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IS IT POSSIBLE TO ESTIMATE URETHRAL MOBILITY BASED ON MUCP MEASUREMENTS?

Hypothesis / aims of study

Over recent years the role of urodynamics as a part of pre-operative assessment of women with stress urinary incontinence has been widely discussed. Several large randomized studies indicate that this examination has little influence on the outcome of surgery. However, other studies have shown that patients with lower maximal urethral closure pressure (MUCP) have a greater risk that SI will not be cured, especially when the transobturator sling procedure is employed. Some physicians prefer to have a urodynamic examination before surgery, and it is commonly accepted that low MUCP values are associated with low urethral mobility, while high MUCP indicate urethral hypermobility.

The aim of this retrospective analysis was to establish a relationship between MUCP and urethral descent in patients with proven urodynamic stress urinary incontinence who were evaluated prior to surgery.

Study design, materials and methods

This study is a retrospective analysis of patients who underwent surgery in our department and were included in three different prospective studies. Patients in the first group were evaluated before surgery from January 2002 to May 2005, those in the second from November 2006 to October 2009, and those in the third from April 2010 to March 2012. All three studies were approved by the local ethics committee, and each patient who was enrolled provided written informed consent and agreed to each procedure. All patients underwent a complete urogynecological investigation before the procedure (clinical examination, urodynamics, ultrasound examination).

The multichannel urodynamic studies at 500-ml bladder volume were performed in the supine position. Subtracted urodynamics were performed with water perfusion, semirigid catheter, Charr 12, and total abdominal pressure was determined by a rectal balloon catheter and subtracted detrusor pressure (vesical minus abdominal). At the beginning of the study pressure transducers were set at zero according to atmospheric pressure at the level of the bladder. The water perfusion rate was 2 ml/min, and the mechanical withdrawal rate was 2 mm/s. Room temperature normal saline was infused until capacity was reached, as determined by patient complaint of fullness. The pressure catheter was withdrawn with an electric catheter puller. Two consecutive urethral pressure profiles were performed at rest and during maximal Valsalva manoeuvre at bladder volumes of 500 ml. As part of the urethral pressure profile, we determined MUCP and functional length of the urethra. The MUCP was defined as the difference between maximum urethral pressure and bladder pressure. An ultrasound examination was performed using the transperineal approach in ccordance with the recommendations of the German Urogynecology Working Group and now also according to ICS, IUGA terminology. Polar coordinates were measured (distance p, rotational angel gama). The orthogonal coordinates (x, y) were calculated easily from p and γ: $x = p \times (\cos(180^\circ - \gamma/180^\circ) \times \pi)$;$y = p \times (\sin(180^\circ - \gamma/180^\circ) \times \pi)$. The mobility was expressed as a distance between the position at rest and at the maximal Valsalva manoeuvre ($v = \sqrt{(xvalsava - xrest)2+ (yvalsava - yrest)2}$, $\omega = 180/\pi * \cos((yvalsava-yrest)/(xvalsava-xrest))$. Before the ultrasound examination the urinary bladder was filled to 300 ml with sterile saline. The measurements were taken in supine position, at rest and during maximal Valsalva. Within each group we compared women of all parameters. Data were summarized as mean and median, with SD and quantile range for measures of variability. Depending on the character of the data, either a matched pairs t-test or Wilcoxon test was used. The level of significance was set to 0.05.

Results

Overall 567 patients were evaluated in this retrospective analysis. Ultrasound data were obtained for 560 patients and MUCP was available for 507 patients.

The mean age of the patients included in the study was 56.1 (SD 10.3, min. 26.8 and max. 82.7) years, mean height 164.9 (SD 6.2, min. 146, max 191) cm, mean weight 74.2 (SD 13, min 49, max 130) kg, mean BMI 27.3 (SD 4.6, min. 16.5 and max 44.3). Mean MUCP was 47.4 cm H_20 (SD 22.2, first quantile 32, third quantile 62). Mean urethral descent was 20.6 mm (SD 8.2, first quantile 14.9, third quantile 25.6 mm). There were no significant differences at the different time points in any monitored parameter in the study participants. Using regression analysis there was an increase in urethral descent; this difference is statistically significant. For a MUCP increase of 10 cm H_20 we could estimate an increase in urethral descent of 1.1 mm.

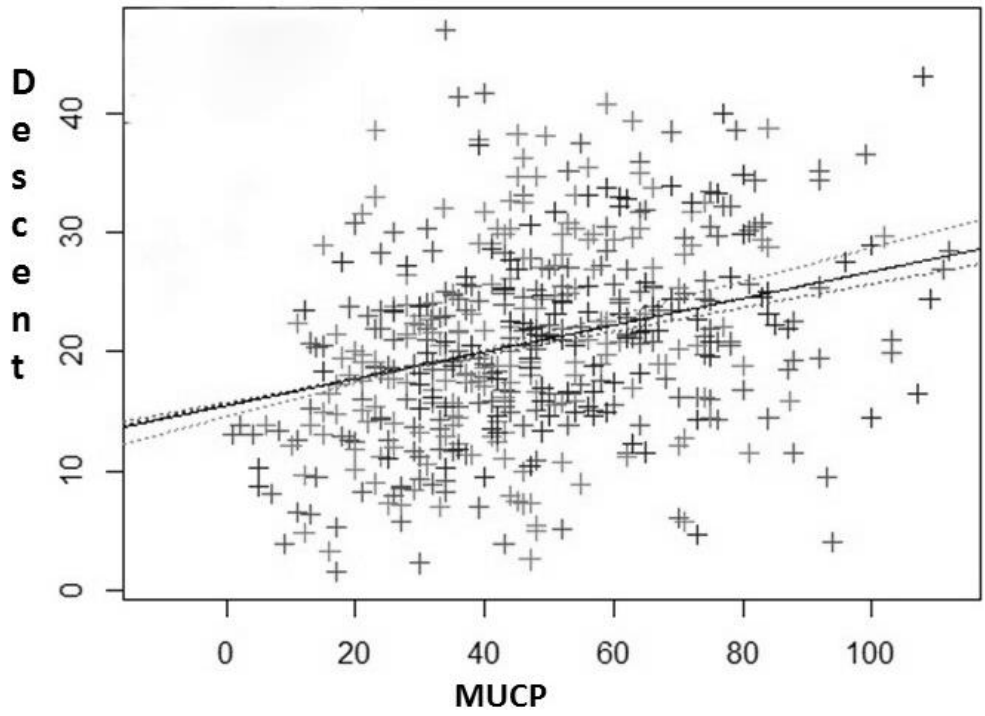
Interpretation of results

We established a statistically significant relationship between urethral descent and MUCP. Unfortunately those differences are not clinically relevant, especially for MUCP over 20 cm H_20. For MUCP below 20 cm H_20 low urethral descent is more likely.

Concluding message

Clinical use of MUCP as predictor of urethral descent is limited due to the high variability involved.

Figure 1. Correlation of MUCP to urethral descent



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