

THE MULTIPLE ARRAY PROBE (MAPLE): A NEW TOOL CAPABLE OF MEASURING EMG OF AND DIFFERENTIATE BETWEEN INDIVIDUAL PELVIC FLOOR MUSCLES.

Hypothesis / aims of study

A new multiple array electrode probe (MAPLe) has been developed for biofeedback registration of the individual pelvic floor muscles. In literature, there is evidence to suggest that the superficial and deeper layers of the pelvic floor musculature (PFM) need to be assessed separately as also does the balance between the left and right sides in pelvic floor dysfunction (PFD) patients. The Multiple Array Probe (MAPLe) is designed to optimally register EMG signals from the various sides and layers of PFM. The aim of this study was to determine whether there are different EMG values for the different PFM layers in healthy volunteers.

Study design, materials and methods

Healthy volunteers not seeking treatment and not using medication for symptoms of Pelvic Organ Prolapse (POP), lower urinary tract, bowel, pain and/or sexual function related to PFD were qualified to participate. The volunteers, aged ≥ 18 -75 years, were divided into 5 groups: males; females nulliparous, premenopausal; females parous, premenopausal; females nulliparous, postmenopausal; females parous, postmenopausal.

The mean EMG values and their standard errors for the right side of the M. Pubococcygeus, M. Puborectalis and the external anal sphincter for tone at rest, for the MVC and endurance were acquired.

Data analysis was performed using SPSS 18. One-way ANOVA tests were performed to detect differences within the groups. For post-hoc pair wise testing further Bonferroni adjustment was applied.

Results

Anal Measurements

In men there were significant differences between the EMG values of the puborectal muscle and the external anal sphincter for tone at rest and between the pubococcygeal muscle and the external anal sphincter for MVC ($p \leq 0.02$).

Tone at rest showed differences in women nulliparous premenopausal between the pubococcygeal and puborectal muscle ($p=0.004$) and between the puborectal muscle and the external anal sphincter ($p \leq 0.02$). In women parous premenopausal there were no significant differences between the muscles.

The EMG values in women parous postmenopausal showed interestingly differences between the pubococcygeal and puborectal muscle for tone at rest, between puborectal muscle and the external anal sphincter for MVC and between the pubococcygeal muscle and the puborectal muscle and for endurance ($p \leq 0.05$).

Vaginal measurements

Significant differences were seen between the left and right side of the pelvic floor for women of all groups ($p \leq 0.05$). The average EMG values on the right side were higher in all cases. In women nulliparous premenopausal significant differences were seen between pubococcygeal and puborectal muscle and between the puborectal muscle and the bulbospongiosus and ischiocavernosus muscle for tone at rest, MVC and endurance ($p \leq 0.001$).

Within the group of women parous premenopausal significant differences were seen between the average EMG values of the pubococcygeal muscle and the puborectal muscle in MVC and between the puborectalis and the bulbospongiosus and ischiocavernosus muscles for endurance ($p \leq 0.05$).

MVC showed in women parous postmenopausal significant differences between the puborectal muscle and the bulbospongiosus and ischiocavernosus muscle ($p \leq 0.05$).

Interpretation of results

The MAPLe appeared to be highly effective in measuring EMG values of individual muscular components (external anal sphincter, puborectal and the pubococcygeal and bulbospongiosus and ischiocavernosus muscles) at different sides of the pelvic floor in men and women.

Concluding message

The MAPLe is the first probe to measure activities of individual pelvic floor muscles which can be used for the diagnosis and treatment of patients with pelvic dysfunctions.

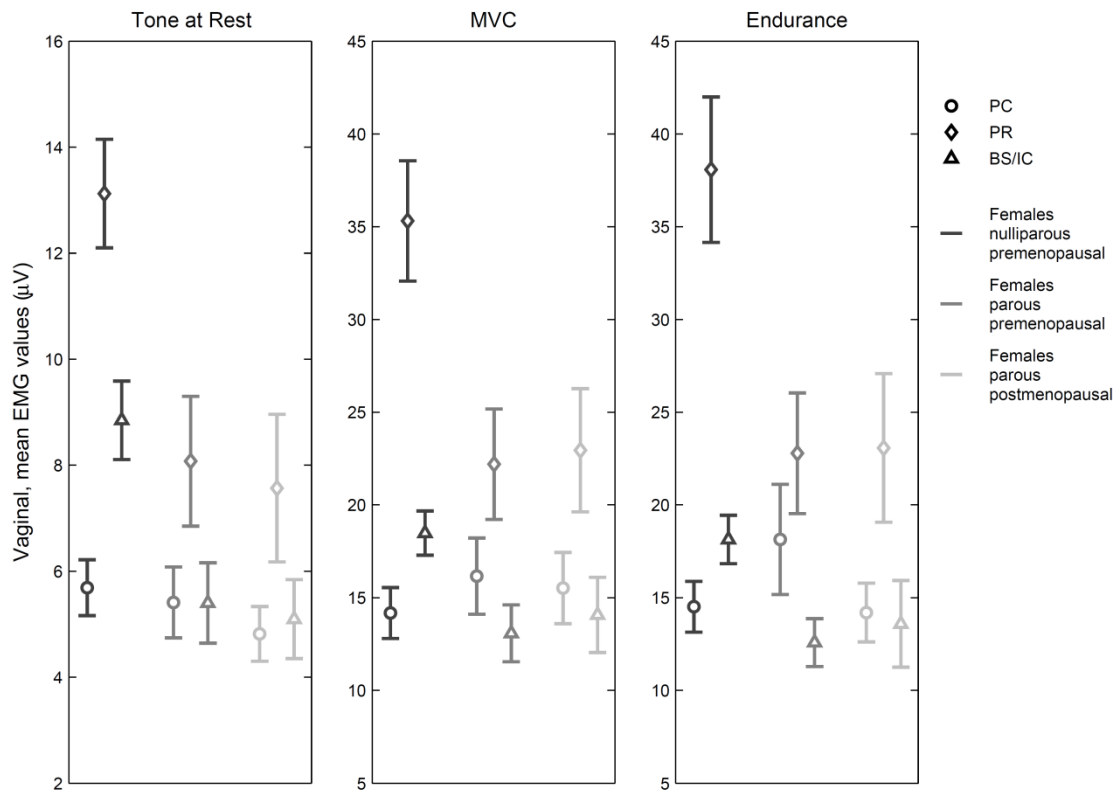


Figure: different EMG values for the different Pelvic Floor Muscles

References

1. Voorham – van der Zalm P.J., Voorham H.C, van den Bos T.W.L., Putter H, DeRuiter M.C, Pelger R.C.M. Reliability of pelvic floor muscle EMG values measured in healthy volunteers using a new device: the Multiple Array Probe (MAPLe). Abstract ICS 2011. *Neurourol. Urodyn.* 30:991-992
2. Voorham-van der Zalm PJ, Pelger RC, van Heeswijk-Faase IC, Elzevier HW, Ouwkerk TJ, Verhoef J, Nijeholt GA. Placement of probes in electrostimulation and biofeedback training in pelvic floor dysfunction. *Acta Obstet Gynecol Scand.* 2006;85(7):850-5.
3. Peng Q, Jones R, Shishido K, Omata S, Constantinou CE. Spatial distribution of vaginal closure pressures of continent and stress urinary incontinent women. *Physiol Meas* 2007 November;28(11):1429-50.

Disclosures

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