3D MODELS OF PELVIC FLOOR MUSCLES DEVELOPED BY MANUAL SEGMENTATION TO FEM

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The female pelvic floor is an understudied region of the body from the biomechanical perspective. MRI has been used in the diagnostic evaluation of the pelvic floor dysfunctions. Static images show their morphology while dynamic images show the functional changes that occur on straining and contraction of the pelvic floor. In the present work, MR images contribute to generate 3D solids of pelvic floor muscles through manual segmentation. To study the biomechanical behavior of pelvic floor muscles the Finite Element Method (FEM) would be applied to these 3D solids, contributing to analyze this complex musculature structure [1]. The purpose of this study was to reconstruct tridimensional pelvic floor muscle by manual segmentation and apply FEM. The manual segmentation was made within commercial software. MR images were acquired from the subject supine position, using a 3.0 T system. Field view of the exam was 25×25 cm, 2 mm thick with no gap. The images were acquired in DICOM format, and later converted jpeg format. Twenty consecutive images obtained in the axial plane for each woman were used to construct a 3D model from each of the 8 women. From this 3D reconstruction made through splines in each image, changes in the pubovisceral muscle (a part from the pelvic floor muscles) from the pubis to coccyx were edited. All the pubovisceral muscles edited were exported in step format to the FE analyses software ABAQUS. Finite element meshes were generated for each woman pubovisceral muscle. According to literature soft tissues properties, FE analyses were established to better understand pelvic floor muscles biomechanics. Manual segmentation of the pelvic floor muscles tissues generated very realistic completely different volumetric solids for each woman. It is a very sluggish technique and the nonlinear shape of the pelvic floor makes difficult the utilization of other automatic segmentation.

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