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THE EFFECT OF DIFFERENT SEVERITY IN BLADDER DYSFUNCTION ON CORPOUS CAVERNOSUM SMOOTH MUSCLE AND RHO-KINASE IN RABBITS

Hypothesis / aims of study

Previous studies have demonstrated that partial bladder outlet obstruction (PBOO) of the rabbit induced an increase in corpus cavernosum smooth muscle (CCSM) tone which may make the CCSM difficult to relax. The goal of this study was to investigate the effect of different severity in bladder dysfunction on corpous cavernosum and expression of Rho-kinase in rabbits

Study design, materials and methods

Twelve adult male New Zealand White rabbits (3~5 kg and 15~20 weeks old) were separated into 3 groups of 4 rabbits each. Rabbits in group 1-2 were subjected to 2 and 8 weeks of PBOO. The remaining group underwent sham surgery. Isolated corporeal strips from all groups were precontracted with phenylephrine (100μM) and the relaxant responses to field stimulation (FS) at 2, 8, and 32 Hz., ATP (2 mM), acethylcholine (500μM), and sodium nitruprusside (SNP) (100μM) were determined. Histological sections of corpus cavernosa were processed with Masson's trichrome staining and the content and distribution of smooth muscle and collagen were assessed. Western blotting was performed to determine the expression of both isoforms of Rho-kinase (ROK α and ROK β) at the protein level.

Results

Fig 1

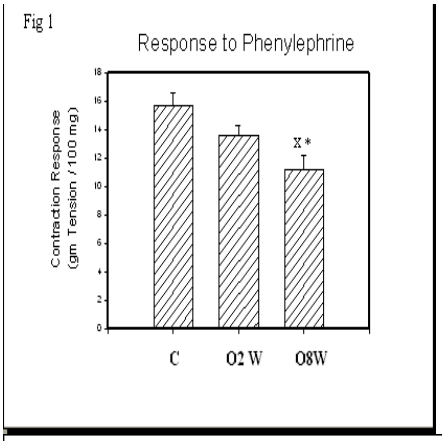
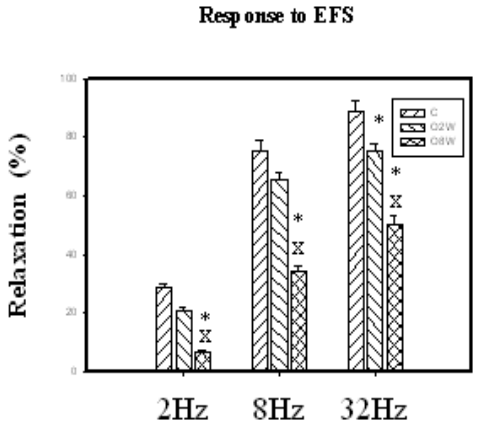


Fig 2



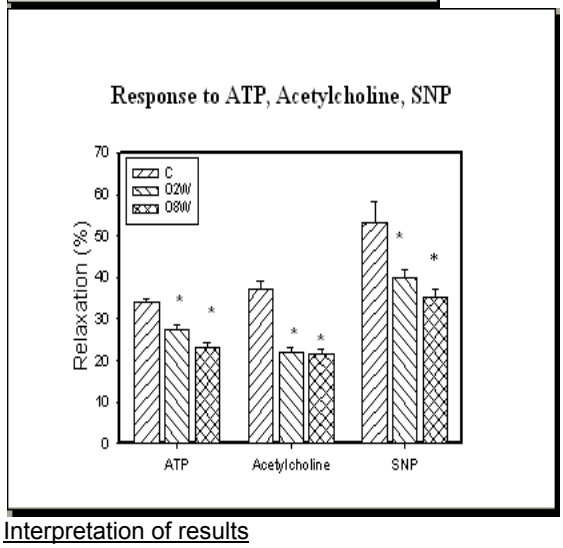
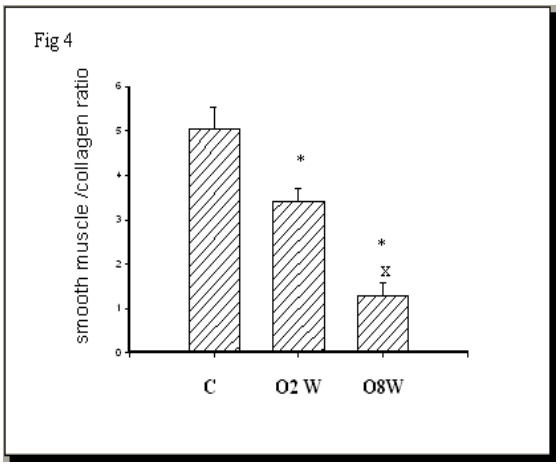


Fig 4



Interpretation of results

CCSM from 8 weeks obstruction group showed significant decreases in the contractile response to phenylephrine and further decreased relaxation responses to EFS in comparison to 2 weeks group. Relaxation

induced by ATP, acetylcholine, and SNP were both significantly diminished at both 2 and 8 weeks groups without prominent difference between the two groups. The ratio of smooth muscle to collagen progressively decreased at 2 weeks and further dropped at 8 weeks obstruction. Expression of both isoforms of Rho-kinase was increased in both obstruction groups. However, there was no increasing expression in both isoforms of Rho-kinase shown at 8 weeks obstruction as compared to 2 weeks.

Concluding message

The present study indicated that severe bladder dysfunction secondary to chronic PBOO induced additional dysfunction of CCSM. Structural change with a decline of smooth-collagen ratio could attribute to the phenomenon. Activities of both ROK isoenzymes showed increases at 2 and 8 week obstructions. Increase in Rho-kinase expression/activity would be expected to make the CCSM more difficult to relax and also contribute to reduction of EFS-induced relaxation of CCSM after chronic PBOO.

References

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ANIMAL SUBJECTS: This study followed the guidelines for care and use of laboratory animals and was approved by Institutional Animal Care and Use Committee of the Stratton VAMC.