival. Our results demonstrate that PME does not impair the quality of the surgical procedure, as complete mesorectal excision was achieved in 86% of patients in the PME group and 88% in the TME group, showing no substantial difference.

To the best of our knowledge, only three previous studies have investigated the clinical and oncological outcomes of PME in patients with mid-rectal cancer.[17-19] However, these studies also included patients with upper rectal cancer. In a cohort of 172 patients reported by Kanso et al.[18], 45 had mid-rectal cancer, and the authors concluded that PME can be safely performed with a low risk of stoma creation, and the prognosis remains comparable to that with TME. In another study involving 211 patients with mid- and upper rectal cancers, participants were divided into four groups based on the distal margin (Q1: <10 mm, Q2: 11-20 mm, Q3: 21-30 mm, Q4: >31 mm). No differences were detected in 5-year local recurrence-free survival, disease-free survival, or overall survival. The authors noted that PME with a shorter distal resection margin does not compromise oncological outcomes.[17] Finally, in a propensity-score matching study that included 671 patients with mid- and upper rectal cancers, Kim et al.[19] reported similar survival rates between the PME and TME groups. The postoperative complication rate was higher in the TME group (21.4% vs. 14.5%), and incontinence was independently associated with TME. The authors recommended PME for patients with mid-rectal cancer when the lower margin is more than 5 cm from the anal verge.[19]

The present study is unique as it solely includes data from a homogenous cohort of patients with mid-rectal cancer. In addition to comparable pathological outcomes, univariate analysis of the postoperative clinical outcomes revealed a substantially lower rate of stoma creation in the PME group (58.3% vs. 85.8%). Additionally, the rate of anastomotic leaks was also lower in the PME group (4.2% vs. 8.9%), although this difference did not reach statistical significance. Rectal sparing is expected to benefit these short-term outcomes, as the risk associated with these outcomes is suggested to decrease with a longer rectal stump.[20] However, following risk adjustment, PME was found to have a similar likelihood of stoma creation and anastomotic leaks compared with TME. This may be explained by the relatively small number of patients in this study. Further research with a larger sample size may yield more favorable results regarding these outcomes following PME.

Study Limitations

The retrospective nature of the data obtained from the prospectively maintained national database and the focus on short-term outcomes are two major limitations of this study. Additionally, there is always a risk of data entry errors, which could affect the validity of the findings. Furthermore, no data regarding the functional evaluation of the PME and TME procedures were included. It is known that if more than 3 cm of rectal stump is preserved, function is normal or subnormal in more than 90% of patients.[10,21] Thus, conservation of the lower rectum with PME can potentially decrease the risk of low anterior resection syndrome.

Conclusion

Our findings suggest that PME does not compromise surgical resection margins or short-term outcomes in patients with mid-rectal cancer. However, these results need to be confirmed with larger cohorts, and further studies are needed to evaluate functional outcomes.

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***Turkish Colorectal Cancer Database Study Group:** Erman Aytaç, Prof. Dr. (Department of General Surgery, Acıbadem Mehmet Ali Aydınlar University Faculty of Medicine; Acıbadem Atakent Hospital, İstanbul, Turkey); Tayfun Bişgin, Assoc. Prof. Dr. (Department of General Surgery, Dokuz Eylül University Faculty of Medicine, İzmir, Turkey); Osman Bozbıyık, Assoc. Prof. Dr. (Department of General Surgery, Ege University Faculty of Medicine, İzmir, Turkey); İsmail Cem Eray, Assoc. Prof. Dr. (Department of General Surgery, Çukurova University Faculty of Medicine, Adana, Turkey); Barış Gülcü, Assoc. Prof. Dr. (Bursa Medicana Hospital, Bursa, Turkey); Özgen Işık, Prof. Dr. (Department of General Surgery, Uludağ University Faculty of Medicine, Bursa, Turkey); Mehmet Ali Koç, Assoc. Prof. Dr. (Department of General Surgery, Ankara University Faculty of Medicine, Ankara, Turkey); Ahmet Rencüzoğulları, Assoc. Prof. Dr. (Department of General Surgery, Koç University Faculty of Medicine, İstanbul, Turkey).

Ethics

Ethics Committee Approval: This study was approved by the Acıbadem University Faculty of Medicine Ethics Committee (approval number: ATADEK 2023-05/150, date: 24.03.2023).

Informed Consent: Retrospective study.

Authorship Contributions

Concept: V.Ö., N.O., Design: V.Ö., N.O., Data Collection or Processing: V.Ö., Analysis or Interpretation: V.Ö., N.O., Literature Search: V.Ö., N.O., Writing: V.Ö., N.O.

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