




NERVE ENTRAPMENT

Antonio Stecco, MD

University of Padua, Department of Physical
Medicine and Rehabilitation, Padua, Italy.

antonio.stecco@unipd.it

Entrapment neuropathies are common clinical entities

- Among the most prevalent are median nerve entrapment at the wrist and ulnar nerve entrapment at the elbow.
- *“Other nerve entrapments and their presenting syndromes pose more difficult diagnostic challenges and may often be confused with more common clinical conditions.”*

Yang LJ, Gala VC, McGillicuddy JE.; Superficial peroneal nerve syndrome: an unusual nerve entrapment. Case report.; J Neurosurg. 2006 May;104(5):820-3.

The presence of a fascia could explain the suprascapular nerve entrapment.



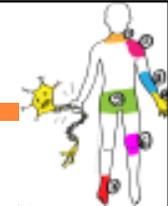
*“In pathologic and post-trauma conditions, **the fascia can be retracted or thickened** and the suprascapular nerve may be **entrapped** along its course in the supraspinatus fossa, between the suprascapular notch and the spinoglenoid notch.”*

Duparc F, Coquerel D, Ozeel J, Noyon M, Gerometta A, Michot C.; Anatomical basis of the suprascapular nerve entrapment, and clinical relevance of the supraspinatus fascia.; Surg Radiol Anat. 2010 Mar;32(3):277-84.

Fibrous bands structures

- *“We suggest that certain fibrous and muscular structures could also be an anatomical basis for supraclavicular nerve entrapment syndrome.”*

Jelev L, Surchev L.; Study of variant anatomical structures (bony canals, fibrous bands, and muscles) in relation to potential supraclavicular nerve entrapment.; Clin Anat. 2007 Apr;20(3):278-85.



Fibrous tunnel within the medial intermuscular septum



“...the ulnar nerve (UN) passes through a **fibrous tunnel** within the medial intermuscular septum into the posterior compartment of the upper arm in **more complicated patterns** than those described in anatomy textbooks. Given that these unreported patterns might be related to the **idiopathic (UN) entrapment at the midarm**”

Won HS, Han SH, Oh CS, Chung IH, Kim SM, Lim SY.; Topographic relationship between the medial intermuscular septum and the ulnar nerve in the upper arm.; J Neurosurg. 2011 Jun;114(6):1534-7.

Primary ulnar entrapment neuropathy in the midarm



“Stimulation of the ulnar nerve showed a motor conduction block at a distance of 7.5-10 cm proximal to the medial epicondyle, where the nerve was compressed by the medial intermuscular septum.”

Nakajima M, Ono N, Kojima T, Kusunose K.; Ulnar entrapment neuropathy along the medial intermuscular septum in the midarm.; Muscle Nerve. 2009 May;39(5):707-10.

Thickening of brachial fascia

“The authors report two anatomic cases of median nerve entrapment, which can be one of the causes of carpal tunnel syndrome. The first case was the **thickening of brachial fascia** that resembles the Struther’s ligament. The second case was the **thickening of the bicipital aponeurosis.**”

Piyawinijwong S, Khampremsri N, Ongsriporn M, Roongruangchai J; Cadaveric study of median nerve entrapment in the arm: report of two anatomical cases. ; J Med Assoc Thai. 2011 Nov;94(11):1405-9.

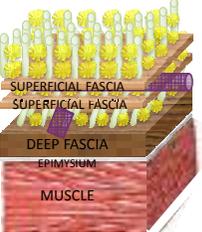
Mechanical compression where the nerve pierces the fascia

“Superficial peroneal nerve syndrome is an entrapment neuropathy that results from mechanical compression of the nerve at or near the point where **the nerve pierces the fascia** to travel within the subcutaneous tissue.”

Yang LJ, Gala VC, McGillicuddy JE.; Superficial peroneal nerve syndrome: an unusual nerve entrapment. Case report.; J Neurosurg. 2006 May;104(5):820-3.

Superficial peroneal nerve





Deep fascia entrapment

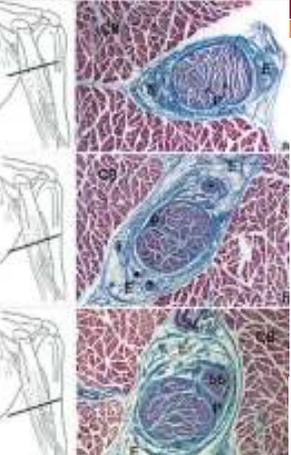
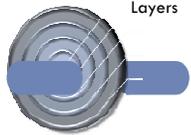
Around the nerve there are always fat and loose connective tissue




UNIVERSITÀ DEGLI STUDI DI PADOVA

Large nerve fibres and deep fascia

The larger nerve fibres are often surrounded by different layers of loose connective tissue that preserves the nerve from traction to which the fascia is subjected.

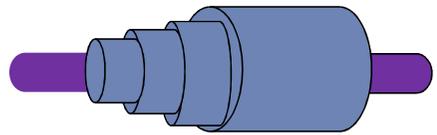



Musculocutaneous Nerve: Histotopographic Study and Clinical Implications

VERONICA MACCHE, CESARE TENGO, ANDREA POZZORATO, ANNA PARENTI, CARLA STICO, FRANCO BASSETTI, RAFFAELE SCAPINELLI, GIUSEPPE TOSI-MAYERS, JOE RAFFAELLA DE CARO

physiology

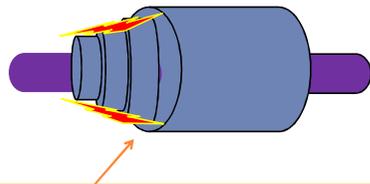
□ longitudinal movement of nerve

Loose connective tissue: GAG, adipose tissue, hyaluronic acid

“Fibrosis and adhesions, impairing intrafascicular gliding. This loss of intrafascicular gliding creates an internal stretch lesion”

- Lundborg G, Rydevik B. Effects of stretching the tibial nerve of the rabbit. A preliminary study of the intraneural circulation and the barrier function of the perineurium. *J Bone Joint Surg Br* 1973;55:390-401.
- Abe Y, Doi K, Kawai S. An experimental model of peripheral nerve adhesion in rabbits. *J Plastic Surg Br* 2005;58:533-40.
- Lundborg G, Dahlin LB. Anatomy, function, and pathophysiology of peripheral nerves and nerve compression. *Hand Clin* 1996;12:185-93.
- Rydevik B, Lundborg G, Nordborg C. Intraneural Tissue reactions induced by internal neurolysis. *Scand J Plast Reconstr Surg* 1976;10:3-8



Increase of the viscosity of the loose connective tissue

UNIVERSITÀ DEGLI STUDI DI PADOVA

RELATIONSHIP WITH THE SUPERFICIAL NERVES

Superficial peroneal nerve

All the nerves for the skin have to cross the superficial fascia. Could damage of the superficial fascia explain some alterations of the cutaneous sensibility?

Femoral-cutaneous nerve

Superficial fascia and nerves

Diagnosis

"In vivo studies using diagnostic ultrasound (DUS) demonstrate that this type of imaging is a valid tool for use in measuring longitudinal and transverse movement of nerve tissue."

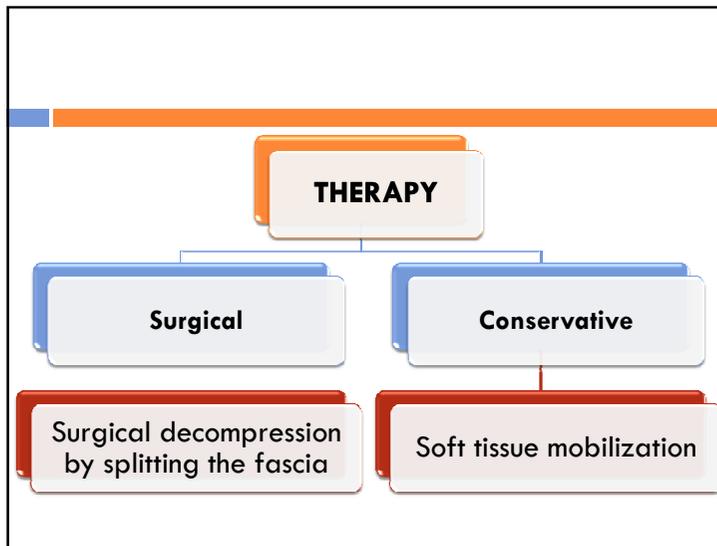
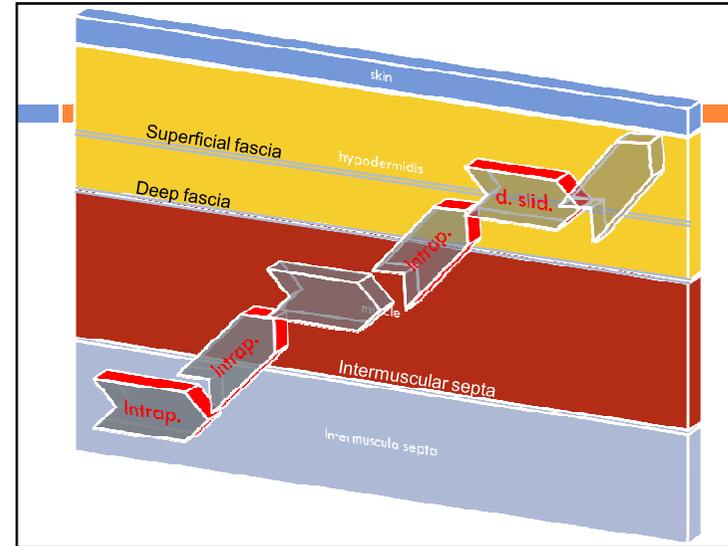
Greening J, Lynn B, Leary R, Warren L, O' Higgins P, Hall- Croggs M. The use of ultrasound imaging to demonstrate reduced movement of the median nerve during wrist flexion in patients with non-specific arm pain. *J Hand Surg Br* 2001;26:401-6.

Hough AD, Moore AP, Jones MP. Reduced longitudinal excursion of the median nerve in carpal tunnel syndrome. *Arch Phys Med Rehabil* 2007;88:569-76.

Dilley A, Lynn B, Greening J, DeLeon N. Quantitative in vivo studies of median nerve sliding in response to wrist, elbow, shoulder and neck movements. *Clin Biomech* 2003;18:899-907.

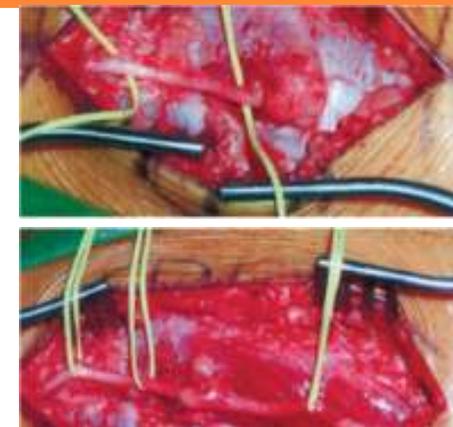
Ellis R, Hing W, Dilley A, McNair P. Reliability of measuring sciatic and tibial nerve movement with diagnostic ultrasound during a neural mobilisation technique. *Ultrasound Med Biol* 2008;34:1209-2008.

Dilley A, Greening J, Lynn B, Leary R, Morris V. The use of cross-correlation analysis between high-frequency ultrasound images to measure longitudinal median nerve movement. *Ultrasound Med Biol* 2001;27:1211-8.



Surgical decompression superficial peroneal nerve

- Before
- After



Physical Medicine and Rehabilitation

*“This is potentially a first-time report describing physical therapy management of entrapment mechanical interface with pain modalities, **soft tissue mobilization**, and neural mobilization. Reduction of pain was noted in this patient (VAS score of 0 cm by the sixth session) with complete pain resolution maintained at a six-month follow-up.”*

Anandkumar S.; Physical therapy management of entrapment of the superficial peroneal nerve in the lower leg: A case report.; Physiother Theory Pract. 2012 Feb 2.

Fascial Manipulation®

- A randomized controlled trial was performed to compare the effectiveness of Fascial Manipulation® (FM) and Low-Level Laser Therapy (LLLT) for CTS. The group that received FM showed a significant reduction in subjective pain perception and an increased function assessed by BCTQ at the end of the treatment and follow-up. The group that received LLLT showed an improvement in the BCTQ at the end of the treatment but the improvement level was not sustained at the three month follow-up. FM is a valid alternative treatment for CTS.

Pratelli E, Pintucci M, Cultrera P, Baldini E, Stecco A, Petrocelli A, Pasquetti P. Conservative treatment of carpal tunnel syndrome: Comparison between laser therapy and fascial manipulation®. J Bodyw Mov Ther. 2015 Jan;19(1):113-8.

We believe that this will be
the begin of many future
articles!

□ Thank you