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THE EFFECT OF EMG BIOFEEDBACK ASSISTED PELVIC FLOOR MUSCLE THERAPY ON SYMPTOMS OF THE OVERACTIVE BLADDER SYNDROME IN WOMEN: ONE-YEAR FOLLOW-UP

Hypothesis / aims of study

The overactive bladder syndrome (OAB) is defined as urinary urgency (the primary symptom of OAB), usually accompanied by frequency and nocturia, with or without urgency urinary incontinence (UUI) by the International Continence Society (ICS) (1).
Within conservative management, behavioural treatment in combination with biofeedback-assisted pelvic floor muscle training (BAPFMT) is a first-line treatment option(2).
Literature on comparative effectiveness indicates that behavioural treatments are either equivalent to or more effective than medications for reducing incontinence and overactive bladder (OAB) symptoms, without exposing patients to the typical side effects of medications. However, pelvic floor physiotherapy has a lack of evidence regarding long-term outcomes and comparison with other treatments.
The aims of this study were to determine the long-term effect of Biofeedback Assisted Pelvic Floor Muscle Therapy (BAPFMT) in female patients with OAB on symptoms, health-related Quality of Life (QoL) and the effect on the EMG signals of the individual pelvic floor muscles after one year follow-up.

Study design, materials and methods

All women who had participated in a prospective randomized controlled trial were included(3). At the start of the study patients were randomly assigned to an intervention group, which received 9 weeks of BAPFMT with the MAPLe, or into a control group which received toilet behaviour and lifestyle instructions and had a postponed treatment starting nine weeks after inclusion. An examination of the pelvic floor was performed, consisting of administering the Pelvic Floor Inventories (PeLFIs), a vaginal visual inspection and digital palpation, as well as EMG registration and all patients were asked to fill out the King's Health Questionnaire (KHQ), a 24-hr bladder diary and to perform a 24-hr pad test. At each examination, EMG signals of the pelvic floor were registered during one minute rest, 10 maximum voluntary contractions (MVCs) and endurance. At 9 weeks, 6 months, and 1 year after treatment in both groups, the examination of the pelvic floor was repeated. Location of electrodes was checked in MRI.
Descriptive statistics were calculated for all clinical variables for each time period. Comparison between groups for continuous variables was made by repeated measure analysis of variance using a mixed model after transformation of the data to enhance normality, with treatment, time (categorical) and their interaction as fixed effects and with random patient effects

Results

Fifty-eight patients were included in this study. Before treatment and after one year follow up the groups were comparable on all key parameters such as severity measures and loss of urine. There were no significant changes between the two groups after one year follow up. Thirteen patients were lost to follow-up at one year. Of 45 women the results at the start of the study were compared to the results after one year follow up. During the one year follow up patients received no other intervention. After one year, the PeLFIs showed significant improvement in complaints of OAB in the domains micturition pattern, urinary incontinence, obstructive micturition and pain ($p< 0.05$). For the KHQ the domains, social limitations, and severity measures improved significantly. The 24-hr voiding diary and 24-hr pad test showed significant reduction at one year follow up compared to the start of the study. Figure 1 shows the average loss in grams for the two groups. An average reduction of more than 50% is achieved after BAPFMT with the MAPLe after treatment. Furthermore it shows that the effect of the treatment is sustained after one year follow-up in both groups.

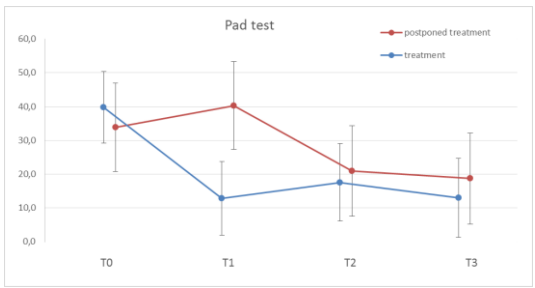

Fig 1. Average loss of urine after one year follow up.

Besides QoL measures, average EMG signals per electrode for rest, MVC, and endurance were calculated and compared for every patient. At one year follow-up, for the combined groups tone at rest was significantly lower for electrodes at the urogenital diaphragm, nearest to the bladder and urethra on the anterior side and nearest to the iliococcygeus muscle on the left side and in the deepest region on the posterior side and significantly higher on the left side nearest to the bulbospongiosus and ischiocavernosus. Mean EMG for MVC and Endurance were significantly higher after one year follow-up for the superficial parts

of the PFM (the Bulbospongiosus and Ischiocavernosus muscles on both sides, at posterior side and the superficial part of the urogenital diaphragm) and significantly lower for most of the deeper parts of the PFM. For the right side of the pubo coccygeus muscle the average EMG was significantly higher and for the iliococcygeus significantly lower. For endurance, average EMG for the puborectal muscle overall was significantly higher and significantly lower for one deeper region of the urogenital diaphragm (Figure 2).

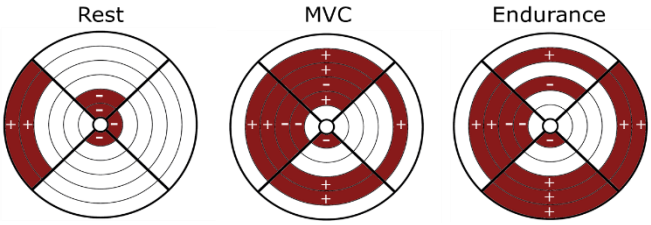

Fig 2. Graphical representations of the average EMG after one year follow up. The four compartments represent the anterior (12 o'clock), left (3 o'clock), posterior (6 o'clock) and right side (9 o'clock) of the PFM. The most outer ring are located at the most caudal or superficial parts of the PFM, the most inner ring (nearest to the center) is located at the most cranial or deeper parts of the PFM. Colour indicates a significant difference, + is higher - is lower.

Interpretation of results

Results show that BAPFMT is effective in women with complaints of OAB after one year follow-up. Validated questionnaires showed a significant reduction in symptoms and complaints of OAB and an increase Quality of Life for patients. Significant changes were still seen in EMG activity after one year follow up, nearest to specific muscle layers and sides for tone at rest, MVC and endurance. This indicates that in the diagnosis and treatment of OAB should focus more on the individual muscle sides and layers of the pelvic floor, instead of the conventional average EMG of all muscles sides and layers combined. The increase in EMG activity in superficial parts and decrease in deeper parts of the PFM could also indicate a restoration of the Guarding reflex

Concluding message

This is the first study that shows that EMG biofeedback assisted pelvic floor muscle therapy with the MAPLe is effective in the OAB syndrome after one year follow up. It significantly reduces symptoms and complaints of OAB and increases Quality of Life for patients.

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Disclosures

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