



Int Urogynecol J (2010) 21:69–77  
DOI 10.1007/s00192-009-0981-z

ORIGINAL ARTICLE

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

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Received: 31 December 2008 / Accepted: 8 August 2009 / Published online: 3 September 2009  
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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 cmH<sub>2</sub>O (maximal Valsalva).

**Conclusion** Bladder neck elevation was only observed when the activity of PFM EMG was high relative to the IAP increase.

**Keywords** 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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