Ultrasound biofeedback in management of urinary incontinence

Leung Wai Ching, Regina
Physiotherapist I
Kwong Wah Hospital
TAUS for PFM training
Case study
Discussion
Conclusion
Pelvic floor muscle training

🌟 Level A evidence for PFMT effectively treat SUI and mixed UI
🌟 1st line treatment
🌟 3rd International consultation on Incontinence (Wilson et al 2005)
Co-contraction between PFM & TrA

- Max / close to max PFM contraction only with abd co-contraction
- Co-contraction allowed during training → max PFM contraction for mm strengthening.

(Pollock et al 1998)
Co-contraction between PFM & TrA

- Lx vertebrae, multifidus, diaphragm, TrA and PFM complex => Abd capsule

- Abd EMG noticed in voluntary PFM contraction (Sapsford et al 2001)

- Core stabilization
Why we use Transabdominal ultrasound (TAUS) for Mx of UI?

- Incorporate PFM strengthening to co-contraction of TrA using TAUS for biofeedback
- Visual Ax for assessing the function of PFM (bladder base displacement)
- US Biofeedback for re-education & rehabilitation of PFM (Ariail et al 2008)
Overview management of urinary incontinence in KWH

UI

SUI
- PF contraction Grade 0,1
- PF Ex, TAUS biofeedback training
- Grade 3

Mixed & Urge
- Pelvic floor Exercise Bladder Retraining +/- Electrotherapy
- PF contraction Grade 3,4,5
- PF Ex in different positions +/- TAUS Biofeedback
- PF contraction Grade 2
- PF Ex +/-TAUS Biofeedback
Transabdominal ultrasound (TAUS) for biofeedback
Transabdominal ultrasound (TAUS) for biofeedback
TAUS for biofeedback & assessment

- Visualize the elevation of the base of bladder by PFM contraction
- Not PFM strength measurement (Thompson et al 2005)
- Progress of PFM training program
Mouse click the video once to play in presentation mode
Bladder Base Displacement
Case study

48 yrs old woman, BMI: 25kg/m²
P2G2, NSD with forceps, both children weighed >8lb at birth
PHx: NAD
Occupation: cleansing worker
Case study

S/E: urine leakage during coughing & sneezing, chasing after the bus, lifting heavy objects

Urgency with triggers of running water and cold
Case study

- O/E: vaginal prolapse: Gd 1
- PFM strength: G2; hold: 3sec; repetition: 2
- Cough brace: failed
- Abd insucking and perineum bearing down during voluntary PFM contraction
- UI frequency: 5 times/week
- Urodynamic studies: GSI
- Bladder base displacement: 0.3cm
Case study

TAUS as biofeedback for re-education of co-contraction between PFM & TrA with PV palpation.

Progress from ly→sit→st→stepping

Emphasize on pre-contraction during coughing, sneezing & heavy lifting

Training program: once/ wk x 2 wks, once/2 wks x 4 wks, once/mth x 3 mths
TrA contraction before training
TrA contraction after training
Bladder base displacement before training
Bladder base displacement after training
Bladder base displacement after training
Case study (after training):

- able to hold urine before voiding
- Maintain PFM contraction during high impact activities e.g. sneezing, coughing, running & heavy lifting.
- UI frequency: twice/ mth only when severe cough and sneeze
- PFM strength: G4; hold x 8 sec; rep:4
- Bladder base displacement: 0.8cm
- Subjective improvement: 70%
Discussion

\( \uparrow \text{IAP} \) without simultaneous co-contraction of PFM may cause caudal displacement of PF

Co-contraction of PFM & TrA occurs in continent women, but it loses or alters in some incontinent women. (Kari et al 2009)

This training may only work at incontinent women with PFM strength \( \geq \) Gd 2

To optimize effect of PFM training, women with SUI should be taught both to pre-contract before \( \uparrow \text{IAP} \) & to strength train their PFM. (Kari et al 2009)
Discussion

Bladder base displacement is a measure of PFM function, but cannot substitute for PFM strength. (Frawley 2006)

Well-positioned PF with high volume & strength will show small displacement in bladder base e.g. not accurate outcome for in the continent women. (Bø & Sherburn 2005)
Conclusion

TAUS as a biofeedback provides an effective means for the management of urinary incontinence and PFM re-education.

It serves as an objective assessment on the evaluation of the PFM performance in different functional positions.
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