

Abstract

Title: The biomechanical effects of levator ani muscle laceration injuries after vaginal delivery

Objectives: The aim of this thesis is to sum up current knowledge about the normal structure and function of levator ani muscle and findings about dysfunctions of a pelvic floor. By means of biomechanical instruments to analyse how the lower part of levator ani muscle closes (puborectalis muscle) during unilateral avulsion lesion. On the basis of computer simulation of biomechanical properties of the pelvic floor during avulsion lesion to describe the theoretical solutions for the therapy of the main types of dysfunctions of the pelvic floor.

Methods: Biomechanical analysis was used with a help of computer model of muscular pelvic floor with a help of the ABAQUS model. This model with matched properties of muscular tissue was influenced by the standard pressure which influences the pelvic floor for a person of 80 kilos standing at rest. This model simulated unilateral avulsion lesion and biomechanical variables were observed during compensatory activation of uninjured parts of levator with the activity 100%, 50% and 10%. The map of the muscular tone and the rate of movement of the muscles of the pelvic floor were evaluated.

Results: Only minimal movement is observed in the intact pelvic floor during constant and calm load, the lowest values of muscular tone are in the area of the urogenital hiatus. During avulsion lesion the values of tension and dislocation of the levator change according to the rate of activation of the intact part of the levator. The separated part of the levator moves in the direction of the intact muscle. The smaller the movement is the higher the compensatory activation of the muscle. The results of observation represent the theoretical basis for the determination of the therapeutic model in post-natal dysfunctions of the pelvic floor, when the physiotherapeutic methods will be particularly suitable in cases of the absence of the muscular defect.

Keywords: pelvic floor, levator ani muscle, birth injuries, avulsion, dysfunction of the pelvic floor, biomechanical model.