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Control/Tracking Number: 2016-A-669-IUGA

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HOW SHOULD WOMEN BREATHE DURING LIFTING? INFLUENCE OF BREATHING VARIATIONS ON BLADDER NECK AND PELVIC FLOOR POSITION IN HEALTHY AND INCONTINENT WOMEN

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Abstract:

Introduction: There are many recommendations with regard to activity restrictions like lifting after pelvic floor operations and childbirth to avoid undue increases in intraabdominal pressure (IAP), most of them are not supported by rigorous data. As shown previously, bladder neck (BN) and pelvic floor position (puborectalis muscle=PRM) are associated with an increased IAP (1). It remains unclear which effect instructions like lifting a weight "with forced expiration" in fitness studios have on the bladder neck and pelvic floor.

Objective: The purpose of this study was to determine the influence of lifting with different breathing variations on IAP and on BN and PR position using perineal ultrasound (PUS) in healthy women and women with stress or mixed incontinence.

Methods: 201 women (169 incontinent women and 34 healthy controls), participated in a study on the assessment of continence and incontinence mechanisms reported previously. PUS (GE Voluson E8) and IAP-recordings were measured simultaneously in standing and stored using a specific hard- and software (Noraxon Inc.) while a standardized weight was lifted. For this trial, these stored records were reviewed offline for complete and lifting measurements without artefacts. The height of BN and PR were calculated in relation to a horizontal line through the lower border of the pubic symphysis at rest and at lifting using a validated method (2) and the IAP at its peak was affirmed.

While lifting, three different breathing variations were performed: 1 - naïve, without any instruction, 2 - hold breath and 3 - forced expiration. BN and PR descent were compared within and between the two groups.

A power analysis showed that 15 women in each group are necessary to demonstrate an established caudal descent of 5,6 mm with a power of 80% and $\alpha=0,05$ and also to show a difference of 4,2 mm between the different breathing tasks (3).

Results: Recordings of 17 healthy and nulliparous and 17 urinary incontinent women were eligible for analysis assessed standing with perineal ultrasound.

During lifting with breath hold and forced expiration, BN descended significantly in healthy women ($p=0.003$ and $p=0.017$) and in incontinent women ($p=0.004$ and $p<0.001$). The best results with least descent were obtained during naïve lifting without statistical difference between the two groups ($p=0.228$ and $p=0.121$, respectively). Less descent of the pelvic floor correlated with decreased BN descent ($r=0.658$; $r=0.490$; $r=0.681$, respectively for the different breathing techniques: $p<0.003$). IAP increase during lifting was similar between the two groups for all breathing variations ($p=0.125$, $p=0.284$, $p=0.438$).

Conclusions: In our study, giving no instructions during lifting obtained best results for the bladder neck and pelvic floor with least descent. Especially incontinent women should refrain from forced expiration during lifting to avoid adverse bladder neck descent. As bladder neck descent was dependent on pelvic floor position, instructions to perform a pelvic floor contraction before lifting might further reduce bladder neck descent.

References: (1) Int Urogynecol J (2013) Vol 24; Suppl 1, S 91

(2) Int Urogynecol J (2001) 12:104-106

(3) Obstet Gynecol (2000) 95(4), 535-40

Tab. 1: Baselines and changes of BN- and PR-position (height in mm)

| | Healthy women n=17 | PF-patients n=17 | P - Mann-Whitney-U-Test (difference between groups) |
|--|----------------------------|-----------------------------|---|
| Age (years, min-max) | 31 (22 - 60) | 48 (27 - 72) | 0.058 |
| Body-Mass-Index | 22.4 (19.6 - 26.6) | 23.0 (19.0 - 36.0) | 0.087 |
| Naïve lift - BN Median (min-max) Wilcoxon (difference rest-lift) | 0.6 (-10.9; 2.5) 0.906 | -0.8 (-17.3; 3.1) 0.121 | 0.228 |
| PR Median (min,max) P | 0 (-8.5; 3.7) 0.589 | -1.4(-9.8; 2.5) 0.121 | 0.121 |
| Lift with breath hold - BN Median (min,max) P | -1.4 (-14.1; 1.4) 0.003 | -2 (-18.4; 7.1) 0.017 | 0.569 |
| PR Median (min,max) P | -1.6 (-8.8; 1.7) 0.023 | -1.7 (-11.1; 4.2) 0.017 | 0.877 |
| Lift with forced expiration - BN Median (min,max) P | -2.3 (-13.1; 2.0) 0.004 | -3.7 (-20.2; 0) <0.001 | 0.056 |
| PR Median (min,max) P | -2.0 (-9.4; 10.8) 0.052 | -5.2 (-14.9; 1.8) <0.001 | 0.408 |

Category (Complete): Imaging ; Urinary Incontinence: Treatment includes Stress incontinence and Overactive Bladder Syndrome) ; Pelvic Organ Prolapse
Keyword (Complete): Bladder Neck Mobility ; perineal ultrasound ; lifting

Additional Questions (Complete):

*Was study presented/published previously?: No

*This study was NOT previously presented at an **International Meeting**: Confirmed

*Was work supported by industry? : No

*Level of support : Investigator initiated, no external funding

*Was consent obtained from patients?: Yes

All authors have reviewed the abstract as submitted and have confirmed approval: Confirm

*Is the presenter a Fellow?: No

If not accepted for oral presentation, would you participate in the informal paper session offered to fellows?: Yes

Does this study have IRB or Ethical Committee Approval?: Yes

IRB Identifier Number or IACUC number for Animal Studies (enter N/A for not applicable) : EA/1/297/10

Status: Complete

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