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Childbirth related deviations to perineal anatomy assessed by three-dimensional endovaginal ultrasound: A reliability study

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Hypothesis and aim

Perineal lacerations are the most common birth trauma. Lacerations often affect the perineal body. The perineal body is a fibro-muscular structure located in the midline of the perineum. Fascial and connective tissue, and pelvic floor muscles connect into the perineal body, which has been described as the "anchor of pelvis" [1]. The support of the pelvic structures and the pelvic floor functionality depend upon the integrity of the perineal body. Despite its importance for normal pelvic floor function, childbirth related deviations to the perineal body have received little attention. Few studies describe normal perineal anatomy [2]. Good to very good reliability for assessment of muscles that fuses into the perineal body: transverse perinei, puboperinealis and puboanalis muscle have been found using three-dimensional endovaginal ultrasound in nulliparous women [3]. To our knowledge, no one has investigated possible deviations of these muscles in women after birth and with a new high-resolution three-dimensional endovaginal probe.

The aim of this study was to assess the intra- and interrater reliability for the evaluation of deviations of the transverse perinei, puboperinealis and puboanalis muscle using three-dimensional endovaginal ultrasound one year postpartum.

Methods

For this reliability study, participants from an ongoing prospective study with the aim to assess changes in the perineal anatomy following childbirth were included one year after delivery. Participants were examined with an endovaginal ultrasound using BK-5000 (BK Medical Systems) with a three-dimensional transducer (type 9038). All ultrasound examinations were conducted by one investigator. Participants were asked to void before examination and examined in dorsal lithotomy position at rest. The probe was entered into the vagina in a neutral position. The symphysis pubis and the anal canal was used as anterior and posterior landmarks. Three-dimensional volumes were obtained during a 60 seconds long pre-programmed automated sequence by the transducer. The ultrasound volumes were stored for offline analysis (Software BK viewer, BK Medical).

A protocol for normal anatomy was developed by using volumes from 20 primiparous participants with caesarean section. To establish criteria for sonographic deviation for perineal anatomy, 20 volumes from primiparous and 20 volumes from multiparous participants after vaginal delivery were analyzed and discussed within the research group. The muscles transverse perinei, puboperinealis and puboanalis were identified at the level where they attach into the perineal body. Deviations of these muscles were defined as muscle discontinuity right, left or centrally, or muscles not being visible on one or both sides. If a muscle was not proper identified in the ultrasound volume due to artefacts, the volume was stated as poor quality for the respective muscle. The analysis protocol from the primiparous participants with caesarean section was used as reference for normality.

For reliability analysis, a new sample of randomly 40 participants (20 participants with caesarean section and 20 participants with vaginal delivery) were analyzed offline two times by one investigator at least two weeks apart for intrarater reliability, and one time by a second investigator for interrater reliability. Both investigators were blinded for previous measurements and obstetric history. Reliability was calculated with Cohens kappa. Kappa values of less than 0.20 was considered none, 0.21-0.40 minimal, 0.41-0.60 moderate, 0.61-0.80 good and 0.81-1.0 excellent reliability.

Results

Table 1 presents the number of detected deviations in the transverse perinei, puboperinealis and puboanalis in the two analyses from the first investigator (investigator 1a and 1b) and from the second investigator in the sample. None of the women with caesarean section had any detected deviations to the perineal anatomy. The percentage agreement ranged between 90% and 100% (Table 1).

For intrarater reliability, kappa value (95% CI) was 1.0 for transverse perinei, 0.849 (0.769-0.929) for puboperinealis, and 1.0 for puboanalis, giving an excellent reliability. For interrater reliability, kappa value was 0.871 (0.782-0.960) for transverse perinei, 0.810 (0.726-0.894) for puboperinealis and 0.658 (0.342-0.974) for puboanalis, giving a good to excellent reliability.

	Investigator 1a	Investigator 1b	Investigator 2	Percentage agreement investigator 1a and 1b	Percentage agreement investigator 1a and 2
Transverse perinei				100%	95%
Normal	30	30	32		
Deviations	10	10	8		
Puboperinealis				92%	90%
Normal	26	27	25		
Deviations	14	13	15		
Puboanalis				100%	97%
Normal	38	38	39		
Deviations	2	2	1		

Table 1: Number of detected deviations in the transverse perinei, puboperinealis and puboanalis, and percentage agreement between the two analyses from the first investigator (investigator 1a and 1b) and second investigator (investigator 2)

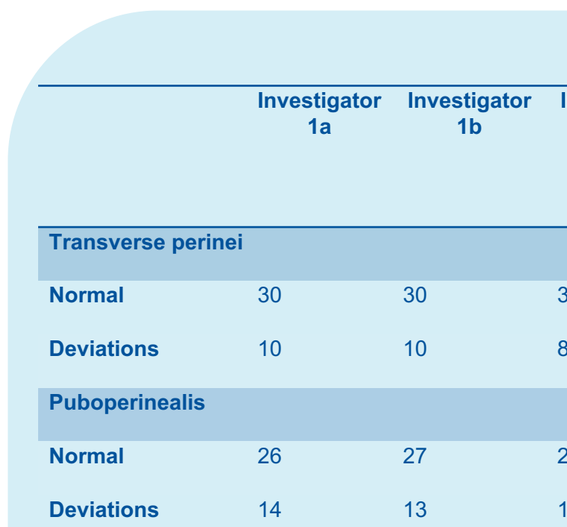

Figure 1: Normal transverse perinei and puboperinealis

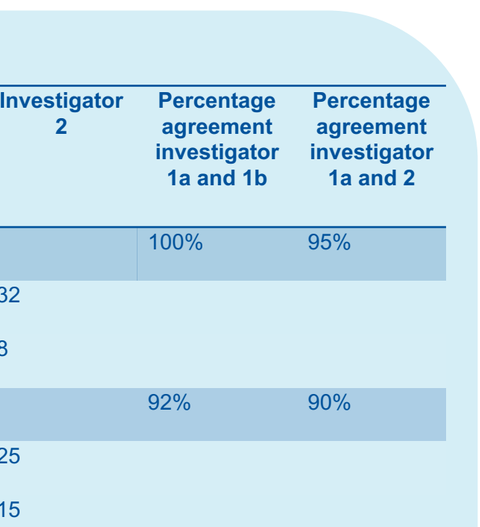

Figure 2: Central deviation in transverse perinei and puboperinealis not visible

Interpretation and conclusion

Our results shows a good to excellent intra- and interrater reliability using three-dimensional endovaginal to identify deviations in the transverse perinei, puboperinealis and puboanalis in women one year postpartum. The clinical significance of the defined muscle deviations is yet unclear; however, a better understanding of this complex perineal anatomy will improve diagnostics and give room for better treatment of pelvic floor dysfunctions in the future.

References

1. Larson KA, Yousuf A, Lewicky-Gaupp C, Fenner DE, DeLancey JO. Perineal body anatomy in living women: 3-dimensional analysis using thin-slice magnetic resonance imaging. Am J Obstet Gynecol. 2010;203(5):494.e15-21.
2. Siccardi MA, Bordoni B. Anatomy, Abdomen and Pelvis, Perineal Body. StatPearls. Treasure Island (FL): StatPearls Publishing. Copyright © 2021, StatPearls Publishing LLC.; 2021.
3. Santoro GA, Shobeiri SA, Petros PP, Zapater P, Wieczorek AP. Perineal body anatomy seen by three-dimensional endovaginal ultrasound of asymptomatic nulliparae. Colorectal Dis. 2016;18(4):400-9.

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