

INTERMUSCULAR MYOFASCIAL CONNECTIONS OF FCU COULD CONTRIBUTE TO WRIST FLEXION TORQUE IN THE SPASTIC ARM OF CEREBRAL PALSY PATIENTS: PRELIMINARY RESULTS.

¹Marije de Bruin, ¹Mark JC Smeulders and ^{1,2}Michiel Kreulen

¹Department of Plastic, Reconstructive and Hand Surgery, Academic Medical Center, Amsterdam, The Netherlands, m.debruin@amc.uva.nl,

²Department of Plastic Reconstructive and Hand Surgery, Red Cross Hospital, Beverwijk, The Netherlands.

INTRODUCTION

The flexor carpi ulnaris muscle (FCU) is thought to be the strongest forearm muscle and is held responsible for the flexion and ulnar deviation deformity of the wrist in cerebral palsy. Recent study revealed an important role of fascia in muscle performance [1,2]. It is thought that myofascial connections play a substantial role in the functioning of the spastic arm in cerebral palsy [2].

The hypothesis was that both tenotomy of the FCU and subsequent dissection of the fascia affect the flexion torque at the wrist.

METHODS

Eight patients having a transposition of the tendon of the FCU were included. Under general anaesthesia without administration of muscle relaxants, the FCU was percutaneously stimulated with supramaximal electrical pulses through two skin electrodes that were placed on the cubital tunnel of the elbow.

The surgeon fixated the forearm in neutral position and assured that the hand was not blocked dorsally. A force transducer was placed on the volar side of the distal tubercle of os metacarpale III. The palmar crest of the hand was assumed to be the volar projection of the wrist flexion axis. The moment arm was the distance of the impact point of the force transducer to this palmar crest. Isometric wrist torque was measured under three conditions: before tenotomy, after tenotomy of the distal tendon, and after subsequent dissection of the fascia around the FCU up until approximately halfway the muscle belly. Each session consisted of three trials that were averaged. Change of torque was expressed as a percentage relative to the torque before tenotomy.

RESULTS AND DISCUSSION

After tenotomy, the wrist flexion torque decreased on average to 80% (Figure 1). This decrease was significant ($p < 0.05$). After dissection of the FCU from surrounding structures, the torque decreased to 59%. The 21%

difference between the after tenotomy and after dissection condition was significant ($p < 0.05$).

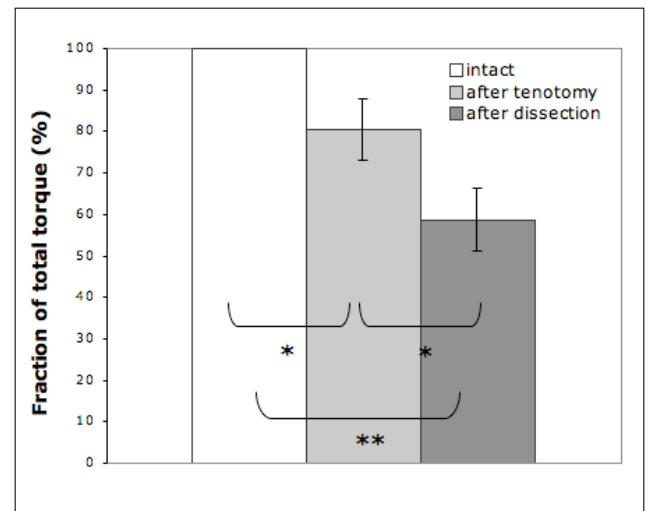


Figure 1: Decrease of wrist torque after tenotomy and after dissection (error bar = SEM). * $p < 0.05$; ** $p < 0.01$.

CONCLUSIONS

In these patients, dissection of the FCU resulted in 21% decrease of wrist torque. Although this preliminary study is conducted on a small group of patients, it can be concluded that dissection does affect the FCU muscle function. The myofascial connections of spastic muscles may play a role in the development of deformities in the spastic arm of cerebral palsy patients.

REFERENCES

1. Maas H, Meijer HJ, Huijing PA. Intermuscular interaction between synergists in rat originates from both intermuscular and extramuscular myofascial force transmission. *Cells Tissues Organs* **181**(1):38-50, 2005.
2. Yucesoy CA and Huijing PA. Substantial effects of epimuscular myofascial force transmission on muscular mechanics have major implications on spastic muscle and remedial surgery. *J Electromyogr Kinesiol.* **17**(6):664-679, 2007.