274

Hoefnagels J[1], van Asselt E[1], van Mastrigt R[1]
1. *Erasmus MC Rotterdam*

LONGITUDINAL LEAK POINT PRESSURE MEASUREMENTS IN RATS USING A MODIFIED PORT AND A TUNNELLED CATHETER SYSTEM.

Hypothesis / aims of study

Leak point pressure (LPP) measurements are used to study urinary (in)continence in rats.[1-3] In previous studies catheters have been implanted in the urinary bladder of the rat two days before LPP measurements.[1-3] In our experimental setup we want to be able to repeat measurements in rats before and after interventions and during much longer periods of time, without the rat being able to chew or scratch at the end of catheter. The port system was originally designed as an infusion system but has also been used to sample blood and to monitor blood pressure in vessels. Small size systems have been developed for use in experimental animals (SoloPort Titanium MID, Instech Solomon, Plymouth Meeting, PA USA). We investigated whether this device can be applied to longitudinally measure urinary bladder pressure in rats.

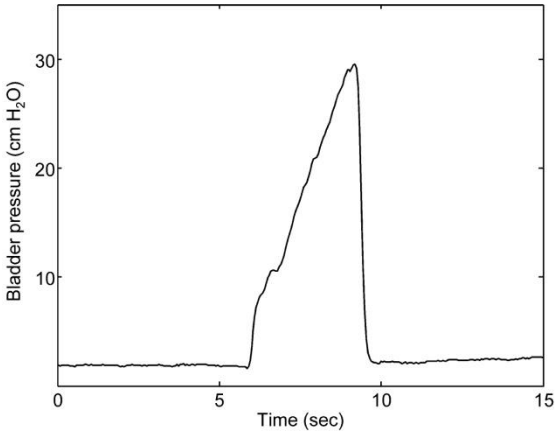
Study design, materials and methods

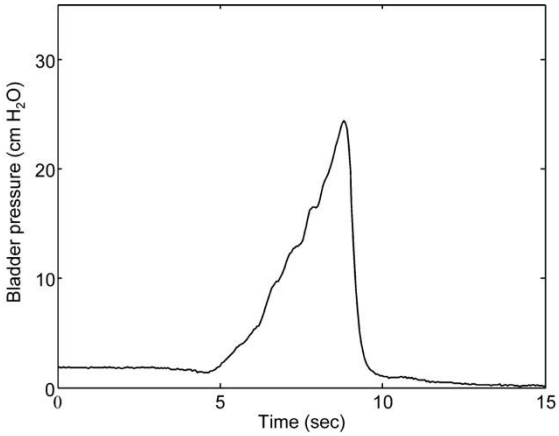
Virgin female Lewis rats (n=2) were anesthetized with isoflurane and a small abdominal incision was made to access the bladder. A suprapubic catheter (PE50 tubing, inner diameter 0.58 mm, outer diameter 0.965 mm) with a flared tip was inserted into the bladder and tightened with a purse string suture. Before insertion the tip of the catheter was flared using the flame from a cigarette lighter to prevent it from slipping out of the bladder, and an extra opening was made right behind the flared tip to insure the passage of saline. This PE50 tube was used instead of the catheter delivered with the port, because with the original catheter pressure could not be measured. The PE50 catheter was tunnelled under the skin towards the back of the neck. There a small incision was made to place the port in a pocket underneath the skin and the tunnelled catheter was connected to the port. See picture.

The animals received Gentamycine (20 mg/kg i.m.) and Finadyne (2.5 mg/kg i.m.) before surgery and after surgery daily for 3 days. For pressure measurements the port was accessed through the skin with a Huber needle (Softee™ Huber Right Angle Infusion Set, Instech Solomon, Plymouth Meeting, PA USA) and connected to a pressure transducer via standard tubing. Pressure data were read into a PC using Labview (National Instruments, Austin, Texas USA). The bladder was filled with saline by a pump, via the needle, the port and the catheter at a rate of 5 ml/hr. Bladder capacity was defined as the volume at which the first leak was detected at the meatus. The leak was detected visually as well as by a leak detector (conductance measurement) placed against the meatus. LPP measurements were performed at 50% and 75% of the bladder capacity (mean capacity 0.59 ± 0.15 ml) by gently depressing the abdomen of the anesthetized rat with one or two fingers while it was in a supine position, until a leak was witnessed visually or by the leak detector.

Results

The port was easy to connect to the PE50 tube, to place into the pocket and to access with the Huber needle. The pressure system was calibrated using a water filled column. The two rats underwent respectively 63 and 58 LPP measurements in respectively 8 and 6 sessions. The figures show typical examples of LPP measurements. The LPP (mean ± SD) values were respectively 29 ± 12 cm H_2O and 23 ± 9 cm H_2O. These values were significantly different (t-test, p=0.001). As the LPP values measured at 50% and 75% of capacity in one rat were not significantly different, they were pooled. The rats could not access the catheter or port under the skin, so that it was not damaged by chewing or scratching. Also this system prevents too short catheters from slipping under the skin. No signs of inflammation or infection were observed. The LPP measurements have been performed during a period of more than 43 days with the implanted catheter and port in place without any problems.





Interpretation of results

The port provides a reliable device for longitudinal urinary bladder pressure measurements in rats. Since the device can remain in place for a long period of time, series of measurements with different time intervals can be performed in the same animal.

Concluding message

Reliable, longitudinal pressure measurements in rats during a period of at least 43 days are possible using the modified port system. Using this system LPP can be measured reproducibly.

References

1. Life Sci. 2001 Jul 27;69(10):1193-202.
2. BJU Int. 2002 Sep;90(4):403-7.
3. J Urol. 2003 Sep;170(3):1027-31

Specify source of funding or grant	**This study was supported by Innovacell Biotechnologie GmbH**
Is this a clinical trial?	**No**
What were the subjects in the study?	**ANIMAL**
Were guidelines for care and use of laboratory animals followed or ethical committee approval obtained?	**Yes**
Name of ethics committee	**Animal Experiments Committee Erasmus MC**