

RADIO-TELEMETERED NATURAL FILLING CYSTOMETRY TO EVALUATE AND MONITOR INTRAVESICAL OBSTRUCTION IN A GÖTTINGEN MINIPIG MODEL

Hypothesis / aims of study

We implanted telemetric transmitter devices (TTD) to perform repeated longterm natural filling cystometry (CM) in awake minipigs (MP) before and after partial bladder outlet obstruction (BOO) and their removal to monitor the resulting urodynamic changes

Study design, materials and methods

The TTD (DSI; St. Paul, Minnesota) were implanted subdermal into 2 female MP. Pressure-sensory catheters were placed into the bladder and intraperitoneally and suture fixed. EMG electrodes fixed outside the bladder surface to record potentials of contraction related activities. Transmitted 24 h pressure and EMG recordings were obtained in a metabolic cage. For validation micturitions (MC) were monitored by video camera (MF), volumes (MV) by flowmetry and detrusor activity by EMG. Baseline values were recorded within a 6 weeks followed by sphincter cuff placement (pig 1) and by banding around the bladder neck (pig 2) to induce BOO, monitored for 4 months. Thereafter banding and cuff were removed and monitored further three months

Results

Good quality CM were obtained in both cases at baseline and on follow-up (mean \pm SD). MC at baseline verified by video and flowmetry correspond with DDmax [mmHg] of 40.2 ± 20.3 , duration of contraction (DoC) 86.3 ± 44.6 sec for pig 1 and with 38.5 ± 10.8 mmHg and 105.1 ± 64.9 sec for pig 2. Detrusor contractions without MC for pig 1 and 2 were 65.4 ± 60.1 and 23.5 ± 4.9 mmHg, the DoC were 100.6 ± 149.3 sec and 56 ± 5.6 sec. EMG provided in all events a clear increase of potentials. MV were 1352.5 ± 725.6 ml and 1574.6 ± 468.3 ml for pig 1 and 2. MF per day was 4 and 7 for pig 1 & 2.

In contrast, BOO induced for pig 1 and 2 significant changes (paired Student t-test, $p < 0.05$): MV 695.8 ± 371.9 ml and 422 ± 446 ml, MF 8 and 12 per day, MC related DDmax [mmHg] 75.3 ± 45.5 and 71.6 ± 25.6 , DoC 65.2 ± 24.1 sec and 510.7 ± 365.8 sec. DDmax without micturition increased as well for pig 1 and 2 up to 72.7 ± 48.2 and 77.3 ± 33 mmHg and their DoC to 42.8 ± 46.5 sec and 200.5 ± 157.7 sec. Two months after removal of BOO telemetric recordings and micturition volumes and frequency returned to baseline indicating functional induced BOO and not organic fixed obstruction

Interpretation of results

Radio-telemetry provides a high quality real-time natural filling CM monitoring. Combined with video monitoring and flowmetry micturition associated and non micturition associated pressure recordings of detrusor activity can be distinguished safely. Moreover, the dynamic process of obstruction induced changes in bladder function and after removal of obstruction can be verified. Radio – telemetric cystometry is a valuable tool for longterm monitoring of a chronic model detrusor overactivity.

Concluding message

Radio-telemetry has the potential to significantly decrease animal use when evaluating or validating BOO models on longterm as a prerequisite to investigate further manipulations on such models by surgery or pharmacological interventions.

Disclosures

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