

CHANGES IN THE SMOOTH MUSCLE OF THE CORPORA CAVERNOSUM RELATED TO PARTIAL BLADDER OUTLET OBSTRUCTION IN RABBITS

Hypothesis / aims of study

Numerous studies have confirmed a close relationship between LUTS and ED regardless of age or other comorbidities. The goal of the current study was to investigate the changes in corpora cavernosum in rabbits both after partial bladder outlet obstruction (PBOO) and reversal of the obstruction.

Study design, materials and methods

We surgically created partial bladder outlet obstructions in male New Zealand White rabbits. Following 4 weeks of obstruction, one group of animals (n=6) was studied, while outlet obstructions were relieved in two additional groups of animals, which were studied at four (n=6) and eight (n=6) weeks after relieving the obstruction. Six sham operated rabbits served as controls. Isolated corporeal strips from all groups were precontracted with phenylephrine (100 μ M) and the relaxant responses to field stimulation (FS) at 2, 8, and 32 Hz., ATP (2 mM), acetylcholine (500 μ M), and sodium nitroprusside (SNP) (100 μ M) 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

Bladder strips contractile response

Fig 1A

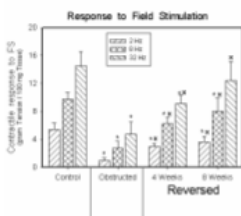


Fig 1B

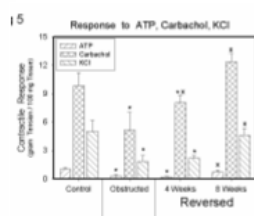


Fig 3

Response to FS

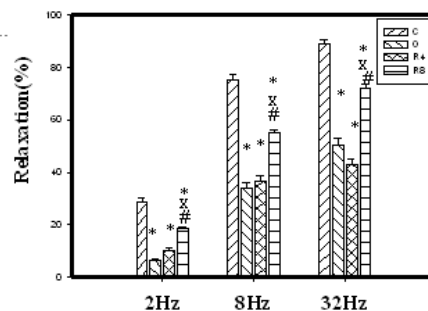
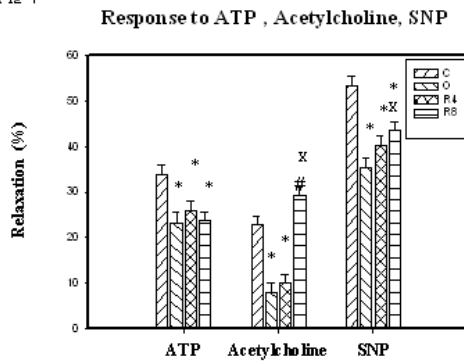
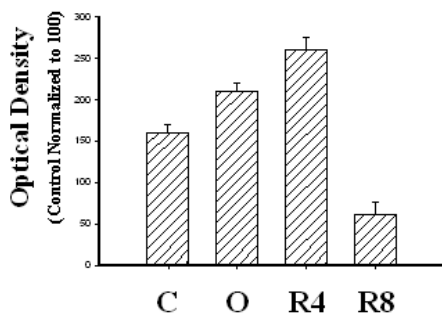


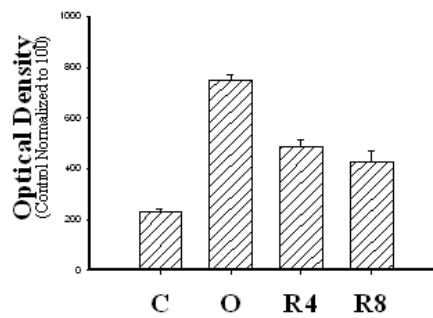
Fig 4



ROK α



ROK β



Interpretation of results

Corpus cavernosum smooth muscle (CCSM) from bladder outlet obstructed and obstruction reversed rabbits showed significant decreases in the contractile responses to phenylephrine. The relaxation responses to field stimulation (FS), ATP, Acetylcholine and sodium nitroprusside (SNP) were decreased in obstructed and 4 weeks reversal groups. By 8 weeks of reversal, relaxation of CCSM was increased slightly in response to FS and SNP, and fully restored in response to acetylcholine. However, the response to ATP did not return to normal. The ratio of smooth muscle to collagen decreased after obstruction and remained low after reversal. Expressions of both isoforms of Rho-kinase (ROK) were increased in obstruction groups. By 8 weeks of reversal, expressions of both ROK α and ROK β significantly decreased when compared to the obstruction group.

Concluding message

our present study indicated that the magnitude of the recovery of the relaxation responses of CCSM is proportional to the time course of the recovery period. We believe that the partial recovery of CCSM relaxation observed to various modes of stimulation after reversal of PBOO is associated with permanent increase in collagen content and distribution observed in the corpus cavernosum. Also, the change in the expression of both isoforms of Rho-kinase is consistent with the alteration in relaxation of CCSM after onset and reversal of 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, Albany, NY.