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Title: ULTRASTRUCTURAL EVIDENCE OF VOIDING DYSFUNCTION IN DIABETIC BLADDER.

Aims Of Study:

Up to 83% of diabetic patients develop lower urinary tract dysfunction. Ultrastructural changes of the bladder have been shown to correlate with the voiding dysfunction patterns. Our aim was to study the structural changes occurring in the diabetic bladder associated with voiding dysfunction.

Methods:

Our laboratory has recently described the use of a transgenic rat model of diabetes mellitus (DM). For this study, in-vivo cystometry under anesthesia was performed on DM rats at various stages of disease (8, 10, 20 weeks of age). After sacrifice, the bladder was harvested and weighed. The harvested bladder samples were then fixed in 10% formalin or in 2.5% gluteraldehyde. The formalin fixed samples were sectioned and stained with Hematoxylin & Eosin for light microscopy (LM) examination. The tissues intended for transmission electron microscopy (EM) examination were trimmed to approximately 1-mm cubes and processed according to previously described standard procedures. Ultrathin (silver to silver-gold) sections were obtained and stained with the standard uranyl nitrate/lead citrate sequence and examined and photographed by a JEOL 100 SX EM.

Results:

Sample specimens were obtained from eight DM rats and four age matched controls. There are significant increases in the bladder capacity ($p = 0.0001$), compliance ($p = 0.0003$) and wet-weight ($p = 0.0003$) of the bladders of DM rats. The LM examination showed a) increased interstitial edema; b) separation of detrusor smooth muscle cells (DSMC); c) increased collagen deposits; and d) hypertrophy of DSMC. EM examination showed: a) patchy dense band pattern; b) scattered and disorganized distribution of collagen bundles; c) caveolar disintegration; d) changes in mitochondria with decreased cristae and loss of internal structure; e) separation of contact plates. Many of the observed ultrastructural changes are similar to those previously described by Elbadawi et al in other voiding dysfunction pathologies such as in the geriatric population and in those with outlet obstruction of the bladder.

Conclusions:

There are distinct gross and ultrastructural changes in the bladder of this transgenic rat model of DM which are associated with in-vivo voiding dysfunction. These changes resemble those seen in other pathologic entities such as aging and outlet obstruction of the bladder. Confirmation of these findings in the bladder of human patients with DM is needed.

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