

THREE-DIMENSIONAL TRANSPERINEAL ULTRASOUND IMAGING OF THE ANAL SPHINCTER IN NULLIPAROUS WOMEN.

Hypothesis / aims of study

Until recently anal sphincter imaging was usually performed utilizing endoanal ultrasound, an invasive technique.

Lately, 3D/4D transperineal ultrasound, a non invasive technique, has been proven to be able to visualize the different parts of the anal sphincter complex as well, i.e. the smooth internal muscle and the superficial and deep part of the striated external anal muscle (1,2), with good interobserver reliabilities (3).

This study aimed to obtain more information on the anatomy of the normal anal sphincter in vaginally nulliparous women by 3D/4D transperineal ultrasound.

Study design, materials and methods

Of 888 women attending a tertiary pelvic floor clinic for analyzing symptoms of pelvic floor disorders between October 2006 and March 2010, only vaginally nulliparous patients without anal sphincter trauma and or surgery were enrolled in this study. All underwent a standardized interview and pelvic floor ultrasound imaging, using a Voluson 730 Expert system and a 4-8 MHz RAB probe for imaging of the levator ani. For anal sphincter imaging a 5-9 MHz RNA probe was used, obtaining volumes at rest and in pelvic floor contraction. Offline analysis of the volumes was performed using GE Kretz software (4D View version 5.3).

For analysis of the anal sphincter, dynamic VCI static imaging was performed with a slice thickness of 2mm. The total length (TL) of the anal sphincter, the length of the external anal sphincter (EAS) and the thickness of the EAS in the midsagittal and coronal plane at 12 o'clock were measured in rest and in contraction (see figure 1).

Figure 1. 3D Transperineal measurements of the anal sphincter complex



1: Total length

2: Length EAS

3: Thickness EAS at 12 O' clock.

Results

83 Women were eligible for this study; the median age was 38 years (range 18 - 77).

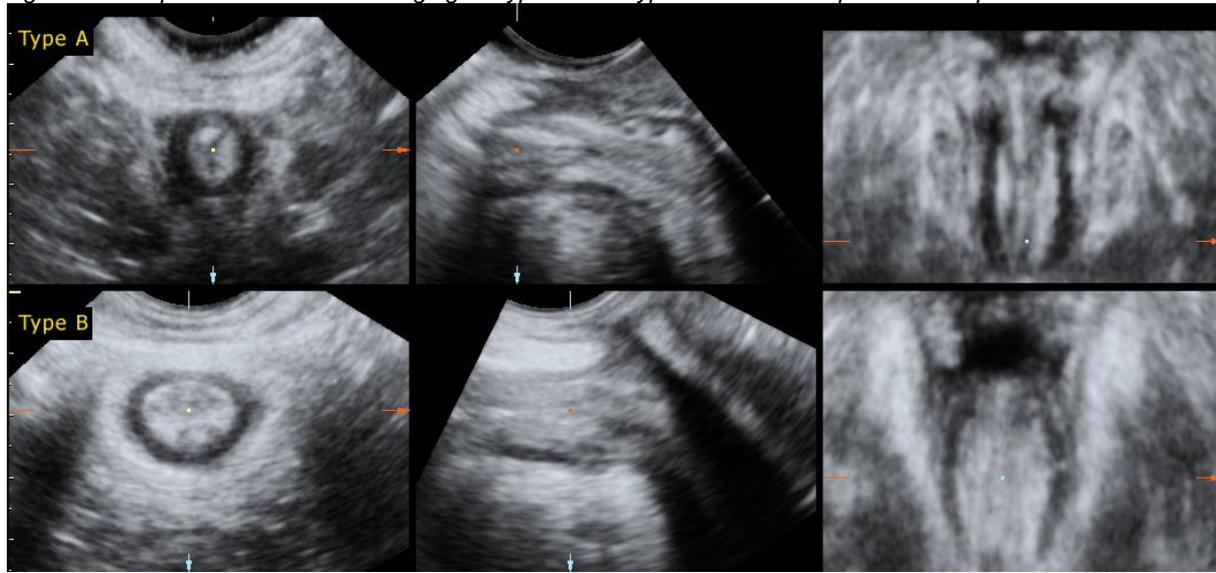
The leading complaints were urinary symptoms in 28% of the women, prolapse symptoms in 8.4%, fecal incontinence in 17% and obstructed defecation in 12% of the cases.

The mean TL of the anal sphincter in rest was 2.52 cm (range 1.46 - 3.56), in contraction 2.44 cm (range 1.30 - 3.17); the length of the EAS in rest was 1.70 cm (range 0.78 - 2.83) and in contraction 1.72 cm (range 0.74 - 2.71). The mean thickness of the EAS at 12 o'clock in rest was 0.37 cm (0.18 - 0.65) and in contraction 0.41 cm (0.13 - 0.89).

No statistical difference was found for the above measurements between women < 50 years in comparison to women ≥ 50 years.

We defined a preliminary classification system, to differentiate between two types of the anal sphincter. Type A was subjectively scored if there was a short and thick external anal sphincter, Type B was defined as a long and thinner sphincter (see figure 2). Type A was found in 49% of the patients and the type B anal sphincter in 51%. Significant differences were found between the two types in rest for the TL of the sphincter (2.42 cm versus 2.63 cm), for the length of the EAS (1.33 cm versus 2.10 cm) and for the thickness of the EAS at 12 o'clock (0.41 cm versus 0.34 cm). Women with a type A (shorter) external anal sphincter did suffer significantly more of symptoms of fecal incontinence.

Figure 2 Transperineal ultrasound Imaging of Type A and Type B of the anal sphincter complex



Interpretation of results

Transperineal ultrasound can be utilized for obtaining imaging of the anatomic morphology of the anal sphincter complex. We found a wide range in TL of the anal sphincter and the length of the EAS in vaginally nulliparous women. These findings are in concordance with previous results (1).

Interestingly, two different types of anal sphincter complexes could be observed with significant morphological differences especially for the external anal sphincter.

Patients with a Type A anal sphincter complex developed more often fecal incontinence.

Further investigation needs to be performed to confirm this finding. We can only speculate that the results showed could be of importance for anal sphincter repair post delivery and sustaining fecal continence. Transperineal ultrasound performed pre delivery can provide us important information about the preexistent condition of the anal sphincter.

Concluding message

The TL of the anal sphincter in nulliparous women varies between 1.46 and 3.56cm, the length of the EAS between 0.78 and 2.38 cm. A subjectively scored preliminary classification showed two different types of the anal sphincter, with significant difference in length and thickness of the (external) anal sphincter. Type A was associated with a greater chance of developing symptoms of fecal incontinence.

References

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