

MUSCLE TISSUE COMPOSITION, MUSCULAR TENDERNESS, AND FORCE PRODUCTION IN SUBJECTS WITH UNILATERAL EPICONDYLITIS LATERALIS

¹Pernille Kofoed Nielsen, ¹Anne Katrine Blangsted, ¹Henrik Baare Olsen and ¹Karen Søgaard

¹Department of Physiology, National Institute of Occupational Health, Denmark;

email: pkn@ami.dk, web: www.ami.dk

INTRODUCTION

Musculoskeletal disorders and pain in the forearm region due to low-force exposure are major problems in the industrialised world. Nevertheless, the pathophysiology is poorly understood.

Prolonged static contractions and ongoing repetitive low-level activity in the forearm muscles is well-known risk factors for development of epicondylitis lateralis. Therefore, it may be speculated that in addition to changes in the tendon also muscular changes may be detectable. Indeed, by the use of biopsy technique, morphological changes in the forearm muscle have been identified in patients diagnosed with epicondylitis lateralis [1]. Such morphological changes could be caused by facilitated formation of non-contractile tissue in the muscle, which may be detectable by non-invasive methods such as ultrasonography [2,3]. Contractile tissue in a healthy muscle will appear dark separated by sharp, bright lines, whereas muscles with different neuromuscular diseases are brighter and more diffuse in the structure [4]. Further, if the contractile tissue is affected it would also be expected to affect the force generating capacity.

The hypothesis of the present study was that in subjects with clinically diagnosed epicondylitis lateralis, the maximal voluntary contraction force (MVC) in wrist extension is lower and the ultrasound image of the muscle is brighter in the afflicted (pain) arm compared to the non-afflicted (no-pain) arm.

METHODS

B-mode ultrasonography was performed bilaterally at the middle part and proximal part of the m. extensor carpi radialis (ECR) on eight patients (5 females, 3 males) with unilateral epicondylitis lateralis. An ultrasound scanner fitted with a 12 MHz linear matrix transducer (LOGIQ 7, M12L, GE-Medical) was used. Gain settings were standardized and kept constant. The transducer was placed perpendicular to the ECR muscle during examination. Each image consisted of pixels with grey-scale values ranging from 0 to 255. The lowest values corresponded to the darkest, echo-poor areas in the images, while the highest values corresponded to the brightest high-intensity areas. A computerized texture analysis calculating the mean grey-scale intensity was used to characterize the images [5].

Next, the muscular tenderness, measured as pressure pain threshold (PPT) was determined with an electronic pressure algometer (Somedic, Hörby, Sweden) [6]. The diameter of the contact area was 10 mm and the pressure was applied perpendicularly to the skin at the middle part of ECR and with a speed of 20 kPa/s. The subjects marked the PPT by pressing

a button when the sensation of “pressure” changed to “pain”. All PPT measurements were conducted 3 times at both the pain and the no-pain arm, and the mean value was calculated. MVC was measured during a wrist extension. The subjects were sitting with the elbows flexed 90 degrees, the forearm pronated and resting on a horizontal platform. In this position they performed a MVC against a force transducer with both the pain arm and the no-pain arm in random order. Moment arm was measured and the wrist extension torque was calculated. Results are presented as mean (SD).

RESULTS AND DISCUSSION

The mean grey-scale intensity for the middle and proximal measuring sites was 42.86 (10.66) and 46.6 (11.6) for the pain arm compared to 41.50 (8.52) and 37.9 (15.4) for the no-pain arm. The mean PPT was 339 (172) kPa/s for the pain arm compared to 371 (148) kPa/s for the no-pain arm, and the mean MVC torque was 10.3 (4.6) Nm and 11.1 (SD 4.9) Nm, respectively. There were no significant differences.

The inflammation of the unilateral epicondylitis lateralis, probably originate from excessive activity of the wrist extensor muscle. Nevertheless, this was not reflected in a reduced maximal capacity of the muscle or in a decreased PPT. Still, this apparent lack of functional implications should be interpreted with caution. The non-afflicted arm serves as control and the study design does not allow any estimation of the initial condition of the afflicted arm before the symptoms emerged. However, the finding of a well preserved force capacity in the muscle indicating unaffected contractile tissue was corroborated by the results from the ultrasound grey-scale analysis.

CONCLUSIONS

In this study, we found no indications of an influence of epicondylitis lateralis on the function, the PPT, or the tissue composition in ECR. However, a case-control study design may be needed to support this conclusion.

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