



Urethral closure is by a reflex musculoelastic mechanism not pressure transmission

Peter Emanuel Petros¹

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Dear Editors:

Regarding Bo S. Bergström's article "The urethral hanging theory and how it relates to Enhörning's theory and the integral theory" [1], a theory has to be supported by a body of experimental proof. This is true for Enhörning's theory and the Integral Theory [3], but not [1]. Dr. Bergstrom quotes prior publications, none of which contains experimental proofs. Nevertheless, Dr. Bergstrom deserves high praise for re-opening discussion on the bladder continence mechanism.

The integral theory continence mechanism of the bladder to which Dr. Bergstrom refers explains the modus operandi of the midurethral sling [2], one part of a universal theory, which, in evolved form, explains pelvic organ prolapse, bladder/bowel closure and evacuation dysfunctions as being mainly due to collagen damage in ligaments [2].

Dr. Bergstrom quotes a video (<https://www.youtube.com/watch?v=WLAQ1PLU2ao>) as proof of his hypothesis. This video clearly shows three directional forces known to activate the two urethral closure mechanisms [2]: forwards (distal), backwards and downwards (bladder neck), movements fundamental to the described closure [2, 3]. He misquotes a 1995 experiment that invalidates all pressure transmission theories [3]: pressure was measured using microtransducers in equivalent positions inside and outside the bladder/urethra during a midurethral sling operation [3], with the patient coughing. At the bladder level, the pressure inside the bladder was, as expected, slightly less than outside (Table 1). At the level of the midurethra, however, the pressure inside was much higher than the equivalent position outside. The only possible explanation for this was a muscular reflex that actively closed the urethra, as demonstrated by the quoted video [1].

✉ Peter Emanuel Petros
pp@kvinno.com

¹ School of Mechanical and Chemical Engineering, University of Western Australia, Perth, WA, Australia

Table 1 Intraoperative cough pressure transmission, vagina intact

Patient	Outside bladder (T ₁)	Inside bladder (T ₂)	Outside urethra (T ₁)	Inside urethra (T ₂)
ER	30.00	26.00	18.00	23.00
KW	22.00	20.00	4.00	10.00
PB	75.00	73.00	40.00	60.00
TH	70.00	65.00	80.00	100.00
MF	22.00	19.00	24.00	45.00
Mean	44.00	41.00	33.00	47.60

T₁ is positioned outside the organ, and T₂ inside the organ
From Petros and Ulmsten [3] by permission

Next, when the vagina was surgically disconnected from the urethra, the pressure on coughing increased by up to 170%, yet all patients leaked large amounts of urine [3]. When the vagina was re-attached after placement of the sling, all patients were dry on coughing. If the pressure transmission theory were correct, the pressure rise (up to 170%) would have closed the urethra and there would be no leakage.

Compliance with ethical standards

Conflicts of interest None.

References

1. Bergström BS. The urethral hanging theory and how it relates to Enhörning's theory and the integral theory. *Int Urogynecol J.* 2020;31:1175–80.
2. Petros PE, Ulmsten U. An integral theory of female urinary incontinence. *Acta Obstet Gynecol Scand.* 1990;69(Suppl 153):1–79.
3. Petros PE, Ulmsten U. Urethral pressure increase on effort originates from within the urethra, and continence from musculo-vaginal closure. *Neurourol Urodyn.* 1995;14:337–50.

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