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THE BLADDER PILL: MEASUREMENT OF INTRAVESICAL PRESSURE FROM CONSECUTIVE VOIDING

Hypothesis / aims of study
To evaluate in vivo accuracy of intravesical pressure measurement using a prototype of a wireless intraluminal vesical pressure measurement device in awake animals

Study design, materials and methods
Design of the bladder pill has been previously reported, which consists of a circuit board containing a pressure sensor microchip combined with a 3 dimensional coil (1). Paired with a belt carrying the transmitting coil, circuitry and battery, which allows free ranging of the animal. The pill measures 5x15 mm, and a polyurethane pigtail 6 Fr in size is affixed to the device to prevent loss. We report results of a pilot study by transurethral insertion in a 50 kg female Göttingen minipig. Simultaneous pressure measurement is performed by insertion of double channel air charged urodynamic catheter and filling cystometry is performed. Animals are housed in accordance to national guidelines and institutional animal ethical approval for experiments were obtained. Investigations are performed in accordance with the ICS Good Urodynamic Practice guidelines.

Results
Data from 4 filling and voiding cycles were obtained. Measured pressure showed strong correlation both in non voiding events (r=0.8008) as well as voiding pressures (r=0.8938).
The Bladder Pill is retained in the bladder during filling and voiding cycles. No expulsion was observed up to 48 hours until transurethral extraction by cystoscopy.

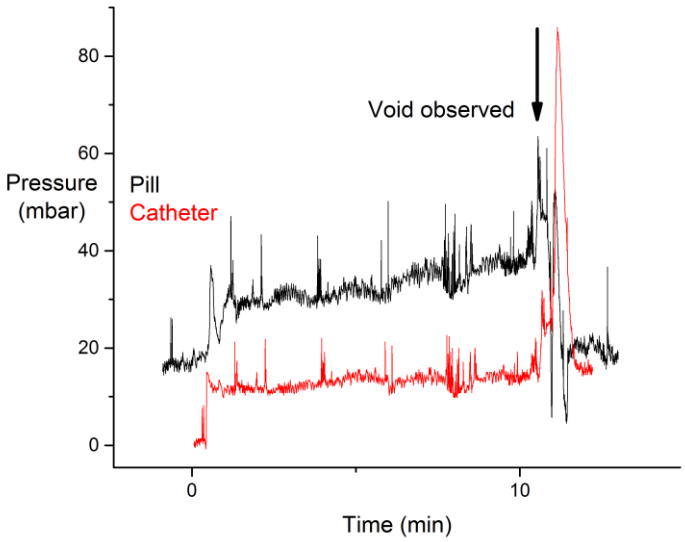

Figure. Representative trace of a single fill and void cycle

Interpretation of results
We previously reported feasibility of wireless and catheterless pressure measurements in vivo.(2) In this report, we demonstrate recording of pressure during both filling and voiding phase of bladder function in awake animals. Pressure data from the bladder pill shows good correlation with catheter based measurements.

Concluding message
This modification of the Bladder Pill reports results of longer recordings of a pill type device which can be retained within the bladder for consecutive voiding cycles. These results are promising for test and development of the device, with device and animal dimensions compatible for human use.

References
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2. M.A. Soebadi, M. Bakula, T. Weydts, F. Van Der Aa, R. Puers, D. De Ridder. 2017. A wearable biosensor for the bladder: Study of awake bladder urodynamics in large animal model. European Urology Supplements, Vol. 16, Issue 3, e1967

Disclosures
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