

ANALYSIS OF MUSCLE CO-ACTIVATION TO EVALUATE THE PELVIC FLOOR MUSCLE FUNCTION IN WOMEN WITH AND WITHOUT VAGINAL AGENESIS

Hypothesis / aims of study

To analyze the muscle co-activation to evaluate the pelvic floor muscle (PFM) function in women with and without vaginal agenesis (VA).

Study design, materials and methods

Women with and without VA attending by medical sections of genital malformation and gynecologic routine were asked to participate in the trial. All subjects gave written informed consent to participate. Once enrolled, subjects were evaluated by a specialist physiotherapist (PT), which measured the PFM function using following methods: inspection, 'limited' vaginal palpation and non-invasive surface electromyography (sEMG). Primarily, patients were positioned in supine. Then, were requested two PFM contractions by verbal command. PT not gave any additional information about the contraction. Considering the limit of vaginal length of women with vaginal agenesis, PT maintained the first phalange of indicator finger placed in vaginal introitus while contraction was performed, named as 'limited' vaginal palpation. It was classified as presence or absence of contraction, and the same method was applied to both groups. The evaluation by sEMG was expressed as the register of activity in six following muscles: transversus abdominus (TrA), rectus abdominus (RA), internal oblique (IO), external oblique (EO), adductor (AD) and gluteus maximus (GM). Surface electrodes were placed in situ and three recordings of 5 sec of baseline (resting) data were acquired from all sensors while the subject attempted to keep the hip, pelvic and abdominal muscles completely relaxed. Thereafter, were required three maximum voluntary and successive contractions aimed at maximally exerting each muscle studied. During evaluation, PT observed by inspection if have occurred an inward movement or/and constriction around the vagina and rectum. The evaluation parameter was the root mean square, and considered the arithmetic mean of the three contractions.

Results

These preliminary results comprise a part of a prospective controlled trial. Fourteen nulliparous women, mean age 24.4 (Range 16-35) years, were included in the six-month recruitment period from July 2013 to January 2014. Of all studied women, six were in good general health (G1) and eight women presented vaginal agenesis (G2). The groups were similar with respect to age ($p=0.540$) and body mass index ($p=0.329$). Regarding to inspection, all patients of G1 were able to contract the PFM on first command. In G2, six patients were able to contract the PFM on first command, one women on second command and one women could not perform the muscle contraction (absent). Comparing the muscle co-activation, no differences were found between groups on six muscles studied, as detailed in Table 1.

Distribution of co-activation muscles can be observed in Table 1.

Muscle	Group		
	G1	G2	P*
TrA	9.83±6.85	16.56±23.59	0.63
RA	4.69±1.59	4.77±0.81	0.82
IO	11.33±5.40	14.15±6.49	0.54
EO	6.72±3.87	12.12±10.62	0.33
ADU	10.93±10.34	7.43±7.96	0.56
GM	36.75±27.95	47.69±57.05	0.99

Mean ± SD

* Mann Whitney

Interpretation of results

Our results suggest that women with and without VA are able to activate equally strong PFM co-contractions when solicited voluntary PFM contraction. Furthermore, only one patient of G2 was not able to perform the voluntary PFM contraction. To date, no studies have investigated the PFM function in women with VA. It is widely described that during pelvic floor muscle (PFM) contraction occurs an interaction with other muscles, mainly because they are morphologically and functionally connected (1). More specifically, several research groups have found that there is a co-contraction of the abdominal muscles during an effort of maximum PFM contraction (1,2). It is, therefore, important to fully investigate whether an abdominal muscle contraction is necessary and synergistic, or whether it indicates that the volunteers were unable to fully isolate a PFM contraction and were displaying an activation pattern that could impair the functionality of these muscles. Moreover, adductors and gluteus muscles should not to contract when PFM contraction is requested. Due to the fact of the impossibility of investigation by invasive method, to analyze the co-activation could be an indicative factor to evaluate the functionality of these muscles. This method also can be reproducible in other cases that invasive method should not be an option.

Concluding message

Women with and without VA are able to activate equally strong PFM co-contractions when solicited voluntary PFM contraction.

References

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2. Neumann P, Gill V. Pelvic floor and abdominal muscle interaction: EMGactivity and intra-abdominal pressure. *IntUrogynecol J* (2002) 13:125-32.

Disclosures

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