

URETHRAL HYPERMOBILITY – FASCIAL OR MUSCULAR DEFECT?

Hypothesis / aims of study

Urethral hypermobility is one of the factors which take part in the development of the stress urinary incontinence. Urethral support is provided by fascial attachment and by pelvic floor muscles. Lateral defects of the vaginal fixation to lateral pelvis are caused by disattachment of the endopelvic fascia to the arcus tendineus fasciae pelvis, or by the avulsion injury of the levator ani muscle. In transabdominal ultrasound examination, we are able to visualize the vagina and the defects directly as a change in the shape, or indirectly as changes in the shape of the urinary bladder (previously described as PVD). Avulsion of the levator ani muscle can be detected by palpation or by 3D ultrasound examination. The aim of our study was to assess how the presence of various defects (fascial and muscular) affects urethra and lower urogenital tract of continent and incontinent women, and their relationship to continency.

Study design, materials and methods

359 women were included in this study, 251 incontinent and 108 continent. Median age was 51 years, median weight 70, median height 165, median parity 2 (average age 50.4, weight 72, height 165.2, parity, 1.65). All women underwent complex examination, in specula, palpation (presence of avulsion), ultrasound examination. The continent and incontinent women were subdivided according to the presence of the lateral defect into three subgroups: no defect D0, unilateral defect D1 (in this subgroup differences between various side defects were compared), and bilateral defect D2. We compared this ultrasound finding with the results of palpation examination and the presence of avulsion injury of the levator ani muscle. For all women, an ultrasound scan was performed – transabdominal for detection of lateral defect (D), transperineal – assessment of the position and mobility of the urethra. The position of the urethra was measured at rest and at maximal Valsalva. Mobility was expressed as vector length and direction of movement from rest to the maximal Valsalva manoeuvre. Only in some patients 3D examination was also carried out to detect avulsion injury (10 patients). For statistical analysis t-test, Wilcoxon test, F test, Kruskal – Wallis test and Anova were used. The local ethical committee approved the study.

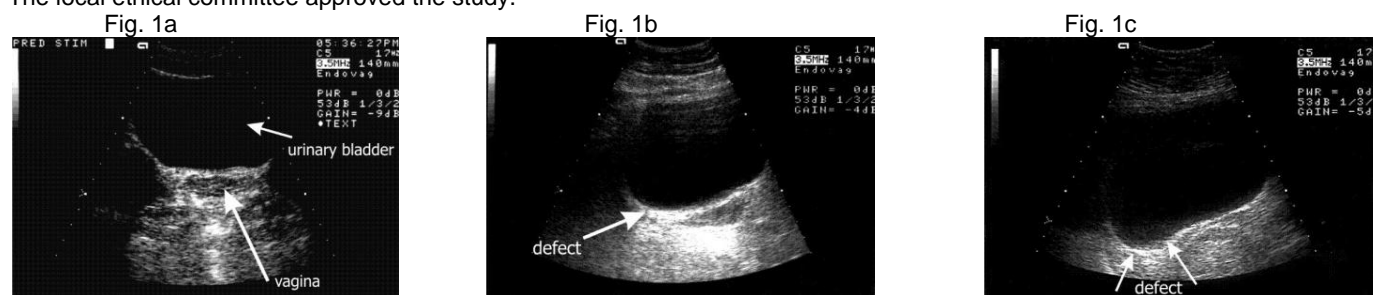


Fig. 1a – normal vaginal wall attachment Fig. 1b,c – unilateral defect

Results

Urethral mobility is significantly increased with the presence of the lateral vaginal wall attachment defect, while a bilateral defect increases the mobility more than a unilateral. There is no difference between the left or right side defect. The defects do not affect the resting position of the urethra; the defects, however, significantly increase the mobility of the whole urethra, with the highest increase in the upper parts (for example, the mobility of UVJ in continent women for D0 is 12.4mm, for D1 17.6 mm for D2 27.2: the differences are statistically significant, $p < 0.001$). In incontinent women the changes are very similar: the mobility of UVJ for D0 is 15.1 mm, for D1 17.1mm for D2 22.3mm: the differences are statistically significant, $p < 0.001$. In 53 (49%) of continent women no defect was detected, in 35 (32%) there was a bilateral and in 20 (19%) an unilateral defect.

In the group of incontinent women, the lateral defect is present in 212 (84%) individuals, in 75 (30%) unilateral, and in 137 bilateral (54%).

Unilateral or bilateral defects are more often present in older women with higher parity. There is no correlation between increasing BMI and those defects.

In comparison with incontinent women, in continent women the prevalence of lateral defects is significantly lower. Parity is lowest in groups without defects.

There are statistically significant differences in the resting position and mobility of the urethra between the same groups of continent and incontinent women. In incontinent women there is a higher descent of the urethra at rest and a different type of movement from rest to maximal Valsalva. The length of the movement is the same for the upper parts of the urethra and slightly longer for the lower parts in incontinent women. The most significant statistical differences are in the directions of the movement. In continent women rotational movement of the urethra is prevalent, while in incontinent women the combination of rotation and "slipping" dominates.

Palpable trauma of the levator ani was detected in 48% patients with ultrasound detected lateral vaginal wall disattachment. The presence of the trauma did not change the urethral mobility compared to those with the lateral defect without the palpable defect. In most women the levator trauma was described as minimal (it well correlates with 3D ultrasound of the puborectal muscle (Fig.2) – in figure 1c. is 2D transabdominal picture of the same patient)

Fig. 2a

Fig. 2b

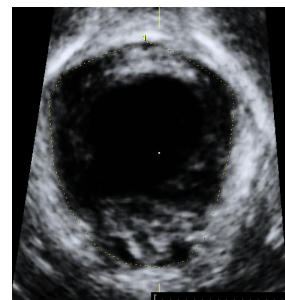
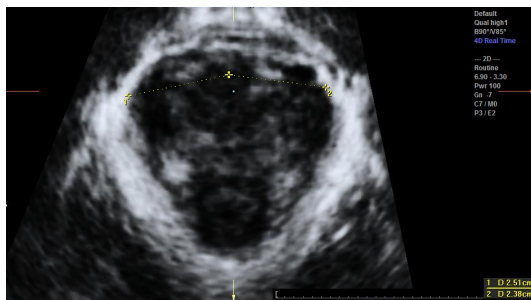


Fig. 2a Small avulsion on the right side (same patient as on Fig. 1c)

Fig. 2b Ballooning

Interpretation of results

Defects of lateral vaginal wall attachment are a reason for increased urethral mobility. The main cause of these defects is injury to the pelvic floor induced by delivery, fascial and muscular trauma. We did not confirm that repeated labour would increase the anatomical defect at the site of the fixation of the anterior vaginal wall to the arcus tendineus, or the presence of levator trauma.

Urethral mobility is very similar in continent and incontinent women. In continent women, however, the movement is mostly rotational, while in incontinent women it is a combination of rotation and slipping.

In women with bilateral defect and high urethral mobility we are not able to distinguish continence based on assessment of position and mobility of the urethra. For stress urinary incontinence, the presence of ISD (intrinsic sphincter deficiency) is also necessary, in addition to the anatomical defects causing hypermobility. In incontinent women of a higher age, the anatomical defect is less common, and the mobility of urethra decreases. We may suppose that with increasing age there is higher proportion of functional defects (ISD) that are the reasons for stress urinary incontinence. Increased BMI was also not associated with higher prevalence of those defects, while increased body weight is one of the reasons for abnormal urethral function (ISD).

Concluding message

The reason for increased urethral mobility is a defect of the lateral vaginal wall attachment. This defect should be only fascial, without levator trauma. The defect is significantly more frequent in parous women (delivery-induced pelvic floor trauma) and is more often present in incontinent women. We did not confirm that repeated labour should increase the prevalence of this defect. Mobility depends on the severity; the highest mobility was found in patients with bilateral defects.

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Was this study approved by an ethics committee?	Yes
Specify Name of Ethics Committee	local ethics committee
Was the Declaration of Helsinki followed?	Yes
Was informed consent obtained from the patients?	Yes