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Bupivacaine treatment enhances the regeneration of lesioned external urethral sphincter of rat

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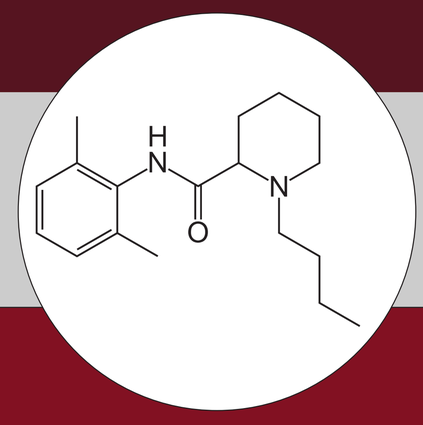


Introduction

Stress urinary incontinence is a major and frequent urinary dysfunction with great impact on patients quality of life. It has been associated with external urethral sphincter (EUS) weakness due to several causes. Current treatments are mainly surgical and far from being satisfactory.
Local anesthetic bupivacaine is known to exert myotoxic action, followed by muscle regeneration with increased strength. This effect was already used in ocular muscles to treat strabismus.
In the present study, we evaluated the effect of bupivacaine application in the recovery of the damaged EUS.

Hypothesis

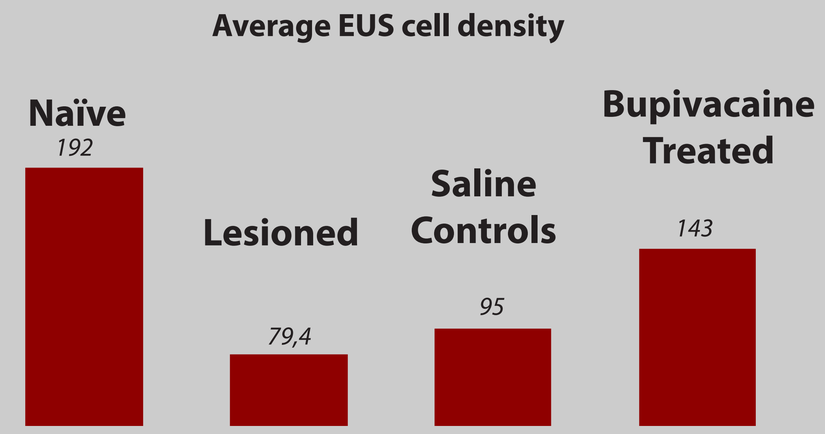
May bupivacaine improve the regeneration of a weakened EUS?

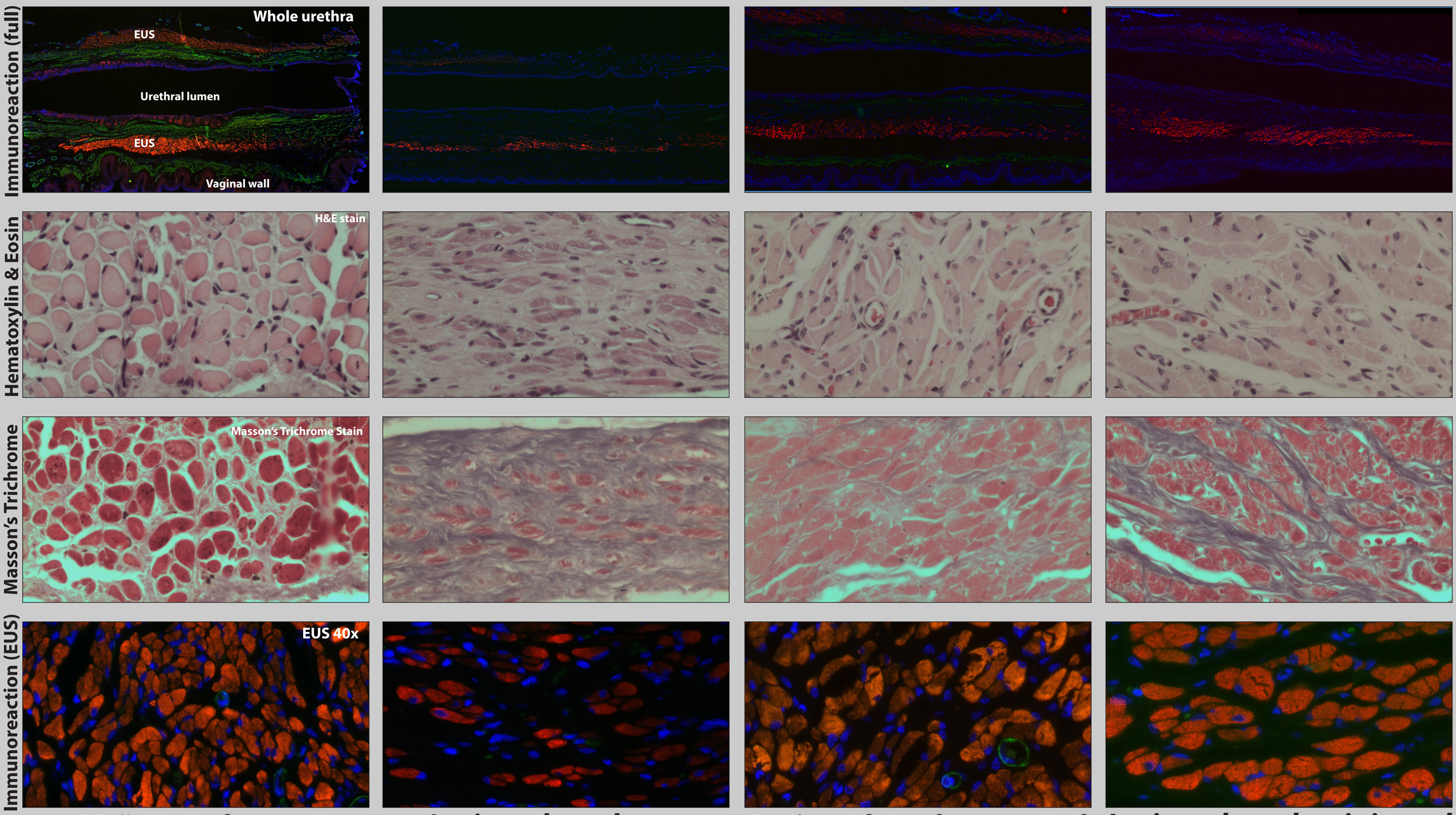
Methods

A lesion of the urethral bladder sphincter was performed in adult female Wistar rats using established protocols (urethrolysis).
Two weeks after the lesion, animals were injected in the EUS with 0.5% bupivacaine.
A control group was also injected with saline solution
Ten days later, the whole urethra was removed, fixed and sectioned in paraffin wax. Sections were stained with hematoxylin and eosin, Massons's trichrome and immunoreacted for markers of striated and smooth muscle (sarcomeric myosin and smooth muscle actin, respectively).

Results

Results of stained sections allow us a overview of urethral morphology (line 2 and 3).
In the immunoreactions, skeletal muscle was marked red, smooth muscle was marked green, and nuclei was marked blue (line 1 and 4).





Naïve urethra | *Lesioned urethra* | *Lesioned urethra treated with bupivacaine* | *Lesioned urethra injected with saline solution*

Conclusion

Two weeks after urethrolysis, a marked reduction of muscle fibres in the EUS was detected. A recovery was evident in lesioned, bupivacaine injected animals when compared with lesioned and saline-injected controls, as denoted by the ausence of collagen and higher cell density. Our data show that bupivacaine application in the lesioned external urethral sphincter accelerates its recovery. This finding opens a therapeutic opportunity to treat stress urinary incontinence.

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