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THE SIGNIFICANCE OF ULTRASOUND DIAGNOSIS OF PARAVAGINAL DEFECTS

Hypothesis / aims of study

Paravaginal defects (PVD) are lateral defects of the attachment of the endopelvic fascia to the arcus tendineus fasciae pelvis. These defects can be demonstrated during transabominal ultrasound examination /1/. According to some studies, ultrasound correlates well with perioperative findings of PVD /2/. However, other studies indicate poor correlation with clinically observed defects /3/. This imaging method has not been validated, which may well explain the different results. The aim of our study was to assess how the presence of paravaginal defect influences the lower urogenital tract of continent and incontinent women and to compare those two groups.

Study design, materials and methods

319 women were included in this study, 211 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, par, 1.65). The continent and incontinent women were subdivided according to the presence of paravaginal defect into three subgroups: no PVD (PVD0), unilateral defect PVD1 (in this subgroup differences between different side defects were compared), and bilateral defect PVD2. For all women an ultrasound scan was performed – transabdominal for detection of paravaginal defect (PVD), transperineal – assessment of the position and mobility of the urethra, introital for presence of funneling and measurement of the thickness of the urinary bladder. The urinary bladder was filled with 300 ml of sterile saline. Measurements of the urethra position were taken at 4 defined points: at the urethrovesical junction (UVJ), 17 mm below UVJ (middle of the urethra) and one centimetre above and below this point (upper and lower third). 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. For statistical analysis t-test, Wilcoxon test, F test, Kruskal – Wallis test and Anova were used. The local ethical committee approved the study.

Results

In 53 (49%) of continent women no PVD was detected, in 35 (32%) there was a bilateral defect and in 20 (19%) unilateral PVD. Unilateral or bilateral defects are more often present in older women with higher parity. There is no correlation between increasing BMI and PVD. The presence of PVD significantly increases urethral mobility, while a bilateral defect increases the mobility more than a unilateral. There is no difference between the left or right side defect. PVD significantly increases the mobility of the whole urethra; the highest increase is in the upper parts (for example, the mobility of UVJ for PVD0 is 12.4mm, for PVD1 17.6 for PVD2 27.2: the differences are statistically significant, $p< 0,001$).

The presence of paravaginal defect does not influence the thickness of the urinary bladder but significantly influences the visible depth and width of the internal urethral orifice at rest: width for PVD0 4.2, PVD1 5 mm, PVD2 5.4 mm ($p< 0,001$), depth for PVD 0 3.3 mm, PVD1 3.9, PVD2 4.1mm. During maximal Valsalva the internal orifice closes, and there is no differences between the groups.

In the group of incontinent women PVD is present in 178 (84%) individuals, in 63 (30%) unilateral, and in 115 bilateral (54%). PVD does not influence the resting position of the urethra, but again there are significant differences in the length of the vector from rest to maximal Valsalva (for example, the mobility of UVJ for PVD0 is 15.1 mm, for PVD1 17.1 for PVD2 22.3mm: the differences are statistically significant, $p< 0,001$). There is no difference between left or right side defects.

There are statistically significant differences in age, BMI and parity between all groups. The mean age is highest in the group without PVD (PVD0 59, PVD1 57, PVD2 54), BMI index is highest in group without PVD (i.e. 29, while in other groups the figure is 27), and parity is lowest in incontinent women without PVD (PVD0 1.5, with PVD 1.5). In incontinent women the presence of PVD does not influence the width and depth of visible opening of the internal urethral orifice (funnelling) at rest and at maximal Valsalva. The thickness of the urinary bladder is lowest in women with bilateral PVD.

In comparison with incontinent women, in continent women the prevalence of PVD is significantly lower. The mean age for women without PVD is lowest in the continent group and highest in the incontinent group. BMI in incontinent women is highest in the group without PVD, but for continent women it is lowest in this group. Parity is lowest in groups without PVD.

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.

Visible opening of the urethra is higher at rest and at maximal Valsalva in incontinent women, and the urinary bladder is also thicker in incontinent women.

Interpretation of results

The reason for increased urethral mobility is the presence of paravaginal defect. The main reason for PVD is injury to the pelvic floor induced by delivery, but we can also find paravaginal defect in nulliparous women. We did not confirm that repeated labour increase the anatomical defect at the site of the fixation of the anterior vaginal wall to the arcus tendineus.

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

In women with bilateral PVD 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, in addition to the anatomical defect which causes hypermobility, the presence of ISD (intrinsic sphincter deficiency) is necessary. In incontinent women of a higher age the anatomical defect is less common, and the mobility of urethra decreases. We can suppose that with increasing age there is higher proportion of functional defects (ISD), which are the reasons for stress urinary incontinence. Increased BMI was also not associated with higher prevalence of PVD, and increase body weight is one of the reasons for abnormal urethral function (ISD).

Concluding message

The presence of PVD is only a marker of increased urethral mobility. The mobility depends on the severity of the fascial defect, with highest mobility found in patients with bilateral defects. Probably most of these defects originate during labour or pregnancy.

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Literature:

1. J Ultrasound Med 1997, 16: 673-677
2. Ultrasound Obstet Gynecol 2002, 19: 496-500
3. Int Urogynecol J 2000, 11: 341-345

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