

PHASIC NON-MICTURITION ACTIVITY IN THE BLADDER OF THE ANAESTHETISED AND AWAKE RAT

Hypothesis / aims of study

Transient rises in intravesical pressure during the filling phase that are not associated with urine flow (non-micturition activity: NMA) have been described in the literature, but little is known about their physiology or pharmacology. The present series of experiments were done on anaesthetised and un-anaesthetised rats to further characterize NMA.

Study design, materials and methods

Bladder activity was studied in two groups of animals: anaesthetised rats (chloral hydrate and urethane) and un-anaesthetised rats which had had an intra-vesical cannula implanted, under full surgical anaesthesia 3 days previously. For each animal, the experimental protocol involved filling the bladder at a constant rate (10 ml/hr) to evoke micturition cycles. Activity during the filling phase was then examined. Electrical activity of the detrusor was measured extracellularly with a suction electrode.

Results

In both groups, transient rises in bladder pressure (0.5-10 cm H₂O) were observed. In the anaesthetised animals the amplitude of the transients increased through out the filling phase with little change in frequency. The phasic NMA was accompanied by electrical changes, which were recorded in anaesthetised animals. In the middle phase of bladder filling pressure changes were accompanied by slow waves of electrical activity with amplitude of 0.2 to 0.85 mV. The electrical activity changed during the pressure cycles immediately before micturition with the appearance of high frequency low amplitude signals. During the micturition contraction the electrical activity increased further in amplitude (up to 4 mV). In the un-anaesthetised animals the amplitude and the frequency of the pressure transients increased during the filling phase. However, the frequency of the transients decreased immediately before micturition despite the increase in amplitude. Details are shown in figure.

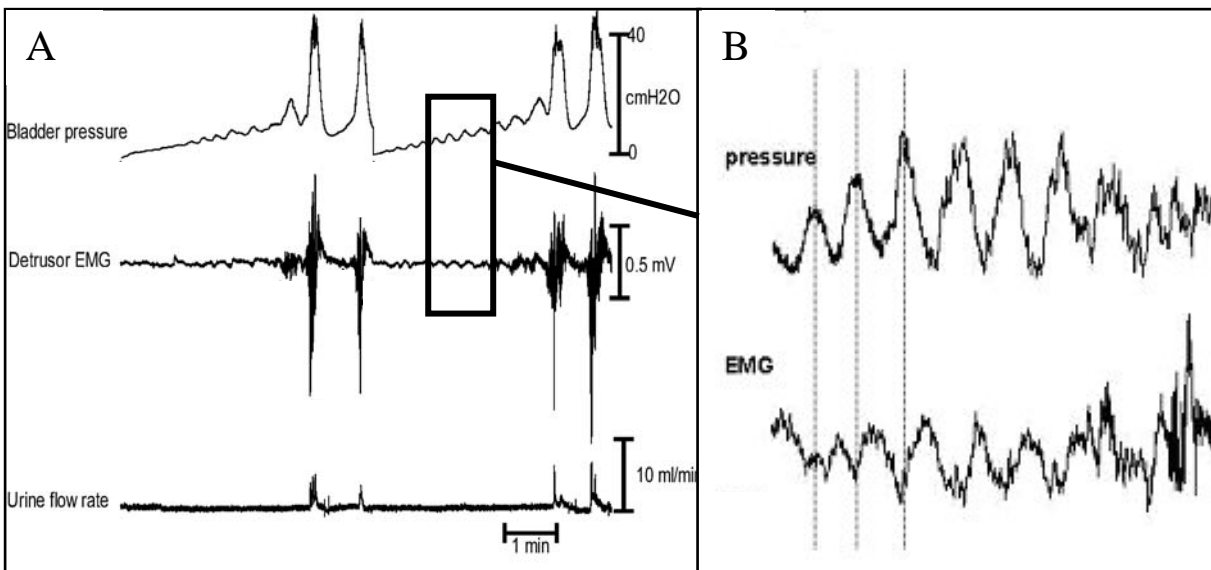


Figure. Measurement of bladder pressure, detrusor electrical activity and urine flow through the urethra, are shown in anaesthetised male rat during cycles of emptying and filling of the bladder (A). The phasic pressure activity is associated with slow electrical waves (B). Just before micturition the electrical activity increases and increases further co-incident with the micturition contraction.

Interpretation of results

The present results confirm the presence of NMA and electrical activity in the rat bladder, and demonstrate changes in the pattern of these activities during the micturition cycle.

Concluding message

The physiological significance of NMA activity is not known but it may be linked to the generation of afferent discharge from mechano-receptors in the wall so contributing to sensations related to bladder volume.

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ANIMAL SUBJECTS: This study followed the guidelines for care and use of laboratory animals and was approved by Animal Ethics Committee, Court of the City of Lund, Sweden