Role of fasciae around the median nerve in pathogenesis of carpal tunnel syndrome: microscopic and ultrasound study

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BACKGROUND Carpal Tunnel Syndrome (CTS) is the most common problem in hand affecting 1-3% of the population [1], while recurrence of CTS following surgery is reported to be between 7-20% [2]. However, the relationship between the fasciae around median nerve (MN) and pathogenesis is unknown. The aim of this study was to investigate the connection between myofascial structure and epineurium, paraneural sheath of MN to evaluate a possible role of fascia in the pathogenesis of CTS.

METHODS Anatomic study (approved by the local ethical committee) was carried out on 9 unembalmed upper limbs managed by the ‘Body Donation Program’ at the Institute of Anatomy, University of Padova. 4 samples of MN and surrounding tissue were excised from arm at 4 different levels for microscopic analysis. Ultrasound images of MN were analyzed in 11 healthy and 8 CTS subjects to evaluate the MN transversal displacement during the 3th finger and all fingers motion at Carpal tunnel (CT) and forearm levels.

RESULTS Anatomical continuity between the epimysium and paraneural sheath of MN was found and the reduction of paraneural fat tissue from proximal to distal was demonstrated in all samples (Figure1). The MN displacement in both levels were significantly different between healthy and CTS subjects, while it was significantly decreased in CTS subjects [forearm: 3th -1.76 (-2.33; -1.26); all -1.65 (-2.21;-0.91); CT: 3th -0.60 (-0.82;-0.41); all -1.14 (-1.56; -0.50); p<0.001].

CONCLUSION This study has clearly demonstrated the link between the epineurium, paraneural sheath of MN and myofascial structure. Therefore, it is possible to argue
that an unbalance condition of epimysial fasciae has to be considered in the pathogenesis of CTS. The CT segment will be more sensitive to pressure since the reduced fat component which reveals a decreased ability in cushioning to protect the nerve. Ultrasound study has confirmed the previous studies about reduction of displacement in CT, but also has shown the reduction of displacement in the forearm for the first time. The present study suggests CTS is not only a nerve compression in CT, but also has a global problem that can affect the nerve movements along all the upper limb

![Image of macroscopic and microscopic dissections](image)

Figure 1: *, median nerve; $, paraneural fat tissue (not show the lacertus fibrosus and half forearm levels).

REFERENCES
