

Assessing urethral length measurement: comparison between simple catheter technique and 3D transperineal ultrasound

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CONTEXT

- Optimal placement of periurethral material plays an important role in treatment efficacy for women stress urinary incontinence (UI) [1].
- Considering individual variations, the assessment of urethral length prior to cystoscope insertion may help determine appropriate site of injection.
- Physicians usually assess urethral length using a Foley catheter. However, the validity of this technique has not been reported.
- Three-dimensional (3D) ultrasound imaging has been suggested to be useful in assessing urethral morphology and identifying site of injection [2].

AIM OF THE STUDY

To investigate the agreement between urethral length measured with a catheter compared to 3D transperineal ultrasound.

PARTICIPANTS

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- 57 women with stress or mixed UI (stress predominance)

Inclusion criteria

- Aged 18 years and older
- Reported at least 3 episodes of stress UI during a 3-day bladder diary
- Had an ambulatory 24 hour pad test with a pad weight over 3 g

Exclusion criteria

- BMI \geq 35
- Pelvic organ prolapse (POP-Q> grade 2)
- Ongoing treatment for UI
- Presented medical conditions or medications that could have interfered with the assessment

ACKNOWLEDGEMENTS

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METHODOLOGY

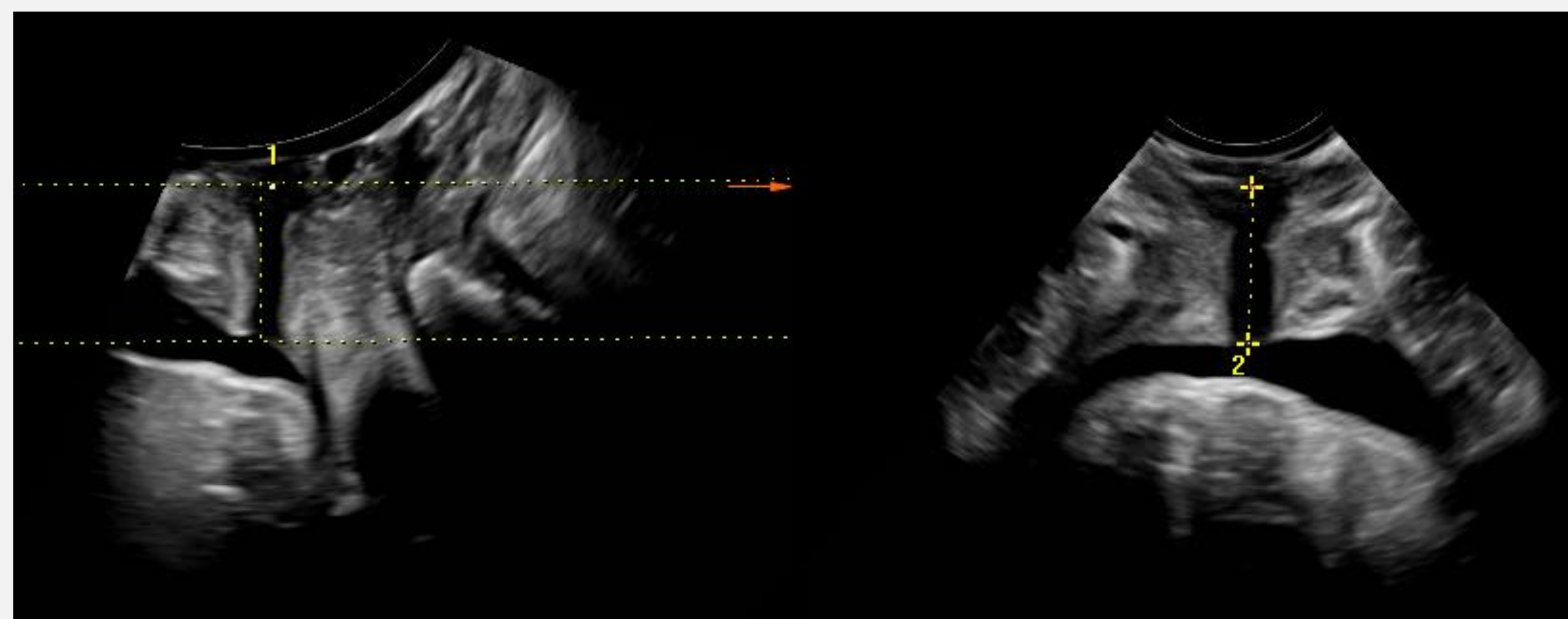
PROCEDURES

- Women underwent a standardized assessment including a structured interview to collect baseline characteristics and 24h pad test results.
- Two different evaluators assessed the urethral length using the two techniques and were blinded to each others data.

Urethral length assessment using 3D transperineal ultrasound

- GE Voluson e8 expert ultrasound system, 4-8 MHz curved array 3D/4D ultrasound transducer
- After asking the patient to empty their bladder, urethral length was calculated from the postero-inferior margin of the pubic symphysis to the bladder neck in sagittal and coronal planes [2] (Fig 1a,b). The mean of the two planes was considered for analysis.

Fig.1: 3D transperineal ultrasound assessment of the urethral length a) mid-sagittal plane b) coronal plane



Urethral length assessment using a Foley Catheter

- A catheter was introduced to empty the bladder and the balloon was inflated with 10 ml of sterile water.
- The bladder was then filled with 50 ml of sterile water.
- Catheter was gently pulled back until the balloon engaged the bladder neck.
- The physician pinched the catheter at the level of the meatus, removed the deflated catheter and hence, measured with a ruler the distance between her finger (meatus) and the balloon re-inflated (bladder neck) in order to evaluate the urethral length (Fig.2).

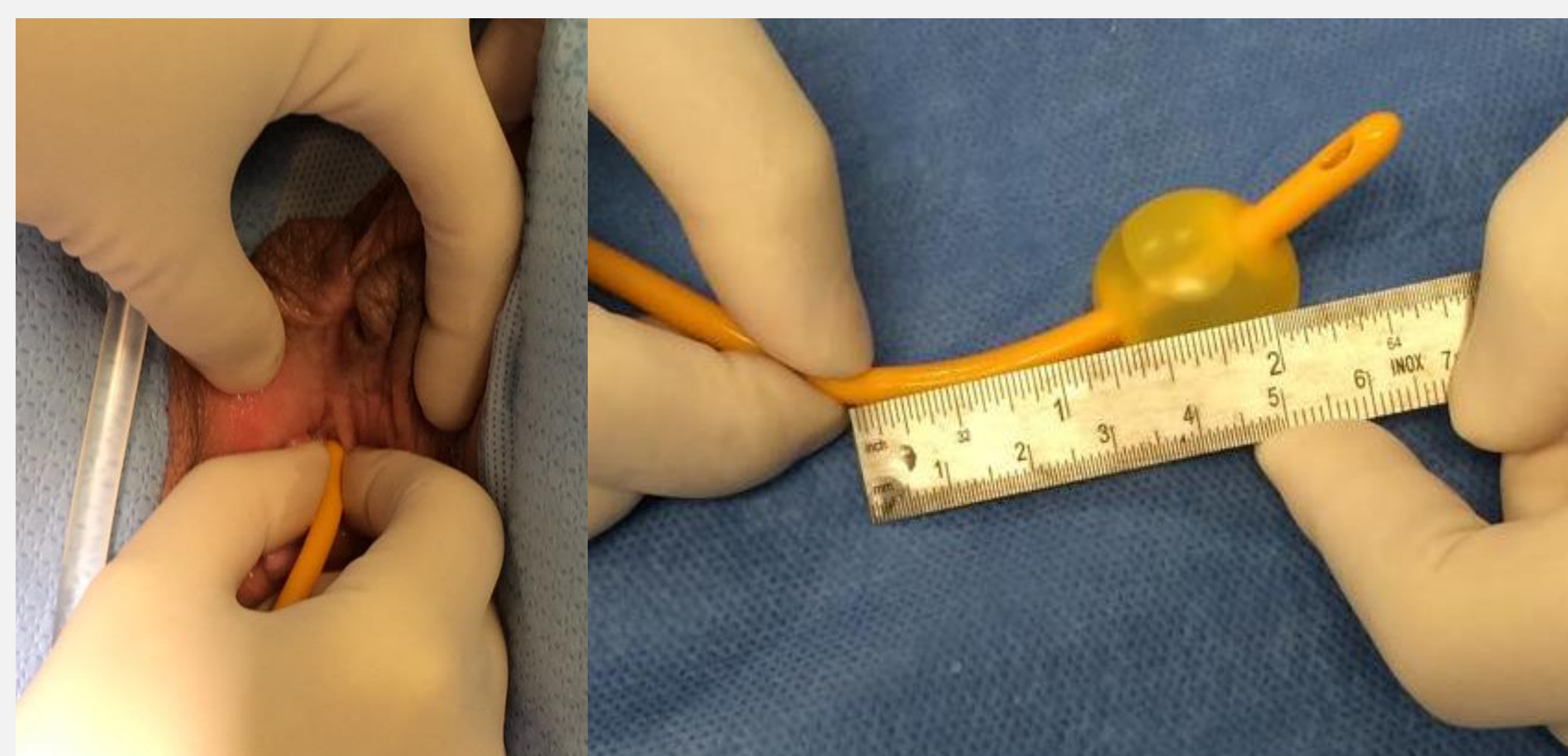


Fig.2: Catheter measurement of the urethral length

STATISTICAL ANALYSIS

- According to a recent systematic review for assessing agreement [3], the Bland and Altman analysis was used to compare the two methods for measuring urethral length.
- A range of agreement was defined as mean bias \pm 2SD.
- Intraclass correlation coefficient (ICC) was also computed using SPSS v.18.

RESULTS

- Among the 57 women participating in the study, 33 (58%) had stress and 24 (42%) mixed UI.

Table 1: Participants' characteristics

	Mean (Range)	SD
Age (years)	48 (26-71)	8
BMI (kg/m ²)	27.4 (19-34)	4.2
Parity	2.6 (0-9)	1.6
24h Pad-Test (g)	71.2 (6.9-416.4)	79.9

- ICC for the two methods: 0.90 (CI 0.82-0.94, $p \leq 0.001$)
- Student t test was not significant ($p=0.857$)
- Limits of agreement (Bland-Altman method, see Fig 3): [+0.46cm; -0.45cm]
mean difference : -0.01 cm, SD 0.23

Table 2: Urethral length

	Mean (Range)	SD
Urethral length with catheter (cm)	3.02 (2.20-3.0)	0.41
Urethral length with 3D transperineal ultrasound (cm)	3.03 (2.31-3.67)	0.34

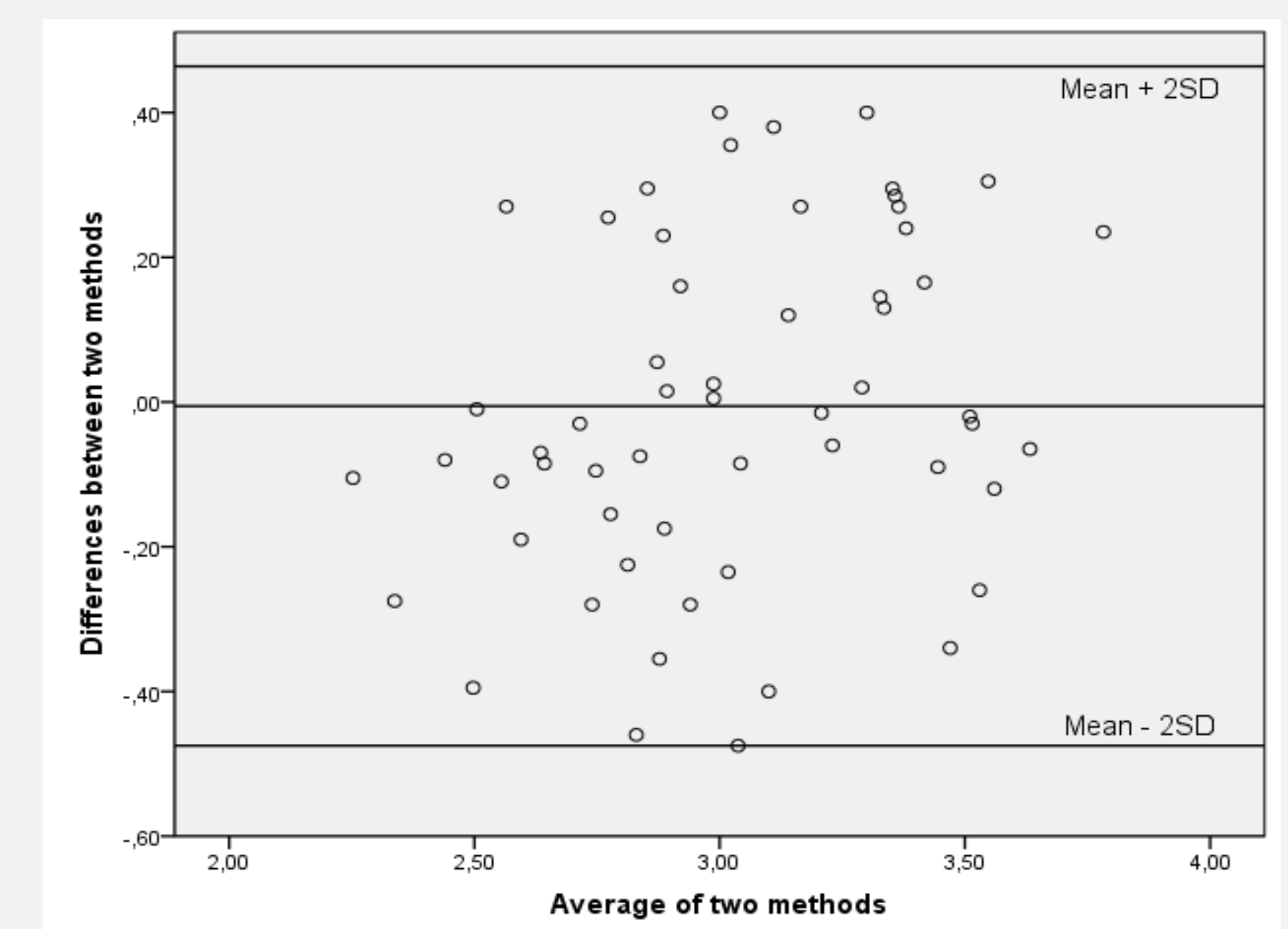


Fig.3: Bland-Altman method

DISCUSSION

- High ICC coefficient supports the concordance of the two methods for evaluating urethral length.
- Bland Altman method also demonstrates good agreement with a difference close to zero (-0.01 cm) suggesting no systematic error.
- Some variability may be explained by bladder residual volume.

CONCLUDING MESSAGE

Findings of this study provide relevant information for clinical practice to properly determine the site of injection for treating SUI. Measuring urethral length using a Foley catheter is a simple method in agreement with transperineal ultrasound assessment, with small mean bias and clinically acceptable limits of agreement.

REFERENCES

- [1] International Urogynecology Journal 2013; 24(7): 1151-9.
- [2] Current Opinion in Obstetric and Gynecology 2004; 16(5):411-7.
- [3] Public Library of Science 2012;7(5):e37908.