URETHRAL PRESSURE RESPONSES TO STIMULATION OF AFFERENT AND EFFERENT NEURONS IN THE PUDENDAL NERVE AND SACRAL SPINAL CORD OF MALE CATS
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Abstract - Our previous studies to evaluate intraspinal microstimulation for control of genitourinary function demonstrated increases in bladder pressure and increases and decreases in urethral pressure. The goal of this work was to study the neural pathways that mediate the urethral pressure responses evoked by microstimulation of the spinal cord. Urethral pressures were measured in male cats anesthetized with a-chlorolose using two catheter-mounted pressure transducers. Pudendal nerve branches innervating the urethra were unilaterally transected and the proximal or distal end of each branch was stimulated. Pressure increases were detected in the postprostatic urethra and bulbourethra, where periurethral striated muscle was identified in histological sections. Threshold stimuli (20 Hz, 1 s train) resulted in pressure increases of 3-11 cm-H2O; supramaximal stimuli generated pressures up to 300 cm-H2O. The pressures generated by afferent fiber activation were strongly dependent on stimulus frequency. At 2-5 Hz the responses followed one-to-one with the stimulus and maintained a constant amplitude; at 10 Hz, the responses followed one-to-one, but the amplitude fell sharply after the first stimulus; at 20 Hz a strong onset response was followed by a weak sustained response during the stimulus train. These responses were similar to pressures evoked by microstimulation in the sacral dorsal horn, while the responses generated by efferent stimulation were similar to pressures generated by microstimulation in the sacral ventral horn. We conclude that a major part of the urethral response to spinal microstimulation is mediated by pudendal afferent and efferent nerve fibers.