894

Eggermont M[1], Gillespie J[1], De Wachter S[1]
1. *Department of Urology, University of Antwerp, Antwerp, Belgium*

THE URETHRAL PRESSURE PROFILE IN THE FEMALE RAT: FEASIBILITY OF THE METHOD AND THE CONTRIBUTION OF THE PUDENDAL NERVE.

Hypothesis / aims of study
There is a substantial body of research suggesting that the urethra plays an important role in the overall control of the lower urinary tract. In order to investigate urethral function, profilometric techniques have been developed in both men and women. In this study, we describe a method to obtain the urethral pressure profile in female rats. The method was then used to investigate the contribution of the pudendal nerve on the urethral pressure profile.

Study design, materials and methods
Six female Sprague-Dawley rats (200-250g) were anesthetized with urethane (1,5g/kg IP). Urethral pressure profiles were obtained in prone position using a modified water-perfusion one-hole catheter (2F) system. Saline was infused into the perfusion catheter (0.3ml/min) while the catheter was pulled back through the urethra (1cm/min). The pressure profiles were studied with the aperture oriented towards different surfaces of the urethra (dorsal, ventral, lateral). Control pressure records were compared to sham-operated and bilateral pudendal transection.

Results
The reproducibility of the current technique is illustrated in figure 1A. No significant difference was found between the area under the curve (AUC) of two consecutive urethral pressure profile control measurements (paired T-test, $P=0.727$). A different urethral pressure profile was obtained if the aperture is oriented to the ventral, lateral or dorsal surface (figure 1C). Bilateral pudendal transection significantly reduced the AUC of the urethral pressure profiles in comparison to the control and sham-operated urethral pressure profiles (repeated measure ANOVA with Bonferroni post hoc, $P<0.05$) (figure 1B), with a mean AUC reduction of 34% (control vs pudendal transection). Pudendal transection seemed to only reduce the pressure in the proximal and middle section of the urethra (Figure 1D).

Interpretation of results
A different pressure profile was seen depended on the orientation of the catheter in the urethra, showing the contribution of different structural components (smooth muscle, striated muscle, vascular tissue) in the urethral pressure profile along the ventral, dorsal and lateral orientation of the female rat urethra. Further, pudendal transection data suggest that the distal resistance is not made by striated muscle but by other structures, like the vascular plexus of the urethra.

Concluding message
Current results demonstrate the feasibility of the developed model, which allows to reproducibly measure the urethral pressure profile in the female rat. Different pressure profiles depended on the orientation in the urethra will allow new investigation of urethral function and the mechanisms behind urinary (in)continence.

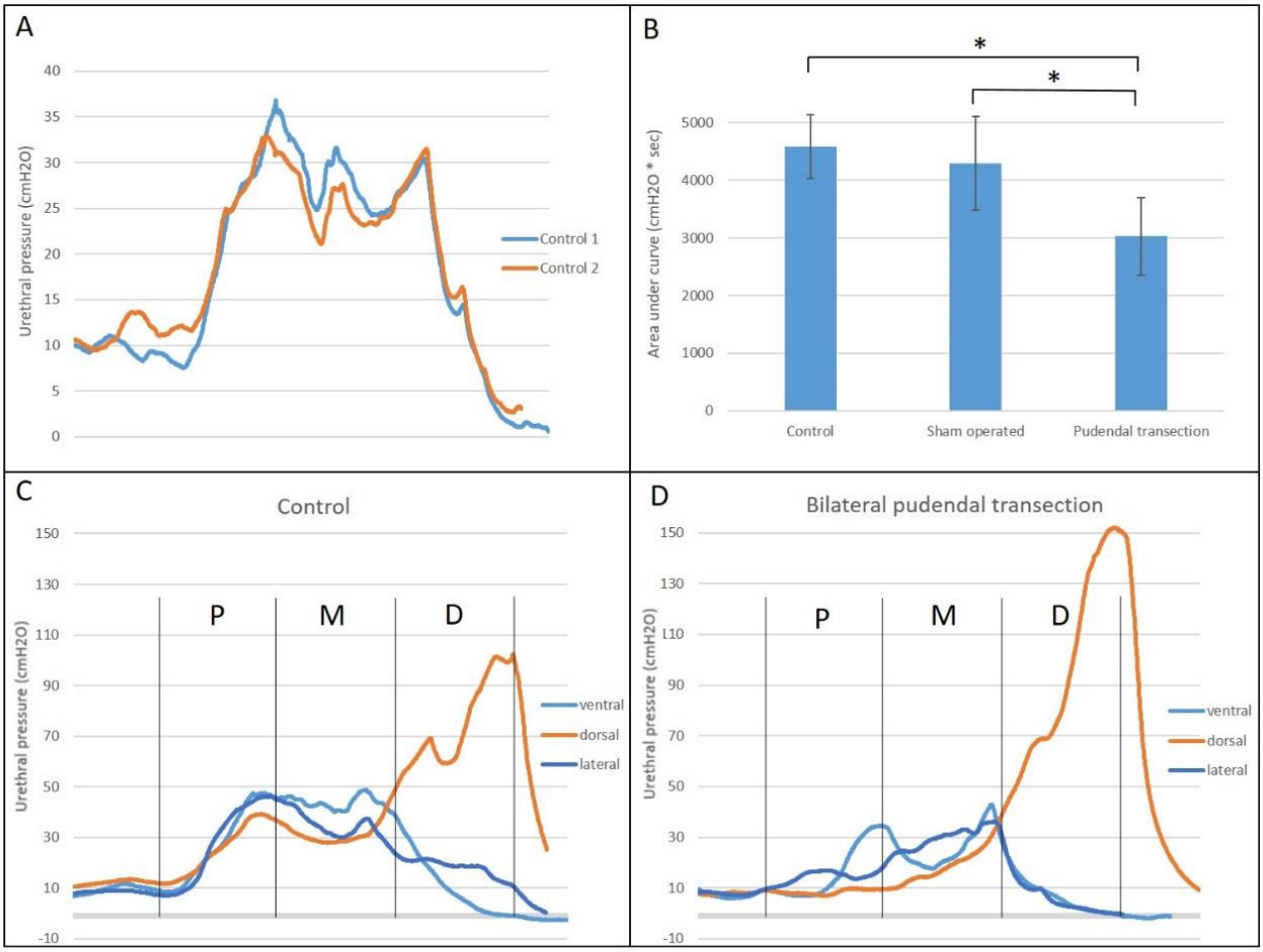

Figure 1: A Example of two consecutive control urethral pressure profiles (lateral orientation of the urethra). B Mean ± SEM of the control, sham-operated and pudendal transection urethral pressure profiles. A significant reduction was found in the control vs pudendal transection profiles (repeated measure ANOVA, P= 0.021) and in the sham-operated vs pudendal transection profiles (repeated measures ANOVA, P= 0.027). C Mean control urethral pressure profiles in the ventral, dorsal and lateral orientation of the urethra. D Mean pudendal transection urethral pressure profiles in the ventral, dorsal and lateral orientation of the urethra. P, M and D represent respectively the proximal, middle and distal region of the urethra.

Disclosures
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