RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

DOI: 10.4274/atfm.galenos.2022.89266
Ankara Üniversitesi Tıp Fakültesi Mecmuası 2022;75(4):515-519

MEDICAL SCIENCES / DAHİLİ TIP BİLİMLERİ

MR Defecography Findings Suggesting Anismus: Reliable or not Reliable?

Anismus'a İşaret Eden MR Defekografi Bulguları: Güvenilir mi, Değil mi?

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Abstract

Objectives: We aimed to describe the MR defecography findings of anismus, and to compare them with those seen in other pelvic floor disorders.

Materials and Methods: MR defecography findings suggesting anismus (Group 1) were compared with findings of other pelvic floor abnormalities (Group 2). Anorectal angle (ARA) was measured both at rest and during defecation. Anal canal diameter was measured as the width of ultrasound gel column passing through the anal canal during defecation on CINE images. Percentage of rectal emptying was calculated by measuring the maximum dimension of contrast-filled rectum at rest and of retained contrast material at the end of the examination after defecatory attempts. MR images were retrospectively evaluated by two radiologists in consensus.

Results: There were 60 patients in Group 1 (39 female, mean age 45 years), and 41 patients in Group 2 (39 female, mean age 54 years). The mean ARA at rest was 97.7° in Group 1, 106.8° in Group 2, and ARA during defecation was 98.8° in Group 1, and 134.9° in Group 2. The mean value of rectal emptying was 35%, and 83% in Group 1 and 2, respectively. Anal canal did not open in 5 patients, the width of the anal canal was less than 10 mm in 48 patients, and was between 10 and 14 mm in 7 patients in Group 1. It was less than 10 mm in 9 patients, between 10 and 15° in 12 patients and more than 15 mm in 20 patients in Group 2. There was a statistically significant difference between two groups in all parameters ($p<0.05$). Accompanying pelvic floor pathologies were present in 28 patients in Group 1 (47%), and rectocele was the most frequent associated abnormality.

Conclusion: MR defecography findings in patients with anismus are significantly different from other pelvic floor pathologies.

Key Words: Anismus, MR Defecography, Dyssynergic Defecation

Öz

Amaç: Amacımız anismusun MR defekografi bulgularını tanımlamak ve bunları diğer pelvik taban hastalıklarına ait bulgularla karşılaştırmaktır.

Gereç ve Yöntem: Anismusa işaret eden MR defekografi bulguları olan hastalar (Grup 1) diğer pelvik taban hastalıklarına ait bulguları olan hastalar (Grup 2) ile karşılaştırıldı. Anorektal açı (ARA) istirahatte ve defekasyon sırasında ölçüldü. Defekasyon sırasında ultrason jeli anal kanaldan geçerken anal kanal genişliği ölçüldü. İstirahat sırasında kontrast madde ile dolu olan rektumun maksimum genişliği ve inceleme sonunda kalan kontrast maddenin çapı ölçülerek rektal boşalma derecesi hesaplandı. MR görüntüleri 2 radyolog tarafından retrospektif olarak ve fikir birliği ile değerlendirildi.

Bulgular: Grup 1'de 60 hasta (39 kadın, ortalama yaş 45), Grup 2'de 41 hasta (39 kadın, ortalama yaş 54) mevcuttu. İstirahatte ortalama ARA Grup 1'de 97,7°, Grup 2'de 106,8°, defekasyon sırasında ARA Grup 1'de 98,8°, Grup 2'de 134,9° ölçüldü. Ortalama rektal boşalma derecesi Grup 1'de %35 ve Grup 2'de %83 idi. Grup 1'de 5 hastada anal kanal açılmaz iken 48 hastada anal kanal çapı <10 mm, 7 hastada 10-14 mm olarak ölçüldü. Anal kanal çapı Grup 2'de 9 hastada <10 mm, 12 hastada 10-15°, 20 hastada >15 mm olarak ölçüldü. Bütün parametreler 2 grup arasında istatistiksel olarak anlamlı fark göstermekteydi ($p<0,05$).

Sonuç: Anismuslu hastalarda MR defekografi bulguları diğer pelvik taban hastalıklarına göre anlamlı olarak farklılık göstermektedir.

Anahtar Kelimeler: Anismus, MR Defekografi, Dissinerjik Defekasyon

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Received/Geliş Tarihi: 24.09.2021 **Accepted/Kabul Tarihi:** 26.10.2022

Introduction

Chronic constipation is a common health problem which is usually relieved by changes in diet. Patients who can not be treated with these changes or with simple medications, need to be assessed with physiological and imaging tests. Anal manometry and magnetic resonance (MR) defecography are widely used to differentiate structural abnormalities from functional problems, which is important in deciding treatment strategy (1).

Diagnostic criteria for functional constipation include; excessive straining during defecation, lumpy or hard stool, need for digital maneuvers to facilitate defecation, sense of incomplete evacuation, and fewer than 3 defecations per week (2). Anismus is a functional abnormality with symptoms of obstructed defecation, and it is the second most common cause of chronic constipation after normal transit constipation (3).

Paradoxical contraction or inadequate relaxation of the puborectalis muscle during defecation is responsible for this functional disorder but structural problems like rectocele or rectal prolapse may also co-exist. There is no consensus in the literature about the reference standard technique to diagnose anismus (4). Rectal balloon expulsion test measures the time required to expel a rectal balloon filled with water or air, and anal manometry measures anal pressures at rest and during straining but these tests have high false positive and false negative rates (2,4).

Dynamic ultrasound (US) is suggested as a diagnostic imaging test for anismus but as US is an operator dependent technique it should be used in experienced hands (5,6). MR defecography is a reliable imaging method to demonstrate anismus as well as structural abnormalities like rectocele or rectal intussusception which may be associated with anismus. With its excellent soft tissue resolution which leads to simultaneous evaluation of both anatomy and function of the entire pelvic floor structures and lack of ionizing radiation, MR defecography is usually preferred over conventional defecography especially in complicated patients (7).

The aim of this study is to describe the MR defecography findings of anismus, and to compare them with those seen in other pelvic floor disorders.

Materials and Methods

The Institutional Ethics Committee of Ankara University Faculty of Medicine approved this retrospective study protocol (Approval no: İ7-473-20, Date: 01.09.2020) and waived informed consent.

Patients

After searching our instutional database to find patients who underwent MR defecography in our department between July 2016-July 2020, we used "anismus", "dyssynergic defecation", and "pelvic dyssynergia" as key words to detect patients who had MR defecography findings suggesting anismus.

Consecutive patients during the same period with other pelvic floor abnormalities like rectocele, or pelvic floor descent generated the control group.

Patients whose images were not available or not adequate for evaluation due to technical considerations or suboptimal patient cooperation, and patients with a history of pelvic floor surgery were excluded.

MR Imaging Protocol

MR defecography was performed by using a 1.5 Tesla MR system (General Electric, Optima MR 450 W) in supine position using a phased array body coil. After obtaining T2W FSE static images in axial, coronal, and sagittal planes, the patient was placed in left lateral decubitus position and approximately 150 mL of US gel was inserted via rectal tube. When the rectum was filled with US 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 sagittal plane using 2D balanced steady-state free precession cine sequences. Consecutive images were obtained from the middle (including symphisis 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 for at least 3 times.

Image Interpretation

MR images were retrospectively evaluated by two radiologists with more than 10 years of experience in pelvic floor imaging, in consensus. Anorectal angle (ARA), the angle between the posterior border of the distal rectum and the central axis of the anal canal, was measured both at rest and during defecation. Anal canal diameter was measured as the width of US gel column passing through the anal canal during defecation on CINE images. Percentage of rectal emptying was calculated by measuring the maximum dimension of contrast-filled rectum at rest and of retained contrast material at the end of the examination after defecatory attempts.

Accompanying pelvic floor abnormalities were noted. Rectocele was defined as 2 cm or more bulging of the anterior rectal wall. Rectal intussusception was characterized by prolapse of full-thickness anorectal wall. 1 cm or more descent of the bladder neck and uterine cervix beyond the pubococcxygeal line was reported as an abnormal pelvic floor descent.

Statistical Analysis

T-test was used to investigate the difference in age and gender between two groups. Mann-Whitney U test was used to analyse the ARA at rest, during defecation, the change in the angle between rest and defecation, the width of the anal canal, and the degree of rectal evacuation. P-value less than 0.05 was considered as statistically significant. All parameters were standardized by taking a mean value of 0 and standard deviation of 1 to obtain the most significant parameter.

Results

There were 320 patients who underwent MR defecography in our department between July 2016-July 2020. Using the aforementioned search and exclusion criteria we found 66 patients with MRI findings suggesting anismus (20%), and excluded 6 of them. The remaining 60 patients (group 1) were retrospectively evaluated. There were 21 (35%) male and 39 (65%) female patients with a mean age of 45 years (age range 18-80 years).

The mean ARA was 97.7° at rest, and 98.8° during defecation. ARA decreased in 26 patients, did not change in 7 patients and increased in 27 patients (Figures 1A, B). The increase in ARA was more than 20° in only 4 patients (7%).

Anal canal did not open and there was no evacuation of contrast material in 5 patients. The width of the anal canal was less than 10 mm in 48 patients, and was between 10-14 mm in 7 patients. 50% or more of the contrast material could be evacuated from rectum in 19 patients (32%). None of the patients could totally empty the rectum. The mean value of rectal emptying was 35% (Figure 2).

Accompanying pelvic floor pathologies were present in 28 patients (47%). Rectocele was found in 17 patients (Figure 2), pelvic floor descent was seen in 4 patients, both rectocele and pelvic floor descent was seen in 5 patients and invagination was detected in 2 patients.

There were 41 patients in the control group (group 2) with a mean age of 54 years (age range 23-78 years), and only 2 of them were male. There was a significant difference in age and gender between the two groups (p=0.01, p<0.001, respectively).

The mean ARA was 106.8° at rest, and 134.9° during defecation. ARA increased in all patients and the degree of increase was between 15-48°. The width of the anal canal was less than 10 mm in 9 patients, between 10-15° in 12 patients and more than 15 mm in 20 patients. ARA at rest, ARA during defecation, the change in the angle during defecation, and the width of the anal canal were significantly different between the two groups (p<0.05).

All patients could evacuate rectum in various degrees changing between 50-100% in the control group. The mean value of rectal emptying was 83%, and there was a statistically significant difference between two groups (p<0.05). Results are summarized in Table 1.

The most statistically significant parameter between the two groups was ARA during defecation. Anal manometry was performed in 17 of the 60 patients in group 1 (28%). In 12 of the 17 patients, the decrease in anorectal pressure during defecation was less than 40 mmHg. In 2 of the 17 patients anorectal pressure paradoxically increased during defecation. In both of these 2 patients the width of the anal canal was less than 10 mm, ARA decreased during defecation, there

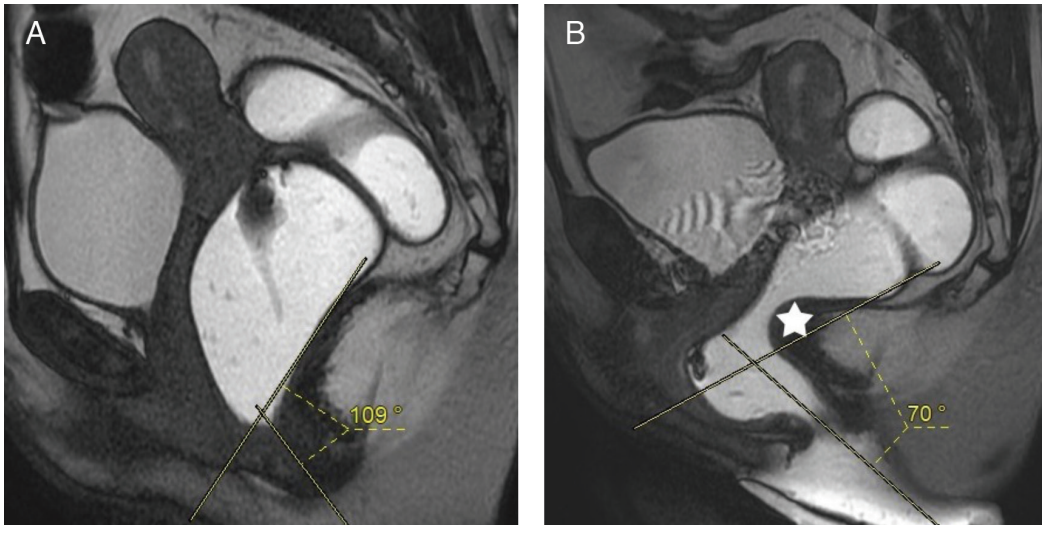

Figure 1: MR defecography images at rest (A), and during defecation (B) of a 34-year-old woman with complaints of impaired and prolonged evacuation, and need for digital maneuver. The ARA has decreased during defecation, and there is a prominent impression of the puborectal sling (asterisk)

ARA: Anorectal angle, MR: Magnetic resonance

were accompanying rectoceles, and only 20% of the contrast material could be evacuated from rectum. In 3 of the 17 (18%) patients, anal manometry findings were within normal limits. In 1 of these 3 patients although ARA decreased from 112° to 95°, 83% of the contrast material was evacuated from rectum. In 2 of the 3 patients with normal manometry findings, anal canal diameter was less than 10 mm. ARA increased from 90° to 110° in 1 patient, and from 90° to 92° in the other one, with 40% and 43% of contrast evacuation, respectively.

In the remaining 43 of the 60 patients without anal manometry examination, patients were treated with dietary regulations, and medical treatment without further investigation.

Discussion

The exact etiology of anismus is unclear; mechanical causes like childbirth, history of sexual abuse or psychological disorders like anxiety, depression have been described as possible predisposing factors. The real incidence of this functional disorder is not clear, and there is a not a reference standard technique for the diagnosis. A female predominancy is suggested (8). The rate of anismus in our study group was 20% and 65% of the patients with anismus were female.

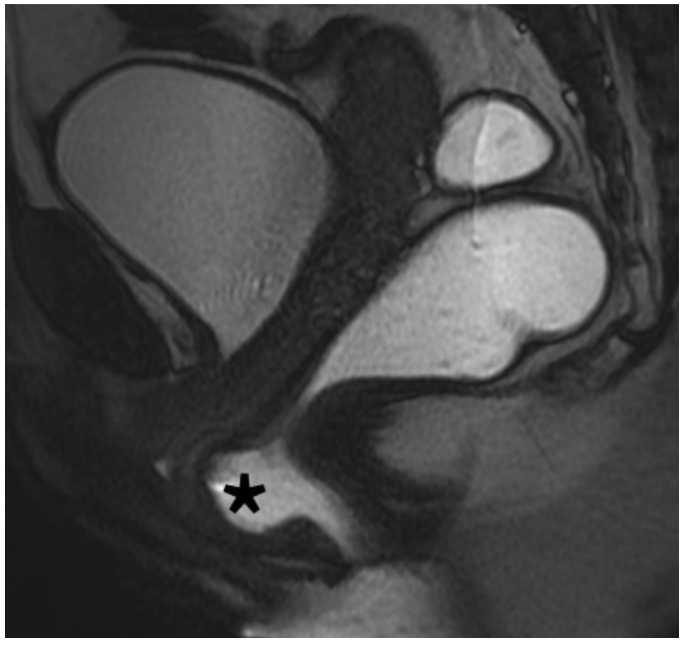

Figure 2: MR defecography image during the last cine imaging. Despite repeated attempts of defecation, the patient could not empty the rectum. Also note the small rectocele (asterisk)

MR: Magnetic resonance

Measuring rectoanal pressure at rest and during defecation by anal manometry to demonstrate a failure in anal relaxation or a paradoxical anal contraction is widely used to diagnose anismus. But it has been reported that anal manometry results may be similar in patients with anismus and healthy volunteers and abnormal manometry patterns may be seen in asymptomatic subjects (9). Recently imaging findings are included in the diagnostic criteria for anismus and MR defecography is reported to be superior to conventional defecography in patients with accompanying pelvic floor pathologies like rectocele (10). We found that accompanying pelvic floor pathologies are present in nearly half of the patients with anismus (47%). So we believe that MR defecography is quite important in these patients, especially for treatment planning.

Anismus is a functional defecatory dysfunction presenting with symptoms of obstructed defecation, and it is usually managed with biofeedback theraphy. On the other hand if there are mechanical causes of obstructed defecation like rectocele or perineal descent, then surgical intervention may be necessary. MR defecography helps to diagnose or rule out both functional and mechanical causes of obstructed defecation, and provides information about all 3 pelvic floor compartments but it may overdiagnose anismus (4).

It has been suggested that impaired rectal evacuation (inability to evacuate two thirds of a 120 mL contrast enema within 30 sec) during defecography is highly specific for the diagnosis of anismus, a better predictor than the ARA measurement (11). Nevertheless given the awkward situation for the patient, impaired evacuation may not always reflect an abnormality. It is utmost importance to explain the procedure to the patient before MR defecography and to make sure that there is no embarassing environment during the examination. At least 3 attempts of evacuation should be scanned. Despite all these efforts if the patient can not evacuate rectum efficiently then a suspicion of anismus may arise. Nevertheless it has also been reported that impaired evacuation can be seen in more than 70% of patients with pelvic floor disorders other than anismus (12). So impaired evacuation can not be used as the sole diagnostic criteria, but should be supported by other imaging findings. ARA measurement, the change in ARA during defecation, and prominent impression of the puborectal

Table 1: The results of MR Defecography measurements

	Mean ARA at rest	Mean ARA during defecation	Anal canal 0-10 mm	Anal canal 10-14 mm	Anal canal >14 mm	Mean rectal emptying
Group 1	97.7°	98.8°	n=53	n=7	None	35%
Group 2	106.8°	134.9°	n=9	n=12	n=20	83%

Group 1: Patients with anismus; Group 2: Patients with pelvic floor pathologies other than anismus, ARA: Anorectal angle, n: number of patients, MR: Magnetic resonance

sling on the posterior aspect of rectum should be taken into consideration to diagnose or rule out anismus. In consistence with the literature we found that ARA during defecation and the change in ARA between rest and defecation are significantly lower in patients with anismus but we also found that ARA was more acute even at rest in these patients which is not consistent with the literature (12). The most significant parameter in our study group was ARA during defecation.

The width of the anal canal during defecation is not usually indicated on MR defecography reports but the opening of the anal canal should be mentioned. In our study population, the width of the anal canal was less than 15 mm in all patients in group 1, and in 21 of the 41 patients (51%) in group 2. We suggest that anal canal diameter less than 15 mm during defecation can support other imaging findings of anismus but may not be taken into consideration if it is not accompanied by other imaging findings of anismus.

Study Limitations

There are some limitations of our study. First, this is a retrospective study. Second, anal manometry was performed in only a small number of patients, so we could not compare the two methods. Third, there is no reference standard technique for the diagnosis, so we might need more studies with larger study groups to indicate MR defecography findings of anismus as definetely reliable.

Conclusion

MR defecography findings in patients with anismus are significantly different from other pelvic floor pathologies but anismus is not an easy diagnosis to make and there is not a unique finding on MR imaging. ARA at rest and during defecation, the change in ARA between rest and defecation, the width of the anal canal, and the degree of rectal emptying should be considered. Moreover we should be confident about the patient cooperation. MR defecography provides useful information about anismus but it still can't be accepted as the reference standard technique.

Main Points

1. There is no reference standard technique to diagnose anismus.

2. MR Defecography findings in patients with anismus are significantly different from other pelvic floor pathologies.

3. ARA at rest, and during defecation, the opening of the anal canal, and the degree of rectal emptying should be considered together.

4. Accompanying pelvic floor pathologies are present in nearly half of the patients with anismus.

Ethics

Ethics Committee Approval: The Institutional Ethics Committee of Ankara University Faculty of Medicine approved this retrospective study protocol (Approval no: İ7-473-20, Date: 01.09.2020).

Informed Consent: Retrospective study.

Peer-reviewed: Externally peer-reviewed.

Authorship Contributions

Concept: D.K.Ö., N.H., A.E., Design: D.K.Ö., N.H., A.E., Data Collection and Processing: D.K.Ö., N.H., A.E., Statistical Analysis: D.K.Ö., N.H., A.E., Literature Search: D.K.Ö., N.H., A.E., Writing: D.K.Ö., N.H., A.E.

Conflict of Interest: The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Financial Disclosure: The authors received no financial support for the research and/or authorship of this article.

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