Effect of abdominal and pelvic floor tasks on muscle activity, abdominal pressure and bladder neck

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Abstract
Introduction and hypothesis Although the bladder neck is elevated during a pelvic floor muscle (PFM) contraction, it descends during straining. This study aimed to investigate the relationship between bladder neck displacement, electromyography (EMG) activity of the pelvic floor and abdominal muscles and intra-abdominal pressure (IAP) during different pelvic floor and abdominal contractions.
Methods Nine women without PFM dysfunction performed maximal, gentle and moderate PFM contractions, maximal and gentle transversus abdominis (TrA) contractions, bracing, Valsalva and head lift. Bladder neck position was assessed with perineal ultrasound. PFM and abdominal muscle activities were recorded with a vaginal probe and fine-wire electrodes, respectively. IAP was recorded with a rectal balloon.
Results Bladder neck elevation only occurred during PFM and TrA contractions. PFM EMG and IAP increased during all tasks from 0.5 (gentle TrA) to 45.7 cmH₂O (maximal Valsalva).
Conclusion Bladder neck elevation was only observed when the activity of PFM EMG was high relative to the IAP increase.

Key words Bladder neck movement · Intra-abdominal pressure · Muscle EMG activity · Pelvic floor re-education · Perineal ultrasound

Abbreviations
ASIS Anterior superior iliac spine
APFQ Australian Pelvic Floor Questionnaire
EMG Electromyography
Hz Hertz
IAP Intra-abdominal pressure
kHz Kilohertz
lowTrA Lower TrA
MHz Megahertz
midTrA Middle TrA
OE Obliquus externus abdominis muscle
OI Obliquus internus abdominis muscle
PUS Perineal ultrasound
RA Rectus abdominis muscle
RMS Root mean square
TrA Transversus abdominis muscle
VAL Valsalva

Introduction
Voluntary contraction of pelvic floor muscles (PFM) elevates the bladder neck [1–4] and compresses the urethra [5]. The contraction also provides a firm base against which the urethra is closed by the increased intra-abdominal pressure (IAP) [6, 7]. These factors contribute to the maintenance of continence, but the extent of elevation of the bladder neck is probably not determined by PFM activity alone; increased IAP may prevent elevation or induce caudal displacement of the bladder neck [1, 3, 7].

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