

THE EFFECT OF SPONTANEOUS, OXYTOCIN-INDUCED AND CESAREAN SECTION DELIVERY ON THE CONTINENCE MECHANISM: AN EXPERIMENTAL STUDY IN FEMALE RATS

Aims of Study:

The study is designed to study the effect of different routes of delivery on the urinary continence mechanism.

Methods:

Thirty-six timed pregnant female Sprague-Dawley rats were divided into three groups: Group 1 - spontaneous delivery (n=15). Group 2- cesarean section (n=11). Group 3 - rats underwent jugular catheter placement on pregnant day 21 and started on IV oxytocin injections (10mU every 10 min. for 2 hours, then 20mU every 10 min for more 2 hours) the next morning (n=10). Immediately after the delivery, the animals underwent cystometry and urethral pressure profile measurement (UPP). Animals were then euthanized and the urethra and vagina harvest for histological studies (Masson's trichrome, tyrosine hydroxylase, nicotinamide adenine dinucleotide phosphate-diaphorase [NADPH-d], calcitonin gene-related peptide [CGRP], alpha-actin and troponin) and electron microscopy evaluation. Timed pregnant female (n=10) and virgin rats (n=10) were used as controls.

Results

No difference in terms of baseline pressure, bladder capacity, postvoid residual, voided volume, voiding efficiency or compliance was observed among the groups. On the other hand, compared to the virgin group, all groups showed decrease of the threshold pressure ($p < 0.05$). Compared to the spontaneous delivery group, the cesarean section group presented higher voiding pressures and maximum bladder pressures ($p = 0.006$ and $p = 0.04$). Regarding the UPP results, no difference in terms of the functional profile length was observed among groups ($p = 0.30$). However, the group 3 (oxytocin-induced) demonstrated higher maximum urethral closure pressure (MUCP) than all the others ($p < 0.05$). The UPP findings of the spontaneous delivery and the cesarean section groups were similar. The histological evaluation demonstrated no difference among the groups in terms of the tyrosine hydroxylase, CGRP, NADPH-d, alpha-actin and troponin staining. Electron microscopy demonstrated swelling of the muscle cells, disruption of mitochondria, alteration of cell morphology and decrease of the finger-like process of the cell membrane in group 1 (spontaneous) and 3 (induced). Compared to the virgin rats, pregnant rats also showed decrease of the caveolae content

Conclusions

Few urodynamic alterations due to the different routes of deliveries were observed in female rats. Spontaneous delivery and cesarean section groups showed similar urethral pressure profile findings. However, the group induced with oxytocin showed higher maximum urethral closure pressure. No difference in neuronal markers and the smooth and striated muscle content was observed in the histological and immunohistochemical studies. Ultrastructural studies showed changes in the urethral smooth muscle in spontaneous-delivery and oxytocin-induced rats.