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STATISTICAL MODELS HOW RISKS FACTORS FOR STRESS URINARY INCONTINENCE- VAGINAL DELIVERY AND AGE INFLUENCE THE MORPHOLOGY OF THE LOWER URINARY TRACT IN CONTINENT AND INCONTINENT WOMEN.

Hypothesis / aims of study

Stress urinary incontinence is a common health problem. Epidemiological studies reveal that the prevalence of incontinence increase with increasing age. Vaginal delivery also increases the risk of developing incontinence. The aim of this study was to reveal the mechanism of the development of urinary incontinence after vaginal delivery and the effect of the increasing age, based on the ultrasound assessment of the anatomy of the lower urogenital tract in incontinent and continent women

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). Women were subdivided according to parity into three subgroups: parity 0, 1 and 2 or more. 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 funnelling and measurement of the thickness of the urinary bladder. Measurements of the urethra position were taken at 4 defined points: at urethrovesical junction (UVJ), 17 mm below UVJ (middle of the urethra) and one centimeter above and below this point (upper and lower third). Mobility was expressed as vector length and direction of movement from rest to the maximal Valsalva maneuver. For statistical analysis t-test, Wilcoxon test, F test, Kruskal – Wallis test and Anova were used. For the statistical dependence of the mobility on parity and on age the linear model was made.

Results

In continent women there is statistically higher mobility in women with a labor history. There is no difference in mobility between women with one or 2 or more labors in their history. Among those women there is no difference in presence of funneling and thickness of the urinary bladder wall. In incontinent women no significant differences based on parity were found. If we compare continent and incontinent women there are statistically significant differences in the position of the urethra at rest and at maximal Valsalva. In incontinent women there is a higher descent (Fig 1). If we compare the length of the vector of movement, it is the same for continent and incontinent women. There are significant differences in the direction. In continent women the movement is rotational, in incontinent women it is a combination of rotation and slipping. In incontinent women there is significantly higher opening of the urethra at rest and at maximal Valsalva (funneling), and there is also higher thickness of the urinary bladder.

Statistical analysis of the dependence of mobility (VUK0V0) on age was studied for two groups of physiological and incontinent women. It was found that there is a statistically significant dependence at 5% level on age that had to be considered in the linear model up to second order. Statistical dependence on group was not significant.

In addition, statistical analysis of the dependence of mobility on age and parity was performed by linear model. We found statistically significant quadratic dependence on age and statistically significant dependence on parity at 5% level. It was shown that it is sufficient to divide parity into two categories, where 0 means no delivery and 1 means one or more deliveries (Figure 2). Therefore mobility can be expressed as

mobility= 6.7533+4.6283 parity+ 0.06802 age- 0.0078 age2 .

This equation expresses that in the case of two women of the same age who differs only in parity, the woman with parity=1 has about 4.6285 larger mobility then the woman with parity 0.

Fig. 1 Comparison of the position of the urethrovesical junction at rest in continent and incontinent women

1.a Nulliparous women 1.b Parous women

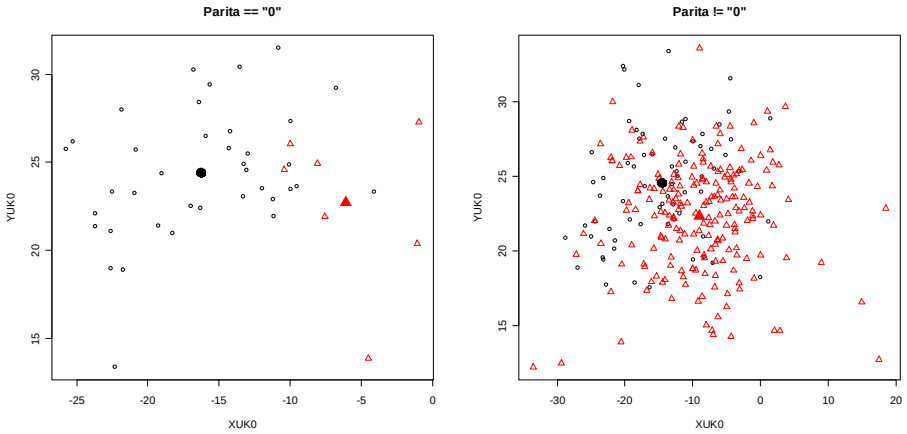
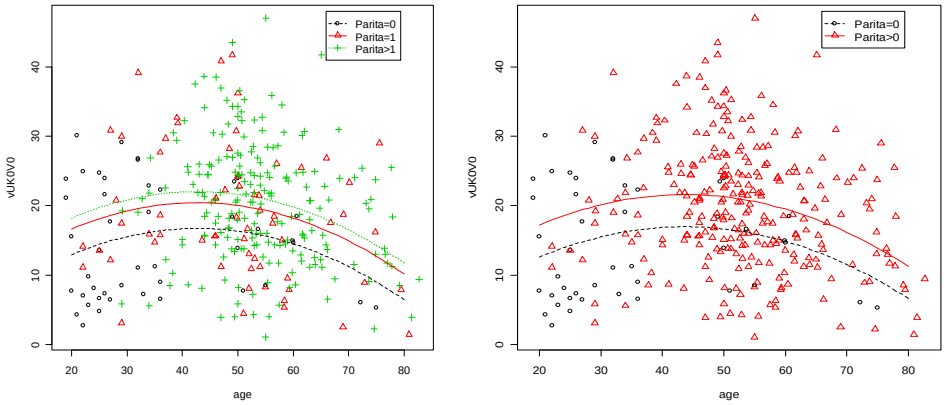


Fig. 2 Linear model of the dependence of mobility on age and parity
1.a Different parity 2.b Comparison of nulliparous and parous



0 means no delivery, 1 means one delivery, more than 1 means more deliveries

Interpretation of results

In continent women the mobility of the urethra is influenced by previous labor. The parameters are influenced in the same manner with one or more labors. The only difference is whether the women have delivered or not. In incontinent women repeated labor also does not increase urethral descend and mobility. In incontinent women there is a different direction of urethral movement, and funneling is more often present. It seems that at first increasing age increases the mobility of urethra (but it is firstly increased by delivery), and afterwards with increasing age there is a decrease of urethral mobility and increase of the width and depth of the visible opening of the urethra at rest.

Concluding message

Labour significantly increases mobility of the urethra. The changes in incontinent women are different to those in continent women with the same length of the movement but a different direction and higher descent. Increasing age directly influences the function of the urethra (funnelling).

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