

HISTOLOGICAL AND BIOMECHANICAL STUDY OF HUMAN FASCIA LATA OF THE THIGH

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Introduction

Fascial system is ubiquitously present connective tissue network allowing for proper fluid flow and harmonious body movement. *Fascia lata* is crucial in stabilizing and controlling movements of lower extremity and pelvis. At microscopic level it represents regular dense connective tissue, formed predominantly by regularly arranged bundles of collagen fibers with fibroblasts being its main cellular component [Bhattacharya, 2010]. Elastin fibres, ensuring elastic properties of the tissue, may be of special importance as their distribution may to great extend influence mechanical behaviour of facial structures [Maksymowicz, 2012; Stecco, 2009].

Methods

Samples of human *fascia lata* of the thigh were collected from 14 male fresh cadavers. Histological and biomechanical studies were performed parallelly. The material was stained with haematoxylin and eosin (H&E) and Weigert's technique. The biomechanical analysis comprised uniaxial tensile tests, which were conducted using MTS Synergie 100 testing machine. The samples were tested in two different directions: longitudinally and transversally to collagen bundles arrangement [Żak, 2011].

Results and Discussion

The mechanical tests results are shown in Fig.1 while histological structure is demonstrated in Fig. 2. Obtained results indicated considerable numbers of elastin fibers within examined fascia, what suggests that *fascia lata* is not only a passive structure but may exhibit high elastic potential *in vivo*. On the other hand our biomechanical tests demonstrated orthotropic properties of the *fascia lata* with the highest tensile strength of tissue oriented longitudinally to the collagen bundles arrangement

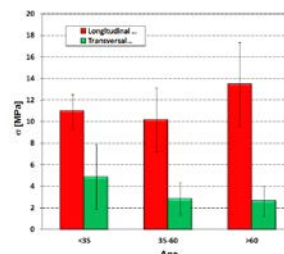


Figure 1: Median tensile strengths for specimens tested longitudinally (red) and transversally (green) to collagen bundles arrangement.

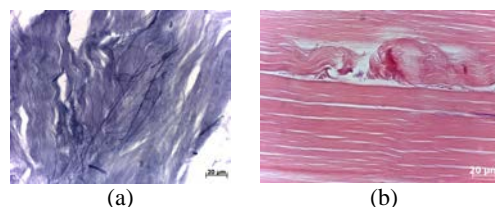


Figure 2: Fascia lata stained with: a) Weigert's method showing elastic fibers intermingled with collagen bundles; b) H&E method after mechanical test - rupture of group of collagen fibers can be observed.

This information may contribute to better clinical understanding of fascial disorders, may help to optimize the grafting technique and numeric fascial modelling.

References

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