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# DOES PARTIAL AVULSION OF THE LEVATOR ANI MATTER FOR SYMPTOMS OR SIGNS OF PELVIC FLOOR DYSFUNCTION?

Hypothesis / aims of study

Major morphological abnormalities of the puborectalis muscle ('avulsion') are likely to be an etiological factor in the development of female pelvic organ prolapse (1). Such trauma is associated with reduced muscle strength, 'ballooning' (abnormal hiatal distensibility of ≥25cm$^2$) (2) and possbile myofascial injury. Women with avulsion are more likely to complain of prolapse symptoms and demonstrate signs of clinically significant prolapse.

However, in a minority of women such trauma is only partial, with part of the puborectalis still adherent to its insertion. To date there is no data on the clinical significance of partial avulsion. We therefore performed a study using 4D ultrasound to correlate the diagnosis of partial avulsion with symptoms and signs of pelvic organ prolapse and bladder dysfunction.

Study design, materials and methods

This is a retrospective study of 764 women referred to a tertiary urogynecological service for symptoms of prolapse or lower urinary tract dysfunction from May 2005 to November 2008. All of them had undergone an interview, clinical assessment using the ICS POPQ system for prolapse grading, and 4D translabial ultrasound. The ultrasound examination was performed supine after bladder emptying on maximum valsalva and on pelvic floor muscle contraction (PFMC). Blinded offline analysis of volume datasets was performed at least 6 months after the original patient contact using 4D View software blinded to all patient data. Tomographic ultrasound imaging (TUI) was performed by the first author on volumes obtained at PFMC at 2.5mm slice intervals, from 5mm below to 12.5mm above the plane of minimal hiatal dimensions, and was used for assessment for levator avulsion as previously described (3). Rest volumes were used in patients unable to perform a PFMC (n=34).

Partial avulsion was diagnosed when any of the slices 3-8 were abnormal, without the patient being classified as a full avulsion due to all three central slices being abnormal (see Figure 1 for an example). The two lowermost TUI slices (ie., those below the plane of minimal dimensions) were excluded from the analysis on the basis of a previous study showing that the appearance of avulsion in those slices may be artefactual due to the curved nature of the levator plane.

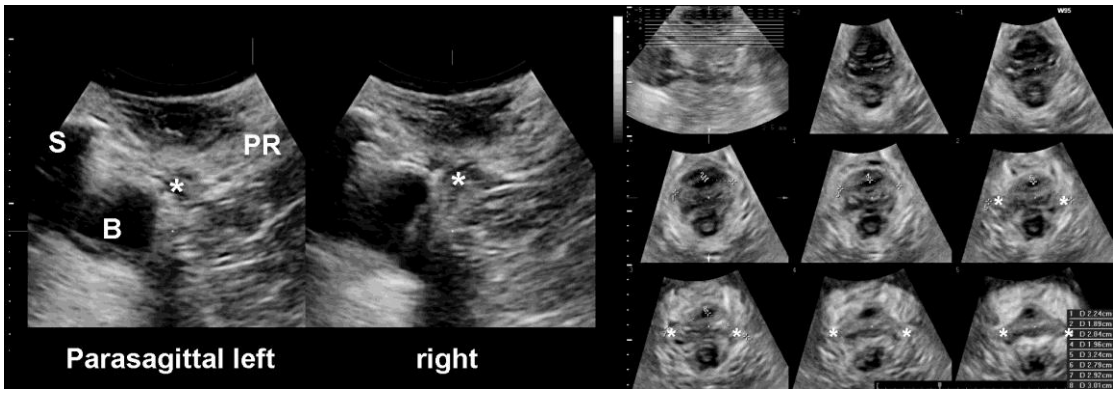


*Figure 1: Large partial trauma (indicated by *) sparing the inferior aspects of the insertions of the puborectalis muscle (2D oblique parasagittal on left, TUI on right).*

Results

The mean age was 55 (range, 18-89). 89% were vaginally parous (n=682), and the median number of vaginal deliveries was 2 (range, 0-10). 186 (24%) had had a vaginal operative delivery. 33% reported a previous hysterectomy (n=251). They complained of symptoms of stress urinary incontinence (n=541, 71%), urge incontinence (n=524, 69%), frequency (n=399, 52%), nocturia (n=384, 50%) and symptoms of prolapse (n=337, 44%). On examination, 50% (n= 379) were shown to have significant pelvic organ prolapse (ICS POP-Q stage 2 or higher). This was a cystocele in 37% (n=281), uterine prolapse in 7 % (n=48) and a rectocele in 28% (n=207). Of 764 patients, two volume datasets were not located, and two more were impossible to assess completely due to technical inadequacy. Per patient, 12 slices were assessed- from the plane of minimal dimensions to 12.5 mm above this plane, equalling a total of 9120 assessments.

In 30% of all patients (n=226) we found an avulsion of the puborectalis muscle on tomographic ultrasound. It was right- sided in 26% (n= 199), left-sided in 20% (n=146) and bilateral in 16% (n=119). On TUI, 1233 slices were positive on the right, and 1024 were positive on the left. As shown previously, a full avulsion was strongly associated with symptoms of prolapse (38% vs 59%, P< 0.001), significant prolapse on clinical assessment (74% vs 40%, P < 0.001) and cystocele descent on ultrasound (14.8 mm below the symphysis vs. 2.3 mm below the symphysis, P< 0.001), see Table 1.

After exclusion of patients with complete (unilateral or bilateral) avulsion (n= 228), 55 patients with partial avulsion were left for analysis against those with an intact levator. There was no association between partial avulsion and symptoms of bladder dysfunction or prolapse, nor did we find an association between significant prolapse on ICS POP-Q and partial avulsion, see Table 1. There was a trend towards more cystocele descent on ultrasound in women with partial avulsion (maximum descent to –6.0 below the symphysis pubis vs. –1.9 below in patient with normal TUI (P= 0.12 on t-test).

| | Complete avulsion vs all others | Partial avulsion vs no defects |
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| | n= 226 | | n= 55 | |
| **Symptoms of prolapse** | 133/226 vs 202/ 534 | P< 0.001 | 18/55 vs 183/477 | n.s. |
| **ICS POP-Q stage 2+** | 164/223 vs 213/530 | P< 0.001 | 24/55 vs 189/473 | n.s. |
| **US Cystocele descent** | -14.8 (SD 19.9) vs -2.3 (SD 17.2) | P< 0.001 | -6 (SD 18.6) vs -1.9 (SD 17) | P= 0.12 |

*Table 1: The association between symptoms and signs of prolapse and complete / partial avulsion. Numbers vary due to missing data (n=7 for ICS POP=Q assessment, n= 11 for ultrasound prolapse assessment).*

Interpretation of results

Avulsion of the insertion of the puborectalis muscle from the inferior pubic ramus seems to matter greatly for pelvic organ support, especially for anterior and central compartment descent. This does not appear to be the case for partial defects, i.e., defects that do not affect the entire puborectalis muscle.

Concluding message

Partial trauma to the puborectalis muscle seems to be of limited clinical relevance.

References


1. BJOG 2008; 115:979-984
2. AJOG 2009; 201:89.e1-89.e5
3. Ultrasound Obstet Gynaecol 2007; 29:329- 334



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|---|---|
| ***Specify source of funding or grant*** | **Nil** |
| ***Is this a clinical trial?*** | **No** |
| ***What were the subjects in the study?*** | **HUMAN** |
| ***Was this study approved by an ethics committee?*** | **Yes** |
| ***Specify Name of Ethics Committee*** | **SWAHS HREC** |
| ***Was the Declaration of Helsinki followed?*** | **Yes** |
| ***Was informed consent obtained from the patients?*** | **No** |