IS HUMAN FEMALE URETHRAL RHABDOSPINCTER COMPOSED OF SLOW-TWITCH MUSCLE FIBERS ONLY?

Hypothesis / aims of study
We previously clarified that approximately 70% of slow-twitch (Type 1) muscle fibers existed in human male rhabdosphincter (RS) (1). However, striated muscle fiber type of human female RS has been generally considered a single population of slow-twitch (2). In this study, we also investigated the composition of striated muscle fibers even in human female RS to clarify the contractile properties of that.

Study design, materials and methods
Muscle specimens of RS were obtained from 6 female patients who underwent radical cystectomy, and were frozen in liquid nitrogen. 10μm-thick frozen sections were stained with myofibrillar ATPase at pH 10.6 and evaluated for quantitative parameters and fiber type distribution.

Results
Of all 6 cases, 4 provided specimens that had striated muscle fibers and could be divided into the two major fiber types, Type 1 (slow-twitch) and Type 2 (fast-twitch). Type 1 muscle fibers were predominant in RS (83.2±5.0 %), and mean size of the muscle fibers tended to be smaller in Type1 (mean area; 877±223 μm²) than in Type2 (mean area; 1365±369 μm²).

Interpretation of results
Likewise human male, it has been considered that RS mainly contributed to urinary continence mechanism by slow contraction. Moreover, the smaller mean size of Type 1 muscle fibers suggests more fatigue resistance compared with Type 2 muscle fibers in RS because small fibers have a shorter diffusion distance for metabolic substrates.

Concluding message
Human female RS contribute to urinary continence mechanism by mostly slow contraction likewise human male. On the other hand, we confirmed a small population of fast-twitch muscle fibers even in human female RS. These results might help a more detailed understanding of human female urethral function.

References

Disclosures
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