



## Comparison of Anatomical Structures in Trigonum Anale-Trigonum Urogenitale in Postpartum and Nulliparous Patients

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**Abstract :** There are many studies in the literature on pelvic anatomy and morphometry using MRI. Pelvic anatomy and the interrelationship of the structures here are extremely important for conditions such as urinary incontinence, pelvic organ prolapse, pelvic floor weakness and dictocia. In this study, the organs in the anal and genital trigone regions on the outer side of the pelvic floor were examined. Because the morphometry of the pelvis and the relationship and morphometry of the external genital, urinary and anal organs in the pelvic floor are as important as the inside of the pelvis. In the study, two groups of patients were determined: patients who had never given birth and patients who had given birth at least once. In the distance measurements of the organs in the pelvic floor, the tuber ischiadicum, a bony structure, was defined as a guide point. In measurement results, the distance between the right tuber ischiadicum and the lower border of the vagina is highly significant when comparing patients who have given birth and those who have not given birth ( $p=0.035$ ). In addition, the distance between the left side tuber ischiadicum and the lower border of the vagina was found to be highly significant in both patient groups ( $p = 0.019$ ).

**Keywords:** Female pelvic floor morphometry, Trigonum anale, Trigonum urogenitale, Nulliparous

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### I. INTRODUCTION

Pelvic anatomy is an area of clinical importance with its complex fascias and sections for surgeons interested in this region. Levator ani muscle is a structure that has an important function in supporting the pelvis and abdominal organs (1). This muscle is also associated with the pelvic floor disorders such as pelvic organ prolapse, urinary incontinence and anal incontinence (2).

Studies on MRI measurements of pelvic bones and pelvic angles have gained quite a place in the literature (3,4,5). However, studies on racial differences in the pelvis have also elucidated female pelvis measurements with statistical data quite well (6,7). One of the most striking studies on measuring structures in the pelvis with MRI is that MRI evaluations in male and female patients can help predict rectal cancer resectability (8).

In this study, unlike the publications in the literature, the distances between the structures in the anal and urogenital triangles were measured in women who had given birth at least once and in women who had never given birth. In the study, the tuber ischiadicum in the pelvic floor is a bone structure that was taken as a guide point. In addition, typographical images of the vagina and rectum openings are also included. It was thought that the study would make a significant contribution to the literature.

## II. MATERIAL AND METHODS

Ethics committee approval was received for this study from Ethics Committee of Kafkas University Faculty of Medicine, in accordance with the World Medical Association Declaration of Helsinki, with the approval number: 26.10.2022/08. In the study, pelvic MRI (Toshiba Aquilion 64) images of female patients (who had never given birth between the ages of 18-45 and had at least one birth between the ages of 15-45 in their radiological reports) who came to the Gynecology and Obstetrics clinic between 2015 and 2022 were taken from the archives of Kafkas University Faculty of Medicine Hospital. Between these years, images of female patients were eliminated from 624 patient images in the hospital archive. From 414 women's lower abdomen MRI images, the number of patients who have given birth at least once is 298, while the number of patients who have never given birth is 116 (two groups). After selecting the patient groups, trigonum anale and trigonum urogenitale; The distances of ostium urethra externa, vestibulum vagina (lower border), clitoris and anus (upper and lower borders) to the tuber ischiadicum (Tuber isch.) were measured. In addition, the resulting measurements were analyzed for both women who had given birth and those who had not given birth. The right and left side measurement differences in each individual were also evaluated statistically.

### *Statistical analysis*

Analyses of the data obtained in our study were carried out using SPSS® Statistic Version 25 (IBM®, USA). Comparisons between groups were made using the Independent and paired samples T Test. As a result of the analyses, p value <0.05 was considered statistically significant.

## III. RESULTS

As can be seen from the results in Table 1 and Table 2, the distance between the right tuber ischiadicum and the lower border of the vagina is highly significant when comparing patients who have given birth and those who have not given birth ( $p < 0.05$ ). In addition, the distance between the left side tuber ischiadicum and the lower border of the vagina was found to be highly significant in both patient groups ( $p < 0.05$ ). In the distances of the tuber ischiadicum to the vagina, clitoris, urethra and anus in patients who have never given birth, the tuber ischiadicum-urethra distance was highly significant when comparing the right and left sides of the patients ( $p = 0.011$ ). In patients who have given birth at least once, the distance between the tuber ischiadicum and the vagina, clitoris, urethra and anus was found to be highly significant when comparing the right and left sides of the patients ( $p = 0.019$ ).

**Table1.** Comparison of measurement parameters and 'p' values of patients who have never given birth and those who have given birth at least once

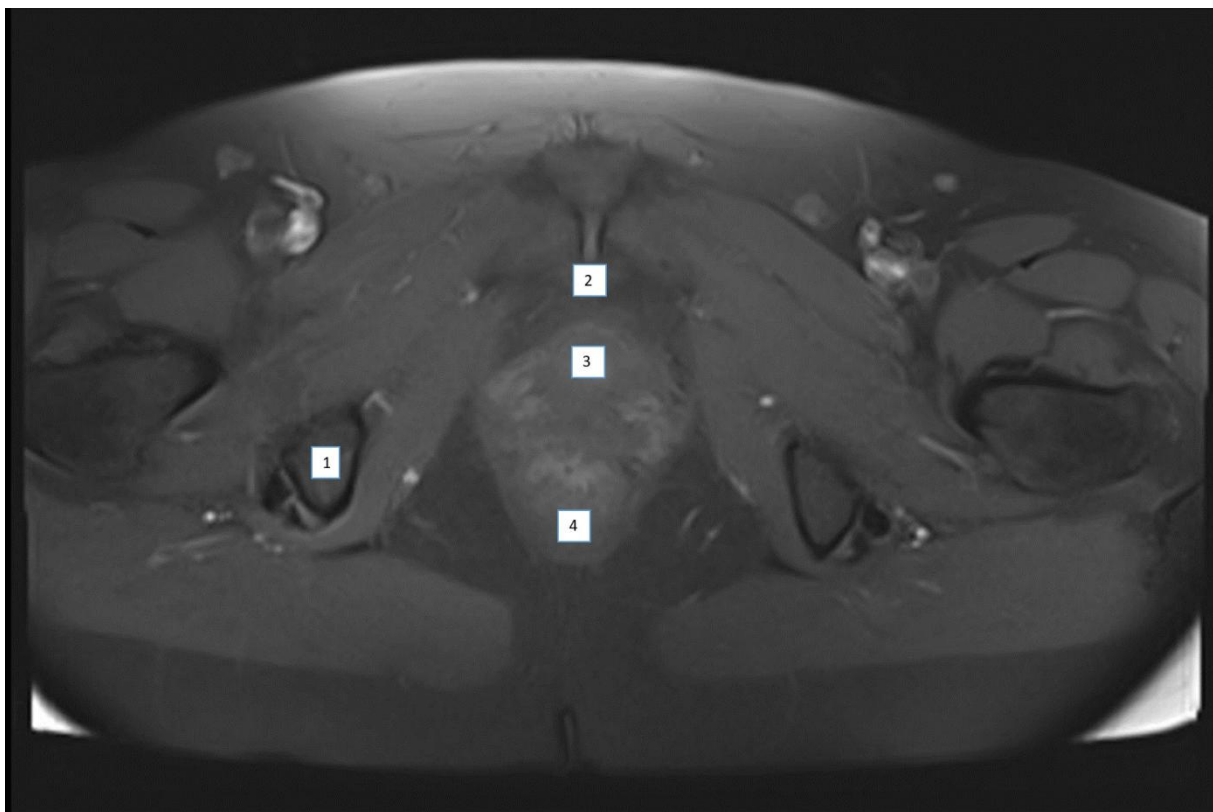
	Patients who have never given birth (Average ± SD)	Patients who have given birth at least once (Average ± SD)	F	'p'
Age	29,33 ± 10,31	46,89 ± 13,07	4,812*	<b>0,000</b>
Tuber Isch-Clitoris (Right)	83,74 ± 4,71	83,26 ± 5,50	2,325	0,408
Tuber Isch-Urethra (Right)	78,39 ± 4,72	80,17 ± 40,75	0,743	0,642
Tuber Isch-Vagina lower border (Right)	71,43 ± 4,88	70,22 ± 5,32	1,121*	<b>0,035</b>
Tuber Isch-Anus upper border (Right)	69,24 ± 5,00	68,60 ± 5,54	1,333	0,286
Tuber Isch-Anus lower border (Right)	67,28 ± 4,86	67,63 ± 5,43	2,772	0,549
Tuber Isch-Clitoris (left)	83,95 ± 5,13	83,78 ± 5,28	0,433	0,774
Tuber Isch-Urethra (left)	79,00 ± 4,75	78,26 ± 4,89	0,037	0,165
Tuber Isch-Vagina lower border (left)	71,42 ± 5,11	70,07 ± 5,23	0,001*	<b>0,019</b>
Tuber Isch-Anus upper border (left)	69,59 ± 5,27	68,57 ± 5,23	0,227	0,076
Tuber Isch-Anus lower border (left)	67,55 ± 5,07	68,02 ± 5,10	0,082	0,400
Tuber Isch-Clitoris (Right-Left difference)	-0,21 ± 3,18	-0,52 ± 3,86	3,419	0,435
Tuber Isch-Urethra (Right-Left difference)	-0,60 ± 2,53	1,90 ± 40,57	0,936	0,507
Tuber Isch-Vagina lower border (Right-Left difference)	0,01 ± 3,11	0,15 ± 3,54	1,704	0,714
Tuber Isch-Anus upper border (Right-Left difference)	-0,35 ± 3,42	0,03 ± 4,40	3,053	0,394
Tuber Isch-Anus lower border (Right-Left difference)	-0,26 ± 3,93	-0,39 ± 4,56	2,764	0,799

**p<0.05 (Independent Sample T Test).**F: F value. **SD:** standard deviation. **p:** indicates significance between groups \*: There are differences between groups.

**Table 2.** Significance (p) values of the right-left difference between the measurement parameters of patients who have never given birth and those who have given birth at least once

Groups	Between Right and Left Sides of the Same Patients	'p' values
Patients who have never given birth	Tuber İsch-Clitoris	0,476
	Tuber İsch-Urethra	<b>0,011</b>
	Tuber İsch-Vagina lower border	0,958
	Tuber İsch-Anus upper border	0,268
	Tuber İsch-Anus lower border	0,466
Patients who have given birth at least once	Tuber İsch-Clitoris	<b>0,019</b>
	Tuber İsch-Urethra	0,420
	Tuber İsch-Vagina lower border	0,457
	Tuber İsch-Anus upper border	0,892
	Tuber İsch-Anus lower border	0,141

**p<0,05** (Paired-Sample T Test).



**Figure 1.** 1: Tuber ischiadicum, 2:Ostium urethra externa, 3.Vestibulum vagina, 4:Anus

#### IV. DISCUSSION

The pelvis region is a very important area in urogenital surgery (9). It is necessary to know the pelvic anatomy well in order to solve both physiological (such as birth) and pathological diseases (urinary incontinence, uterine prolapse, etc.) (10). Although the anatomy of the pelvis seems simple, the neighborhood of the structures within it and the junctions of the interlocking fascias with the vessels and nerves make the pelvic anatomy a little complicated (9,10).

In addition to the anatomy of the pelvis, knowing the morphometry of the anatomical structures in the perineal region is very important for surgeons interested in this area (11,12). It is necessary to know the pelvic floor anatomy and openings well, especially to reduce the risk of complications (1,9,11).

In the study, the distance of the tuber ischiadicum to the vagina, clitoris, urethra and anus in the patient groups who have never given birth and who have given birth at least once can give an idea about the distance between these regions and the interventions to be made in these regions. At the same time, the numerical values obtained for surgeries planned in the perineal and anal-urogenital trigone regions may be beneficial both in planning the operations and in reducing the risks of possible complications. The distance between the right tuber ischiadicum and the lower border of the vagina is highly significant when comparing patients who have given birth and those who have not given birth ( $p=0.035$ ). In addition, the distance between the left side tuber ischiadicum and the lower border of the vagina was found to be highly significant in both patient groups ( $p = 0.019$ ).

In the study, in the distances of the tuber ischiadicum to the vagina, clitoris, urethra and anus in patients who have never given birth, the tuber ischiadicum-urethra distance was highly significant when comparing the right and left sides of the patients ( $p = 0.011$ ). It is conceivable that the entrance to the ostium urethra externa is not exactly in the median location. Because tuber ischiadicum did not show such significance when comparing other right and left parameters.

In patients who have given birth at least once, the distance between the tuber ischiadicum and the vagina, clitoris, urethra and anus was found to be highly significant when comparing the right and left sides of the patients ( $p=0.019$ ). In this case, it is conceivable that the clitoris location is not exactly in the median direction.

In the study, the distance of the tuber ischiadicum, which is a bony structure, to the genital, urinary and anal organs, which consist of soft tissue in the anal and urogenital trigone regions, may contain important data for elucidating the anatomy of this region. The study may provide important clues to surgeons in this field in elucidating subpelvic morphometry. Especially for episiotomy, the distances of the genital, urinary and anal openings to the tuber ischiadicum can be helpful in determining the operation plan when comparing individuals who have given birth and those who have not.

#### V. CONCLUSION

There are almost no studies on Trigonum anale and trigonum urogenitale in women. MRI findings of pelvic bones and pelvis measurements are abundant in the literature. Pelvic lower section examinations and morphometry can be studied for diseases such as dystocia and urinary incontinence. In this study, revealing the distances of the tuber ischiadicum to the vagina, clitoris, urethra and anus in patients who have given birth and those who have not given birth may contain information that is very useful for the literature and reduces complications.

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**Conflict of Interest:** Regarding this study, the author and/or her family members do not have a potential conflict of interest, scientific and medical committee membership or relationship with its members, consultancy, expertise, employment in any company, shareholding or similar situations.

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