DOI: 10.4274/tjcd.galenos.2021.2021-5-8
Turk J Colorectal Dis 2022;32:54-58

RESEARCH ARTICLE

Comparison of Anismus and Perineal Descent on Static Images of Magnetic Resonance Defecography: Can We Rule Out Anismus in Patients Who Can not Defecate?

Nuray Haliloğlu, Mustafa Fatih Arslan, Ayşe Erden

Ankara University Faculty of Medicine, Department of Radiology, Ankara, Turkey

ABSTRACT

Aim: Both anismus and perineal descent may cause symptoms of obstructed defecation, and impaired rectal evacuation may be a major finding of anismus, or due to insufficient patient co-operation. The aim was to compare static magnetic resonance defecography (MRD) measurements in patients with anismus and perineal descent, and to identify findings which may rule out anismus in patients who can not defecate.

Method: Patients with symptoms of obstructed defecation who underwent MRD between July 2016 and March 2018 were retrospectively evaluated. Thickness of anal sphincter was measured on T2W axial images. Anorectal angle (ARA) and M-line were measured on static MRD images with distended rectum.

After all measurements were completed, patients were divided into two groups depending on the diagnosis indicated by MRD. Group 1 consisted of patients with findings suggesting anismus and group 2 consisted of patients with perineal descent.

The measurements of ARA, M line and thicknesses of anal sphincter were compared.

Results: In total 90 patients (68 female; 75.6%) were included. Group 1 consisted of 37 (20 female) patients with a mean age of 46 years. Group 2 consisted of 53 (48 female) patients with a mean age of 52 years. Both the age (p=0.039) and the gender distribution (p<0.01) differed significantly between the groups, while the thickness of the internal and external anal sphincter was not significantly different. Both the ARA measurements (p=0.025) and difference in the length of M-line (p=0.047) were significantly different between the groups on images with distended rectum.

Conclusion: Patients with anismus were younger but there was no gender predilection. When the rectum was filled with contrast media, the ARA was wider and M-line was longer in patients with perineal descent.

Keywords: Anismus, defecography, dyssynergic defecation, perineal descent

Introduction

In patients with perineal descensus syndrome there is an excessive pelvic floor descent, and in anismus there is an inappropriate contraction of the pelvic floor during defecation.[1] In both abnormalities, patients may present with symptoms of obstructed defecation, such as incomplete evacuation, need to apply digital support and excessive straining during defecation with repeated and prolonged attempts for evacuation.[2] Magnetic resonance defecography (MRD) is the method of choice in the assessment of pelvic floor disorders, especially defecatory dysfunctions. An appropriate MRD should include T2-weighted (T2W) axial, coronal, and sagittal images, and also dynamic sequences at rest, and during squeezing, straining, and evacuation. It is strongly recommended that the patient must be informed about the examination before the procedure and the importance of patient co-operation must be emphasized.[3,4] Asking the patient to evacuate in a supine position within the MR unit is not comfortable, physiological or dignified during defecation. Therefore the entire study is clearly explained to

Address for Correspondence: Nuray Haliloğlu, MD, Ankara University Faculty of Medicine, Department of Radiology, Ankara, Turkey
E-mail: nurayunsal2@hotmail.com **ORCID ID:** orcid.org/0000-0002-1125-4896
Received: 20.05.2021 **Accepted:** 13.07.2021

our patients at their first visit. We attempt to comfort them before the examination and repeat the evacuation phase at least three times to ensure the best possible dynamic images are obtained. Nevertheless, some patients still cannot defecate during the examination, which may or may not be associated with anismus.

It has been suggested that MRD may overdiagnose anismus, and should not be used solely for the diagnosis.[5] As impaired rectal evacuation may be a major finding of anismus, or due to insufficient patient co-operation, and both anismus and perineal descent may cause symptoms of obstructed defecation, a careful examination of MR images is of the utmost importance before reaching a final diagnosis that depends on radiological findings. We aimed to assess and compare static MRD measurements in patients with anismus and perineal descent, and to investigate if there were any findings that could aid in diagnosis of anismus in patients who cannot defecate.

Materials and Methods

The Institutional Ethics Committee approved this retrospective study protocol (approval number: 08-624-19) and waived informed consent.

Patient Population

We retrospectively evaluated 114 consecutive patients with symptoms of obstructed defecation (prolonged evacuation, the need to interdigitate the rectum, excessive straining, incomplete evacuation of stool) or chronic constipation who underwent MRD in a single center between July 2016 and March 2018. Patients who had a history of anorectal surgery, those with poor quality MR images due to artefacts or did not have adequate static images due to fecal incontinence or suboptimal patient cooperation were excluded. As a part of our standard procedure all patients were fully informed about the examination and the importance of patient cooperation.

MR Imaging Protocol

MRD was performed using a 1.5 Tesla system (General Electric, Optima MR 450 W). Patients were in the supine position using a phased array body coil. After obtaining T2W fast-spin echo static images in axial, coronal, and sagittal planes, the patient was placed in the left lateral decubitus position and approximately 150 mL of ultrasound gel was inserted via a rectal tube. When the rectum was filled with ultrasound gel, the patient was asked to lie in supine position, and a pillow was placed under the knee with slight flexion in order to be close to the physiological defecation position. Dynamic imaging was performed at rest and during evacuation in the sagittal plane using two-dimensional (2D) balanced, steady-state, free precession cine sequences. Consecutive images were obtained from the middle (including symphysis pubis, bladder, vagina, rectum and coccyx) and from a 1.5 cm distance on both sides of the midline, with a cross-sectional thickness of 5 mm. CINE images in the defecation phase were repeated three or four times or until the rectum was completely emptied.

Image Interpretation

Static MR images were retrospectively evaluated by a radiologist with 10 years experience in pelvic floor imaging, who was blind to the clinical data and dynamic MR imaging findings. Thickness of the internal and external anal sphincter was measured on T2W axial images. The pubococcygeal line (PCL) was drawn from the inferior tip of the pubic symphysis to the last coccygeal joint. The anorectal angle (ARA), defined as the angle between the anal canal and the posterior wall of the inferior rectum and M-line (the distance between the PCL and anorectal junction) were measured on static images with a distended rectum. Measurements below the PCL were considered as positive (+) values.

After recording all measurements on static images, dynamic images were reviewed and patients were divided into two groups, depending on the diagnosis reached through MRD. Group 1 consisted of patients with MRD findings suggesting anismus, including prolonged and incomplete evacuation, paradoxical contraction of the puborectalis muscle during defecation, inadequate opening of the anal canal and insufficient increase or decrease in ARA. Group 2 consisted of patients with any degree of perineal descent but with no sign of anismus. According to the "rule of three" pelvic floor descent was graded as "mild" if a pelvic organ prolapse was 3 cm or less below the PCL, "moderate" if it was between 3 cm to 6 cm below the PCL, and "severe" if descent was 6 cm or more below the PCL. Patients with coexisting anismus and perineal descent were excluded.

Thickness of anal sphincters, length of M-line, and degree of ARA were compared between the two groups.

Statistical Analysis

Data are presented as count and percentage (%), mean ± standard deviation or median and range, as appropriate. The t-test was used for the analysis of ages, and Pearson chi-square test was used to assess gender distribution in the groups. As data were nonparametric, Mann-Whitney U test was employed to compare the measurements of ARA, M-line and thicknesses of anal sphincters between the two groups. A $p<0.05$ was considered to be statistically significant.

Results

After excluding ineligible patients, a total of 90 patients (68 female, 75.6%) with a mean age of 49 years were evaluated. There were 17 male (45.9%), and 20 female (54.1%) patients in group 1 and 5 male (9.4%), and 48 female (90.6%) patients in group 2. Gender difference between the groups was significant (p<0.01). The mean age of the patients were 46±13.02 years in group 1 and 52±12.3 years in group 2. The mean ages of the patients were significantly different between the two groups (p=0.039).

Mean value of internal and external anal sphincter thickness was 4.7 and 4.9 mm, respectively in group 1 and 4.8 and 4.9 mm, respectively in group 2. Thickness of internal and external anal sphincters was not different.

The mean size of the ARA on static defecography images was 94±9.28° in group 1 and 97±10.53° in group 2. The median (range) values were 96° (80°-122°) in group 1 and 100° (85°-140°) in group 2 (Figure 1A, B). There was a significant difference in ARA measurements on static defecography images with a distended rectum (p=0.025).

Median values of M-line was +10 mm in group 1 and +16 mm in group 2 on static defecography images with a distended rectum (Figure 2A, B). There was a significant difference in the length of M-line (p=0.047). Results are summarized in Table 1.

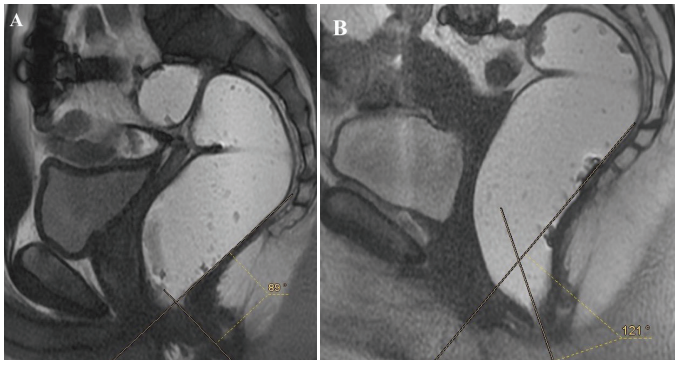

Figure 1. (A, B) Anorectal angle (the angle between the anal canal and the posterior wall of the inferior rectum). The angle is measured as 89° in a 40-year-old male patient with anismus (A), and 121° in a 56-year-old female patient with anterior and middle compartment descent (B)

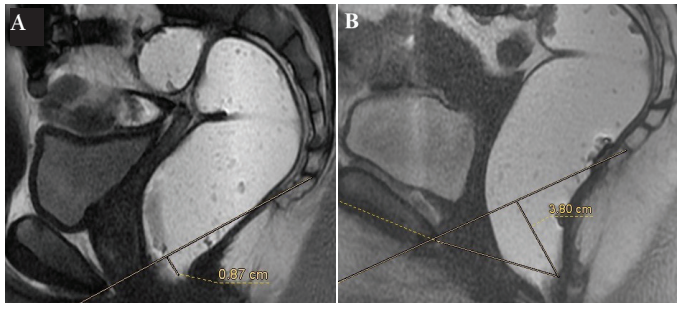

Figure 2. M-line (distance between pubococcygeal line and anorectal junction) measurements of the patients in Figure 1. The M line is much longer in the patient with descent (B)

Table 1. Comparison of patients with anismus and perineal descent

	Anismus (group 1)	Perineal descent (group 2)	p
Gender, n (%)	Male, (n=17) (45.9) Female, (n=20) (54.1)	Male, (n=5) (9.4) Female, (n=48) (90.6)	<0.01
Mean age, years	46	52	0.039
IAS thickness, mm	4.7	4.8	>0.05
EAS thickness, mm	4.9	4.9	>0.05
Mean anorectal angle	96°	100°	0.025
M line length, mm	+10	+16	0.047

n: Number of patients, IAS: Internal anal sphincter, EAS: External anal sphincter

Discussion

With the increased use of MRD, it has become obligatory to have a good understanding of anorectal morphology and function. Although dynamic sequences remain very important, static sequences should not be underestimated.

It has been reported that the success of defecation phase in MRD is variable and some patients may demonstrate no evacuation.[6,7] Besides being an indication of anismus, the non-physiological defecation position, poor instruction by the MR staff, limited numbers of attempts to defecate, lack of privacy and performance anxiety may all be causes of incomplete evacuation.[5,6] In order to avoid over-diagnosing anismus, the radiologist must pay careful attention to all sequences, including the images at rest. There is no reference diagnostic method for anismus, and a limited number of studies have been conducted in this field. Therefore diagnosis of anismus is usually a challenge for both clinicians and radiologists.

Both anismus and descending perineum syndrome may cause symptoms of obstructed defecation, but typical MR findings during evacuation are completely different.[3,4] Nevertheless little to no correlation was reported between patient symptoms and MRD findings.[6] It has also been suggested that there are no morphological abnormalities on defecography that are significantly associated with anismus.[5] Tirumanisetty et al.[8] assessed anal sphincter morphology and anorectal motion in healthy women and found that the perineum was lower at rest and during defecation in older women, as a result of increased perineal laxity. The distance between the anorectal junction and the PCL should not be greater than 2 cm.[9]

It has been suggested that aging is a risk factor for pelvic floor dysfunction, although this excludes cases of anismus. Descending perineum syndrome is more frequent among women over 50 years of age.[10] Our study also demonstrated that patients with anismus are significantly younger than patients with perineal descent, and approximately half of the patients with anismus were male. Interestingly, Piloni et al.[11], investigated MRD findings in male patients with obstructed defecation syndrome, and found that men with anismus tended to be older than those with rectal prolapse.

We found that the M-line was slightly longer in patients with perineal descent than in patients with anismus. We suggest that perineal laxity becomes obvious when rectum is distended, and an experienced radiologist can identify this, even on static images from MRD.

The mean thickness of the internal and external anal sphincters is about 3.5 mm and 4 mm, respectively. The external sphincter merges with the sling-like puborectalis muscle.[12] It has been reported that there is an increase in both internal and external anal sphincter thickness with age.[13] Although there is an abnormal muscular contraction in anismus, we could not find a significant difference in the thickness of anal sphincters in our patient population. This may be due to the relatively young age of the patients.

The ARA is normally measured to be in the range 90°-100° at rest and increases by about 15°-20° during defecation.[9,14] Age, body mass index and parity all influence ARA to varying degrees.[8] We found that ARA was slightly but significantly wider in patients with perineal descent than those with anismus, even at rest.

As MRD is an uncomfortable examination, it is not easy to conduct studies including asymptomatic volunteers. Most of our patients admitted to the MR unit for defecography have suffered from chronic symptoms and complain about seeking help for a long period of time. Therefore, almost every patient undergoing MRD has some type and degree of pelvic floor dysfunction, and it is not usually possible to generate a control group in MRD studies.

Study Limitations

Our study has some limitations. First, we do not have a control group of asymptomatic volunteers. Second, we have grouped the patients depending on the diagnosis reached by MRD and we did not have a gold standard technique to confirm the diagnosis. Third, our patients with perineal descent are a heterogenous group with variable severity of an abnormality that included different compartments of the pelvic floor in different patients. The retrospective nature of the study is also a notable limitation.

Conclusion

There is no significant gender predilection in anismus. Patients with anismus tended to be relatively younger than patients with perineal descent. The thickness of the anal sphincters did not differ between patients diagnosed with anismus and perineal descent on T2W images. However, when rectum was filled with contrast medium, the ARA was wider and the M-line was longer in patients with perineal descent, even at rest. These findings may help to rule out anismus in patients who cannot defecate during the examination.

Ethics

Ethics Committee Approval: The Institutional Ethics Committee approved this retrospective study protocol (approval number: 08-624-19).

Informed Consent: It wasn't obtained.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: N.H., A.E., Design: N.H., A.E., Data Collection or Processing: N.H., M.F.A., Analysis or Interpretation: N.H., M.F.A., Literature Search: N.H., M.F.A., Writing: N.H., M.F.A., A.E.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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