382

Baessler K[1], Junginger B[1]
1. *Pelvic Floor Unit, Charité University Hospital Berlin*

BLADDER NECK ELEVATION WITH DIFFERENT LEVELS OF EFFORT OF PELVIC FLOOR MUSCLE CONTRACTION

Hypothesis / aims of study

The aim of this study was to assess the effect of maximal and submaximal voluntary pelvic floor muscle contractions (PFMC) on the bladder neck (BN), transverse abdominis (TrA) and internal oblique (IO) muscles and on the intraabdominal pressure (IAP).

Study design, materials and methods

Fourteen pelvic floor-healthy, premenopausal nulliparous women and 20 consecutive urogynaecological patients who were able to voluntarily contract their pelvic floor muscles were recruited from gynaecological outpatient clinics. Women with pelvic organ prolapse beyond the hymen and women who had had previous pelvic floor surgery were excluded.

Participants were placed in a half-sitting (30°) position with their legs supported in stirrups. Intraabdominal pressure was recorded with an intrarectal pressure probe. The position of the bladder neck was imaged on perineal ultrasound. Images were saved and analysed with the assessor blinded to the level of effort of contractions. A coordinate system through the pubic symphysis was used as the basis for calculations of the movement vectors ($c^2 = a^2+b^2$; Fig. 1). Thickness of the transverse and internal oblique abdominis muscles during the tasks was measured using a second abdominal ultrasound probe placed on the upper right-lateral abdomen (Fig. 2). The ultrasound measurements adhere to validated methods (1, 2).

The following tasks were performed and recorded: 1- measurements at rest, 2- maximal PFMC, 3- perceived 50% of maximal PFMC (perform a PFMC half as strong as your last maximal contraction), 4- perceived 25% of maximal PFMC (perform a contraction half as strong as your last 50% contraction), 5- perceived 75% of maximal PFMC (perform a contraction three-quarters of your maximal contraction, almost a maximal contraction).

Based on previous bladder neck measurements of 8.5 mm at maximal PFMC (3), we assumed that a 50% PFMC would result in 4 mm of bladder neck movement. 34 subjects were required to demonstrate this difference with a power of 80% and α=0.05.

Figure 1
Estimation of bladder neck position using a coordinate system through the pubic symphysis

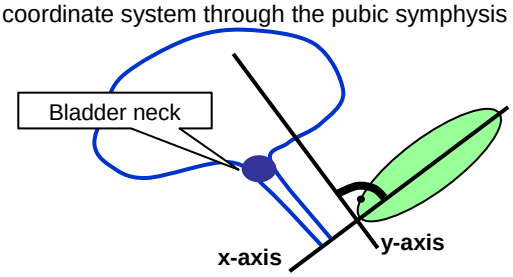
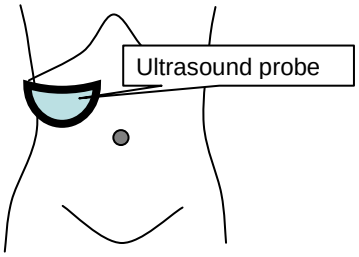


Figure 2
Position of the abdominal ultrasound probe to measure the thickness of the TrA and IO



Results

The age of the 14 healthy women and 20 urogynaecological patients ranged between 21-49 years (median 35) and 32-75 years (median 50), respectively (p<0.001). Urogynaecological patients had had 0-3 vaginal deliveries (median 1).

Urogynaecological patients had a lower BN position at rest compared with healthy nulliparas (p=0.003). There was a significant BN elevation already at 25% of PFMC. BN movements at 75% and 100% of PFMC were not statistically significantly different from 50% of PFMC (p<0.05; Table). IAP increased significantly with increased amount of effort. There were no differences between nulliparas and urogynaecological women.

The thicker the IO at 50% of PFMC the smaller the BN movement (Spearman -0.64, p=0.019).

Interpretation of results

Our results show that a perceived effort of only 25% of a maximal pelvic floor contraction leads to a significant elevation of the bladder neck. A maximal pelvic floor contraction does not further elevate the bladder neck after 50% of effort. There is a considerable increase in intraabdominal pressure with maximal power which might cause bladder neck descent.

Concluding message

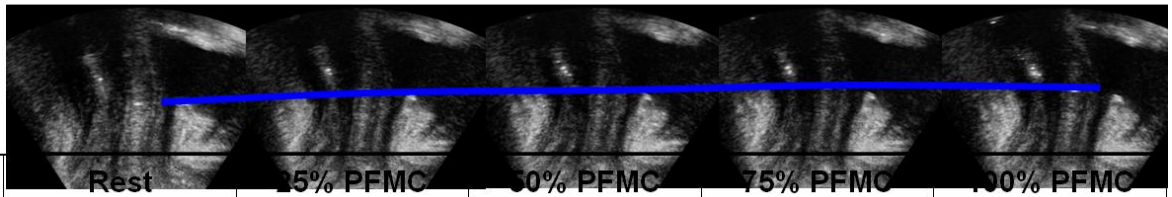
Maximal pelvic floor muscle contractions are not necessary to elevate the bladder neck and have the disadvantage of increasing the intraabdominal pressure undesirably due to co-contractions of the abdominal muscles. Especially in women with pelvic floor disorders this might offset the initial functional bladder neck elevation.

References

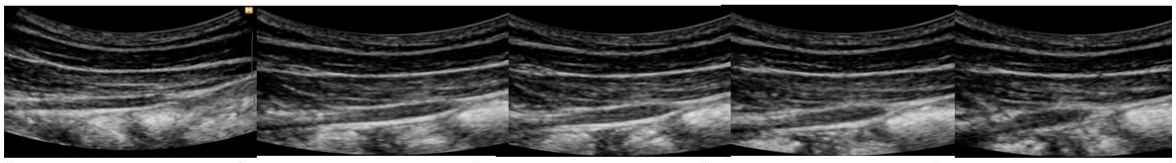
(1) Ultrasound Obstet Gynecol 1996; 7: 347-52. (2) Eur Respir J 1997; 10: 2861-67.
(3) ANZJOG 2004; 44: 19-23.

Combined Tables and Figures: In the Tables the Median (range) of the bladder neck movements (BN vector), IAP increases and the thickness of the TrA and IO are summarised in healthy women (H) and patients (P). Typical images of the perineal and abdominal ultrasound are shown. In the perineal ultrasound, delineated are the bladder neck position and the lower border of the pubic symphysis. The graph displays the mean increments of the IAP, bladder neck elevation and TrA and IO thickness increases.

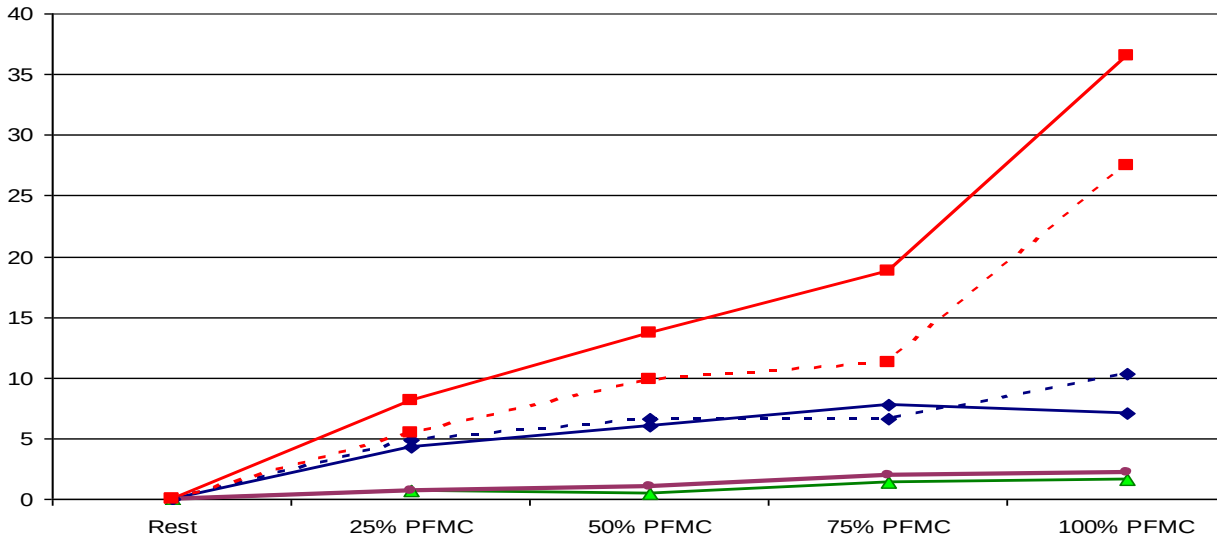
	Rest	25% PFMC	50% PFMC	75% PFMC	100% PFMC
BN vector --H	-	3.7 (0.5-10.3)	5.1 (1.6-18.4)	4.8 (0.9-32)	6.2 (1.8-32)
mm --P		3.5 (1.4-5.1)	5.2 (1.8-14.9)	5.5 (1.0-15.9)	8.0 (2.4-26.8)



	Rest	25% PFMC	50% PFMC	75% PFMC	100% PFMC
TrA mm --H	2.3 (1.4-5.1)	3.1 (2.1-5.6)	3.0 (2.1-5.9)	3.6 (2.3-8.6)	4.2 (1.6-9.6)
IO mm --H	7.6 (3.5-12.1)	8.4 (4.2-14.2)	8.3 (4.2-13.2)	9.2 (4.4-14.8)	9.9 (5.4-13.6)



	Rest	25% PFMC	50% PFMC	75% PFMC	100% PFMC
IAPcmH_2O--H	-	5.5 (1-12)	11.0 (3-30)	16.5 (2-43)	32.0 (6-114)
increase --P		5.0 (0-12)	10.0 (0-22)	11.0 (0-35)	26.0 (9-43)



Specify source of funding or grant	**None**
Is this a clinical trial?	**Yes**
Is this study registered in a public clinical trials registry?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**Ethics Committee, Charité University Hospital, Campus Benjamin Franklin**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**