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Original Article

The evaluation of the effect of vaginal delivery and aging on anal sphincter anatomy and function

Mahmut Çay [a,*], Aymelek Çetin [b], Mustafa Ateş [c], Işıl Köleli [d], Deniz Şenol [b], Evren Köse [b], Dinçer Özgör [c], Arife Şimşek [c], Davut Özbağ [b]

[a] Department of Anatomy, Faculty of Medicine, Uşak University, 64100 Uşak, Turkey
[b] Department of Anatomy, Faculty of Medicine, İnönü University, 44200 Malatya, Turkey
[c] Department of General Surgery, Faculty of Medicine, İnönü University, 44200 Malatya, Turkey
[d] Department of Obstetric and Gynecology, Faculty of Medicine, İnönü University, 44200 Malatya, Turkey

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ABSTRACT

Objective. – This study was conducted to evaluate the effect of vaginal delivery and aging on anal sphincter anatomy and function.
Method. – Asymptomatic thirty women were included in this prospective study. Group 1 included 10 women (age range: 18–50) who had never been pregnant. Group 2 included 10 women (age range: 18–50) who had vaginal delivery. Group 3 included 10 women over 50 who had vaginal delivery.
Results. – There was no statistically significant difference between the three groups in terms of resting and squeeze pressures. It was found that sphincter thickness showed statistically significant difference between the group 1 and group 3, and also group 2 and group 3. There was not statistically significant difference between the group 1 and group 2 in terms of sphincter thickness. There was a positive correlation between the age and sphincter thickness in all groups. In terms of sphincter thickness and pressure findings there was a positive correlation between the squeeze pressure and external anal sphincter thickness only in group 3.
Conclusion. – The vaginal delivery did not have a negative influence on the structure and function of the anal sphincter in asymptomatic women. However, it was found that anal sphincter thickness changed strongly in a positive manner with aging.

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1. Introduction

Canalis analis (anal canal) forms the last part of digestive system. This part, which is approximately 4 cm long and 3 cm in diameter, starts from linea anorectalis below ampulla recti. It extends posteriorly and inferiorly and ends at the line called anus or anal verge [1,2]. In the anatomy of the canal, which is very important in terms of continence, two important muscles are known to enable this function. These muscles are m. sphincter ani internus (internal anal sphincter – IAS) and m. sphincter ani externus (external anal sphincter – EAS) [1]. Anal continence is maintaining stool until social conditions are suitable and being able to realize what the content of rectum is even during sleep. Defecation is a special function. Its forming at an unsuitable moment and the person's not being able to control it creates a big problem. Besides causing a person to get away from social life and the society, it can also cause sexual problems and sexual dysfunction [3]. When anal continence is disrupted, the clinical condition also defined as anal incontinence or fecal incontinence develops [3,4]. Anal continence occurs based on a great number of factors [4–8]. These factors can be summarized as the relationship of sphincter muscles with each other and having rectal and anal sensation and normal pelvis anatomy. When gas and stool reach the rectum, the rectum stretches and thus rectoanal inhibitor reflex awakens and causes IAS to relax. Thus, the content of rectum starts to enter the anal canal. Sensitive receptors at anoderm differentiate between whether the content is gas or stool. If the person wants to prevent the disposal of content, anal sphincters stretch through pudendal nerve and defecation is blocked. This physiological situation is defined as continence. If this mechanism is not working, the patient is accepted to develop incontinence [4,6]. A great number of factors can be said to cause disruption of anal sphincter. Especially in women, the most important reason for

* Corresponding author.
E-mail address: mcay.anatomi@gmail.com (M. Çay).

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anal sphincter disruption is delivery and complications due to delivery. Some researchers report that disruptions occur in the anatomic structure of anal sphincter after vaginal birth and functional effects decrease or disappear completely [9]. At the same time, there are also studies reporting changes in the function and structure of anal sphincters due to aging [6–8]. For definitive diagnosis, the responses of muscles to stimulants are checked with anal manometry/anorectal manometry (ARM) test, while the integrity of anal muscles and defects in muscles are assessed with endoanal ultrasonography (EAUSG) [10]. The purpose of our study was to examine the anal sphincters of women who gave birth and women who never gave birth with ARM test and three dimensional endoanal ultrasonography (3D-EAUSG) in order to understand the effects of vaginal birth and age on the anatomic structure and functions of anal sphincters.

2. Material and method

This study is a prospective clinical study approved with the 2016/01 numbered decision of Malatya Clinical Researches Ethical Board. First of all, the participants of the study were informed in detail about ARM and 3D-EAUSG processes to be applied and the participants read and singed the "volunteer informed consent form" that the results would be used in our study. Before starting ARM and 3D-EAUSG applications, the patients were asked questions about their ages, obstetric and medical history, general health problems, anorectal disease histories and whether they had any surgical procedures performed on this area. In normal spontaneous vaginal births, the shape of episiotomy, perineal lacerations to be formed and their degrees were recorded. In addition, the patients were asked about their smoking habits, height-weight values, their existing fecal and urinary incontinence complaints and the results were recorded in the patient information form.

2.1. Study groups

Our study was planned in three groups; the patients in group 1 consisted of 10 women between the ages of 18 and 50 who had never been pregnant. The patients in Group 2 consisted of 10 women between the ages of 18 and 50 who had only vaginal birth. The patients in Group 2 consisted of 10 women at and over the age of 50 who had only vaginal birth (Table 1).

Since the intergroup highest anal sphincter thickness difference was 0.2, standard deviation was 0.12, Type-1 (α) error was 0.05 and Type-2 error (β) was 0.20, it was confirmed with statistical power analysis that each group needed at least 10 individuals.

2.2. Inclusion criteria

Being between the ages of 18 and 50 and not having any births or pregnancies, being between the ages of 18 and 50 and having given vaginal birth, being at and over the age of 50 and having given vaginal birth

2.3. Exclusion criteria

The patients who had received pelvic radiotherapy, who had fecal incontinence, sphincter defect, neurological disorder, those who had undergone anorectal surgery and those who had diabetes were not included in the study. To all the patients in all three groups, both ARM test and 3D-EAUSG were given on the day they came to the polyclinic.

Table 1
Age intervals and birth histories of study groups.

Groups	Patients	Age	Birth history
Group 1	10	18–50	Never been pregnant
Group 2	10	18–50	Only vaginal birth
Group 3	10	50 and over	Only vaginal birth

2.4. ARM test examination

ARM mechanism we used in the study (MMS, Solar GI, software version 9.1, Holland) has ballooned barometer, pressure calibration device, monitor, computer and scanner (Fig. 1).

There are 4 pressure canals on the ARM catheter put on the barometer with 7 mm between each canal and it can measure 360° pressure. The catheter which has four measuring points starting from the distal, has a diameter of Fr (French) and it has the technology of measuring pressure with air (air-charged, clinical innovation).

ARM test was applied on the patients in line with the literature [11,12]. Before starting the application, fleet enema was applied on all the patients to empty the rectum. After the rectum was emptied, the patients wore a special leg covering. Due to the anatomic location of sigmoid colon, the process was conducted on all patients while on a position lying on the left lateral. After the procedure was explained to the patient who was brought to a position ready for the test, rectal palpation examination was made first and sensitivity was assessed. Later, ARM catheter which had balloons on the tip was calibrated and placed in the anal canal with the help of lubricant gel. After the catheter was placed, a resting period was given to ensure sphincter tone and relaxation. Meanwhile, pressure canals were followed from the monitor to confirm that the basal level occurred. Firstly, resting pressure was measured for 20 s. Later, squeezing pressure, tolerated squeezing pressure, coughing reflex, defecation intervention (pushing), RAIR, first sensation, squeezing sensation and maximum tolerance volume values were examined respectively (Fig. 2).

ARM test lasted for 15 min approximately and after the procedure was finished, the balloon in the anal canal was removed

Fig. 1. ARM facility. Balloon capillary system pressure gauge, pressure calibrator, monitor, computer and printer.

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