Distinct viscoelastic behavior of internal and external rectus abdominis fascia, consequences for our notion of abdominal wall function.

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Introduction

The past decades fascia has gained scientific interest, underpinning its unique role in physical function. Several studies consider the abdominal fascia’s as stabilizers of the spine [1,2]. From an evolutionary perspective this is peculiar, because bone developed much later than fascia [3]. Should it not be the other way around: the spine as subordinate to fascia. To explore this notion we need better understanding of the function of fascia. This study explores the visco-elastic behavior of internal and external rectus abdominis fascia, as significant components of the abdominal fascial system[4].

Methods

7 embalmed human bodies were dissected. Just lateral (2 cm) of the umbilicus, samples (4 x 4 cm) were bilaterally taken from both internal and external rectus abdominis fascia. Visco-elastic behavior was examined by means of a displacement sensor (Microstrain®) attached to the fascial sample. Force (20 grams) was applied in longitudinal and transverse directions to the samples. Mean elongation was calculated over three repetitions in each direction. Data were analyzed by using the Wilcoxon signed rank test.

Results

There is a significant difference in the visco-elastic behavior of the internal and external rectus abdominis fascia. More surprising, in the internal fascia there is a significant difference in visco-elastic behavior in longitudinal and transversal directions. Longitudinally the internal fascia allows far more stretch than in transverse direction where the fascia is very stiff. This particular visco-elastic behavior is far less outspoken in the external fascia.

Conclusion

Internal rectus abdominis fascia displays very characteristic visco-elastic behavior, apparently corresponding to its specific purpose. It allows stiffening of the trunk in the coronary plane, while longitudinal elasticity is maintained. This raises the question whether balanced control of trunk stiffness is not more important than spinal control. Considering trunk function from this perspective may enhance our understanding of coherence between back- and pelvic pain, urinary incontinence, breathing disorders, diastasis recti and even exorbitant bellies [5].


Figure 1 Visco-elastic behavior of internal and external rectus fascia