393

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THE BLADDER PILL: WIRELESS AND CATHETER-LESS CONTINUOUS BLADDER PRESSURE MONITORING

Hypothesis / aims of study
To demonstrate feasibility of continuous bladder pressure monitoring (Bladder Pill) without catheters and wires in a large animal model.

Study design, materials and methods
Experimental evaluation was performed in 35 kg female Gottingen minipigs. Study design was approved by institutional animal ethics committee. Animals were housed in accordance to national guidelines for care and use.
The Bladder Pill measures 5x30 mm and contains a commercially available pressure sensor with a receiving coil for wireless power and communications and was enclosed in polydimethylsiloxane for waterproofing (Fig. 1). A band containing a coil, receiving circuit and battery was fitted around the lower abdomen of the pig in front of the hindlimbs. Short term sedation utilised a combination of tiletamine, zolazepam and xylazine. After identification of the urethral meatus within the urogenital sinus, the Pill was inserted through an amplatz access sheath. Cystometry was subsequently performed with both urodynamics equipment and bladder pill in situ adhering to ICS Good Urodynamics Practice. We infused room temperature fluid through an 8 French catheter.

Results
Pressure recording was continuously observed in real time throughout the filling & voiding cycle. Non-voiding contractions corresponded very well with conventional urodynamic measurements (Fig. 2). After completion of the measurement, the bladder pill was easily extracted per urethra by way of a built in suture. No complications were seen after insertion, cystometry and pill extraction.

Interpretation of results
The Bladder Pill can be employed for ambulatory cystometric application. This evolution brings it closer to clinical application by virtue of smaller size, ease of insertion, real time pressure monitoring. Absence of catheters and possibility for cystoscopic insertion will increase patient comfort and acceptance. With improved ease of use and friendly user interface, the Bladder Pill can be developed as a future clinical tool in alternative to catheter-based ambulatory urodynamics.

Concluding message
Continuous real-time bladder pressure monitoring is feasible using the Bladder Pill.

Fig 1. Bladder Pill (top, scale cm) and animal fitted
with band containing coil, receiving circuit and battery (bottom)

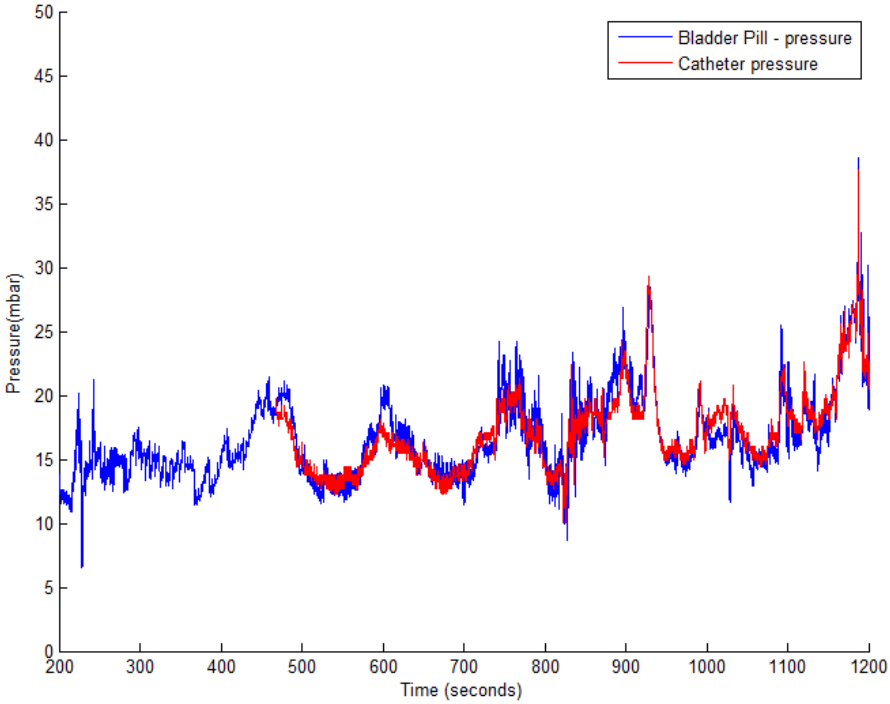

Fig 2. Representative trace of intravesical pressure by bladder pill and urodynamic catheter

Disclosures
Funding: ERC Advanced Grant, Indonesia Endowment for Education. **Clinical Trial:** No **Subjects:** ANIMAL **Species:** Gottingen Minipig **Ethics Committee:** Ethical Committee for Animal Experimentation, KU Leuven