

THE INFLUENCE OF TESTOSTERONE DEFICIENCY ON URINARY BLADDER SMOOTH MUSCLE CONTRACTILE RESPONSE IN CASTRATED RATS

Hypothesis / aims of study

Decreased testosterone in elderly men is known to result in a variety of physical symptoms. According to the clinical practice guidelines for male lower urinary tract symptoms, 41.9% of elderly men who do not have lower urinary tract obstruction but have lower urinary tract symptoms have been reported to have detrusor contractile dysfunction. However, the effect of testosterone deficiency on bladder and urinary function has not yet been elucidated. Therefore, we aimed to elucidate the effect of testosterone deficiency on bladder function in castrated rats using pharmacological and molecular biological techniques.

Study design, materials and methods

We divided sexually mature 12-week-old male Wistar-ST rats into the sham (Sham) and castrated (Cast) groups. After 4 months, voiding function and detrusor muscle contraction were evaluated. Cystometry (CMG) was performed to assess the voiding interval and intravesical pressure. Detrusor muscle contraction was measured by isometric tension using bladder tissue. Contraction was induced by carbachol and electrical field stimulation (EFS). Moreover, a muscarinic receptor antagonist was used. Real-time PCR was used to examine variations in the expression of mRNA in the excised bladder tissue.

Results

Based on the CMG (80 μ L/min) results, castration did not significantly affect the voiding interval (Cast group: 653.3 \pm 145.7 seconds, Sham group: 767.7 \pm 233.2 seconds). Intravesical pressure was also not significantly different between groups. On the other hand, castrated rats showed significantly weaker contractile force of the detrusor muscle in response to carbachol (Cast-group: 61.9 \pm 15.4 N/g, Sham group: 220.6 \pm 62.4 N/g). Similarly, castrated rats showed weaker contractile force against EFS. After a muscarinic receptor antagonist was added, the contractile force against EFS was not significantly different between the Sham and Cast groups. Muscarinic receptor (M2 and M3) mRNA expression tended to be lower in the Cast group than in the Sham group.

Interpretation of results

CMG did not reveal a difference in the urinary function of sham-operated and castrated rats 4 months after castration. On the other hand, weaker detrusor muscle contraction force by carbachol and EFS was observed in castrated rats. The inhibited muscarinic receptor and real-time PCR results showed that testosterone deficiency decreased urinary bladder smooth muscle contractile response through muscarinic receptors.

Concluding message

Testosterone deficiency might cause an under active bladder by decreasing the response of the muscarinic receptors and urinary bladder smooth muscle contractility.

Disclosures

Funding: The authors declare no conflict of interest. **Clinical Trial:** No **Subjects:** ANIMAL **Species:** Rat **Ethics Committee:** The Ethics Review Board of Nagoya City University