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THE ROLE OF THE LFG-COMPLEX (LEVATOR ANI MUSCLE – FOSSA ISCHIOANALIS – GLUTEUS MAXIMUS MUSCLE) FOR THE FUNCTIONAL INTEGRATION OF THE PELVIC FLOOR

Aims of Study

The levator ani muscle is the major structure of the pelvic floor and serves as primary support for the pelvic organs. Pelvic floor muscle exercises are regulary used as an intervention in the conservative treatment of urinary stress incontinence [1, 2]. It has been emphasised that exercises of the pelvic floor muscles, especially the levator ani muscle, should be performed in isolation without contraction of the glutei muscles. Contracting the gluteus maximus muscle during pelvic floor exercises is considered incorrect [3] as these actions may occur without concurrent pelvic floor muscle activity and thus render the exercises ineffective. The aim of this study was to assess the importance of the relationships between the levator ani muscle (LA) fossa ischioanalis (FI) and the gluteus maximus muscle (GM) for the functional integration of the pelvic floor.

Methods

Using a PC-compatible surface electromyography (s-EMG) and a magnetic resonance imaging (MRI) 21 nulliparous female volunteers, aged 16 to 26, without a history of urinary and anal incontinence, genital prolapse, surgeries or injury of the pelvic floor were examined. The electromyogramms were recorded simultaneously vaginally of the LA and with two electrode pairs of the GM during active voluntary contraction of the pelvic floor muscles and at rest. Ten multimeasurements were done for each of the six body positions (Fig. 1), which were described by Bø et al. [4] as positions which support selective contraction of the LA.

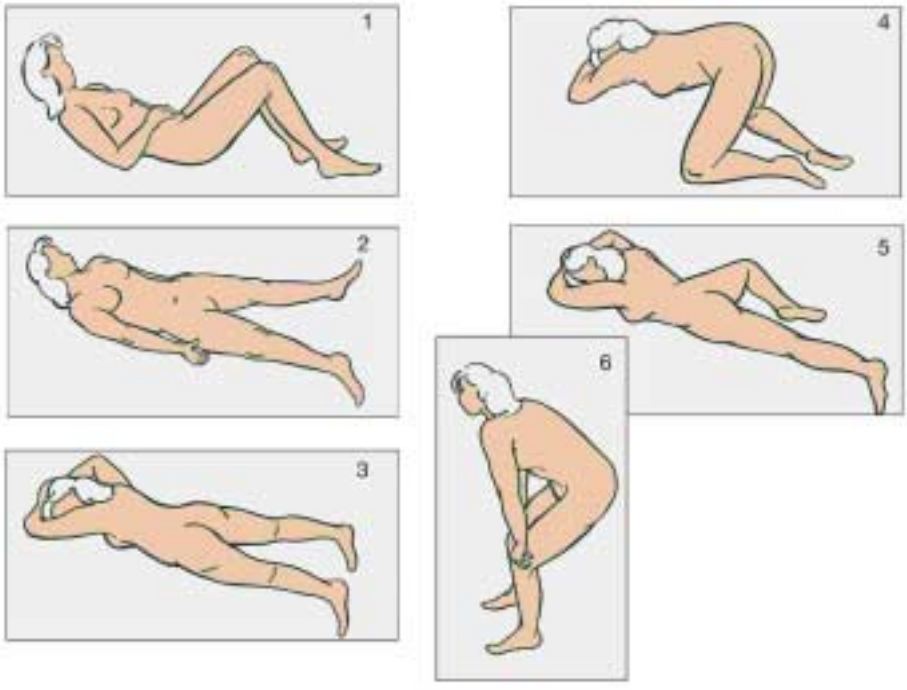

Fig. 1 Body positions, which support selective contraction of the levator ani muscle [4]

The functional MRI was performed with 1.5 Tesla superconductive magnet unit (Vision®, Siemens, Germany) and included a dynamic midsagittal, parasagittal bilateral, axial (upper and lower rim of the pubic bone) True

FISP sequence (TR 5.8 ms, TE 2.5 ms, matrix 224 x 256, field of view 236 x 270 mm, 20 measurements). During the examination the volunteer was asked to relax her pelvic floor muscles, contract them slowly to the maximum and then relax them again. To study the morphology of these structures plastinated sections of the human pelvis were used.

Results

Representative selective LA contractions were not proved. Simultaneous contraction of the LA and the GM muscles in the s-EMG was observed independently of the body positions (97,2%). (Fig. 2)

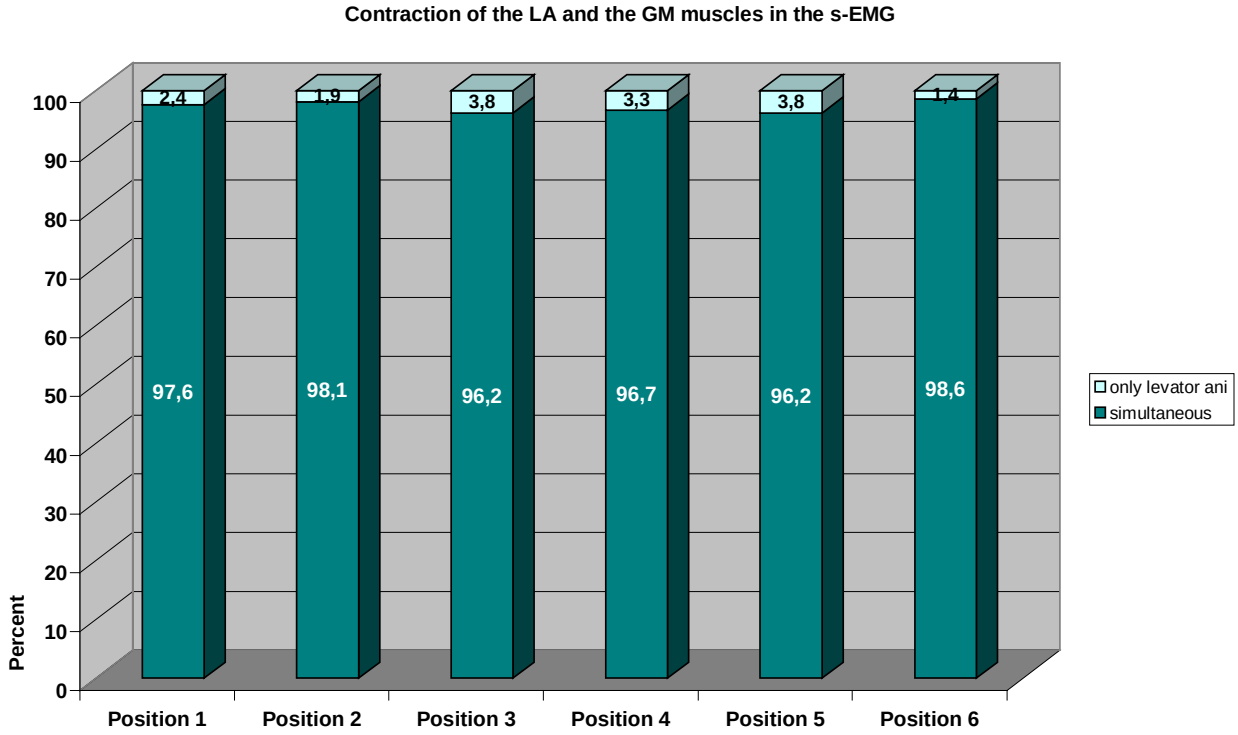

Fig. 2 Simultaneous contraction of the LA and the GM muscles in the s-EMG was observed independently of the body positions

Maximum contractions of both muscle groups were seen in those positions with knees bent and apart. The results of the MRI showed a synchronous movement of all structures: the LA, the FI and the GM. During contraction the LA area (- 7.8 %) was reduced, the GM area (+ 8.4 %) was increased significantly. The FI area remained unchanged. Analysing the sections we found out, that the network of connective tissue septa, which goes through the FI, connects the LA and the GM muscles.

Conclusions

The levator ani muscle, the fossa ischioanalis and the gluteus maximus muscle are connected morphologically and functionally. Therefore we recommend, these structures be considered as the 'LFG-Complex', emphasizing the importance of this unit for the functional integration of the pelvic floor. The results of this study should have an effect on pelvic floor reeducation and on obstetrical management.

References

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