91

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CORRELATION OF PENILE SHAFT AND URETHRAL GIRTH MEASUREMENTS: IMPLICATIONS FOR ARTIFICIAL URINARY SPHINCTER CUFF PLACEMENT

Hypothesis / aims of study
Recent evidence suggests that a perineal surgical approach may yield superior outcomes versus a transscrotal approach for artificial urinary sphincter (AUS) cuff placement, likely due to better coaptation of the relatively larger proximal bulbar urethra within the sphincter cuff. We assessed intraoperative penile shaft and urethral girth measurements to develop a rational, quantitative guide for selection of surgical approach (perineal vs. penoscrotal vs. transcorporal) for AUS cuff placement.

Study design, materials and methods
The records of 57 men who underwent AUS placement (N=27) or anastomotic urethroplasty (N=30) from February 2008 to January 2009 were retrospectively reviewed. Measurements of stretched penile length (SPL), penile circumference (PC) at shaft base, and distal bulbar (DB) and proximal bulbar (PB) urethral circumference were obtained intraoperatively. The correlation between penile measurements (SPL and PC) and bulbar urethral measurements (DB and PB) was assessed, and patients were analyzed according to two groups (Group 1 - PC 8.0 cm or less; Group 2 - PC 8.5 cm or more).

Results
Distal bulbar urethral circumference (DB, mean 3.8 cm) was 48% of the penile shaft circumference (PC mean 8.8 cm, rho = 0.68) using a linear regression analysis. Proximal bulbar urethral circumference was uniformly larger (PB, mean 4.3 cm) and by linear regression was 60% of the penile circumference (rho = 0.67). Men having a PC of 8.0 cm or less (Group 1) had an average DB of only 3.5 cm and if receiving an AUS were more likely to receive transcorporal cuff placement (5/15, 33%) compared to those with a PC of 8.5 cm or more (Group 2, average DB 4.0cm), of whom only 1/12 (8%) required transcorporal cuffs (Odds ratio 5.5). Penile length had a less robust correlation with DB and PB (rho = 0.42 and 0.37 respectively). Patient who underwent urethroplasty were younger on average than AUS patients (48 vs. 68 years), less likely to have undergone prostate surgery (3/30 vs. 27/27), less likely to have documented erectile dysfunction (7/30 vs. 22/27) and proximal and distal bulbar urethral measurements were significantly larger (PB 4.6 vs. 3.9 cm p = 0.0014; DB 4.0 vs. 3.1 p = 0.0003).

Interpretation of results
Proximal bulbar circumference is uniformly greater than distal bulbar circumference, and both are strongly correlated to penile circumference. Men with a penile circumference $\leq$8 cm are likely to have a distal bulbar circumference <4 cm, thus suggesting that transcorporal or proximal perineal AUS cuff placement might be preferred to optimize urethral coaptation in this group of patients. Increased age, history of prostatectomy, and impotence are associated with reduced urethral girth.

Concluding message
A penoscrotal approach for AUS placement makes the sphincter likely to be placed more distal than a perineal approach. In patients with penile circumference $\leq$ 8 cm even the smallest sphincter cuff at 4.0 cm may not provide adequate mucosal coaptation if placed around the distal bulbar urethra. The need for a perineal or transcorporal approach for AUS placement can be anticipated by penile circumference measurements and a combination of other factors such as age, history of prostatectomy, and impotence.

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