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ONE SIZE FITS THEM ALL? WHAT TAPE LENGTH IS NEEDED FOR THE TRANSOBTURATOR APPROACH.

Hypothesis / aims of study
This study aims to describe ranges of distances from the mid-urethra to the obturator foramen, describe differences in anatomy of women that suffer from stress urinary incontinence and try to find correlation in the pelvic dimensions with the body height.

The mini-slings were introduced as a modification of current treatment of female stress urinary incontinence in 2006. The concept of mini-slings was to eliminate foreign material, easing the procedure to be carried out under local anesthesia with achieving the same efficacy as previous generations of tension free vaginal tapes. Most of the slings aim either obturator internus muscle or obturator membrane as a fixation site. However the first mini-sling TVT-Secur™ did not reach expectations of surgeons as the proper insertion was rare.

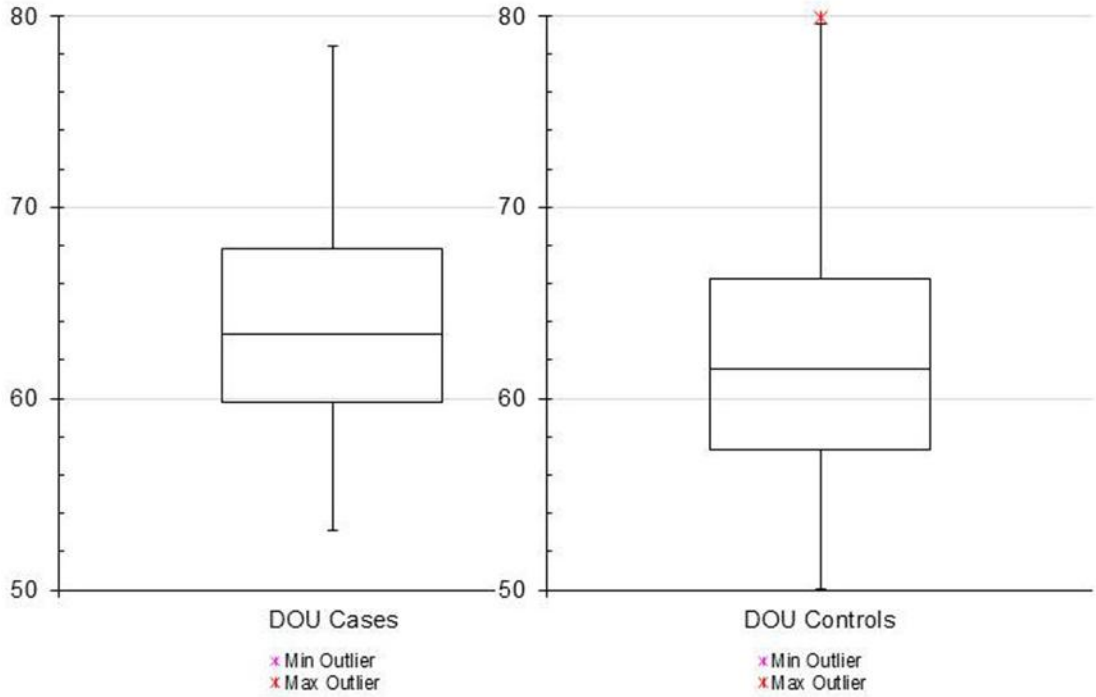
As different types of tapes and mini-slings have different fixation point and some of them aim to be anchored in obturator membrane it is essential to understand anatomy of lesser pelvis and to know what distances can be expected. Knowledge of the standard range of dimensions is important for the surgeons same as for the manufacturers.

This study aims to describe range of the distances from the mid-urethra to the obturator foramen, describe possible differences in anatomy of lesser pelvis in group of women that suffer of stress urinary incontinence and try to find correlation in the pelvic dimensions with the body height.

Study design, materials and methods
We evaluated group of fifty randomly chosen women suffering of stress urinary incontinence (cases) that were enrolled in MRI study and group of fifty randomly chosen women that did not showed signs of stress urinary incontinence (controls). The study was approved by the local IRB. Women in the groups were identical in matters of age, parity, weight, height, BMI. For the measurements of the 5mm MRI slices we used ImageJ. Measurements were taken by two researchers, later compared and averaged for further analysis. For the measurements we used axial scans. The distances measured were distance from the lower edge of symphysis to the lowest part of coccyx and distances from urethra to the obturator foramen. The urethral point was set as the third slide from bottom displaying the urethral muscles as this is the point where tapes are inserted. The shortest distance from urethral point was measured to the obturator foramen with its membrane in this and two following cranial slides. The validity of this study design was confirmed by measuring distances in Slicer 3D model of urethra and the obturator membrane of the same case, with similar results.

For inter-rater reliability we used Pearson's correlation and for comparison of the groups of cases and controls same as for comparing left and right sides we used two sample Student's *t* test and Wilcoxon test. Statistical test were performed at the 5% level of significance alpha.

Results
The overall inter-rater reliability was 91.5%. Figure 1 shows the variation in distances for cases and controls from the mid-urethra to the obturator on the left (D L OU) and right (D R OU). The distance from the urethral point to the obturator membrane in group of cases was 31.8mm (SD 3.4mm) on the left and 32.1mm (SD 2.7mm) on the right. The same distance in group of controls was 30.6mm (SD 3.3) on the left and 31.4mm (SD 3.4mm) on the right. However ranges of the distances from the urethra to the obturator membrane in the group of cases were from 25.9mm to the 42.0mm and in the group of controls the ranges were 24.3mm to the 40.4mm. Overall the total distance from the left obturator membrane to the urethral point and further to the right obturator membrane was in the group of cases 64.0mm (SD 5.5) with the range of 53.1mm to 78.4mm. The same total distance at group of controls was 62.0mm (SD 6.3) with the range from 50.1mm to 79.9mm. There was no statistical significance based on comparing the total distance and left and right side distance between groups of cases and controls. The mean distance in group of cases from the lower edge of symphysis to the coccyx was 94.5mm (SD 8.8mm). The same distance in the group of controls was 95.0mm (SD 9.9mm).
The following box plots and table displays results of total distance from the left obturator membrane to the mid-urethra and then to the right obturator membrane in group of cases with the spread urethra to obturator foramen.



DOU Cases		DOU Controls	
Min	53,1	Min	50,1
Q1	59,8	Q1	57,3
Median	63,4	Median	61,5
Q3	67,9	Q3	66,3
Max	78,4	Max	79,9
IQR	8,1	IQR	8,9

Interpretation of results

When comparing group of cases and controls we have not found statistical significance in the results. Similarly we compared shorter half of each group with the taller half of the same group without proving statistical significance. While comparing the total distances from one obturator membrane to the other obturator membrane passing underneath mid-urethra with the distances from symphysis to coccyx we did not find statistical significance. Therefore body height neither the distance from symphysis to coccys cannot be used as a predictor for this dimension.

Concluding message

In cases the mean distance from one obturator membrane to the other while passing underneath the urethra was 64mm. In the group of controls the similar distance was 62mm. However the range of the distances was almost fifty percent of the mean. Body height cannot be used as a strong predictor of dimensions in lesser pelvis.

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Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**Institutional Review Boards of the University of Michigan Medical School IRBMED #2002-0636**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**