

Carpal Tunnel Syndrome: What a patient needs to know

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Personal and Professional

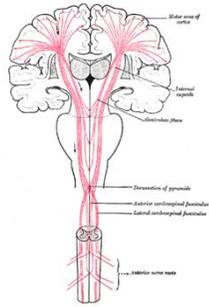
• I have no conflicts of interest to disclose.

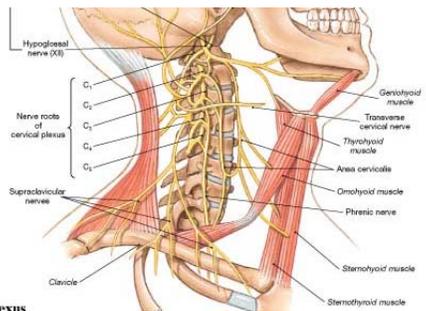
Learning objectives

By the end of the session, participants will be better able to:

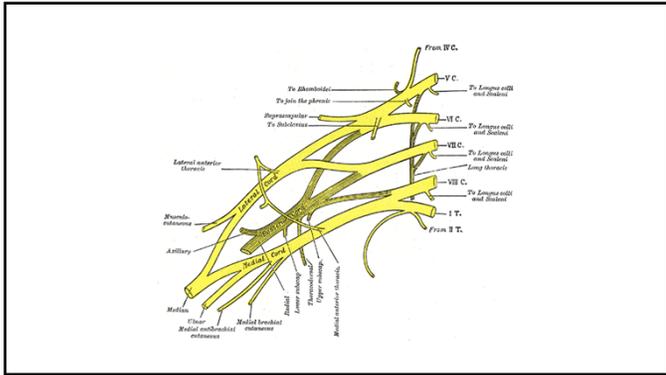
1. Recognize symptoms of carpal tunnel syndrome.
2. Identify diagnostic testing used for evaluating possible carpal tunnel syndrome.
3. Discuss treatment options for carpal tunnel syndrome.

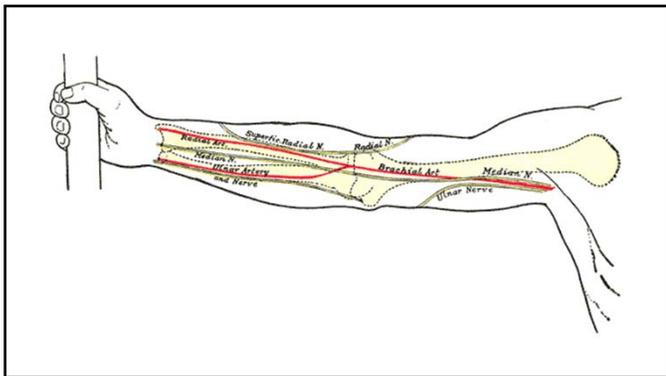
The anatomy of the median nerve and carpal tunnel

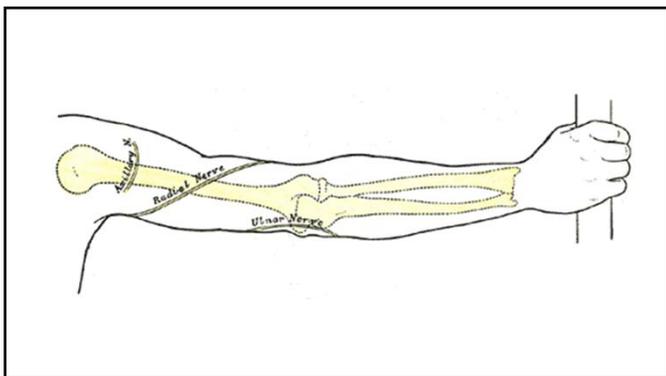


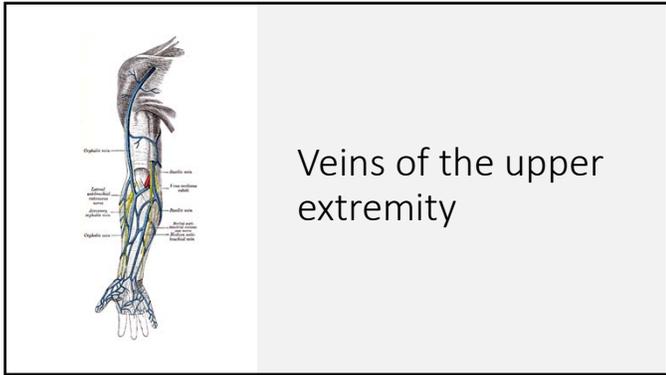


• FIGURE 13-9
The Cervical Plexus

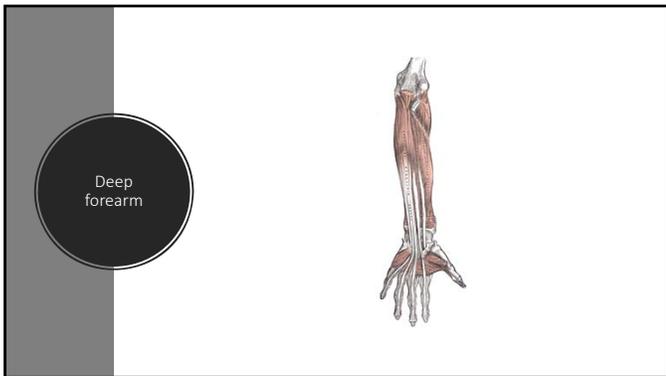




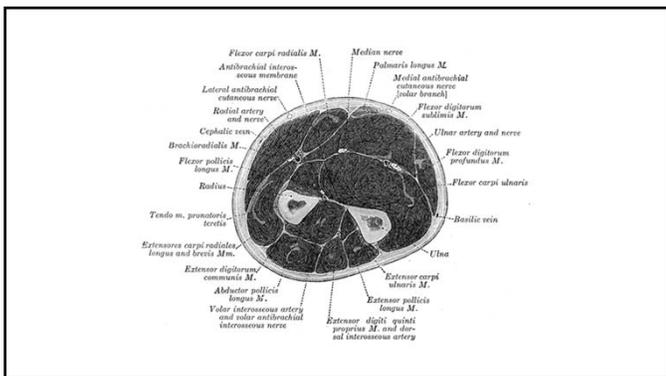


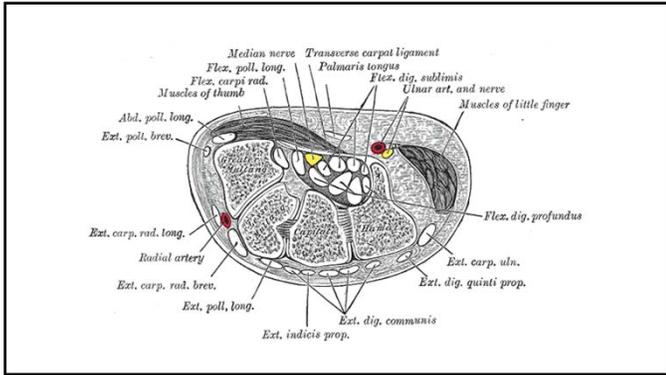


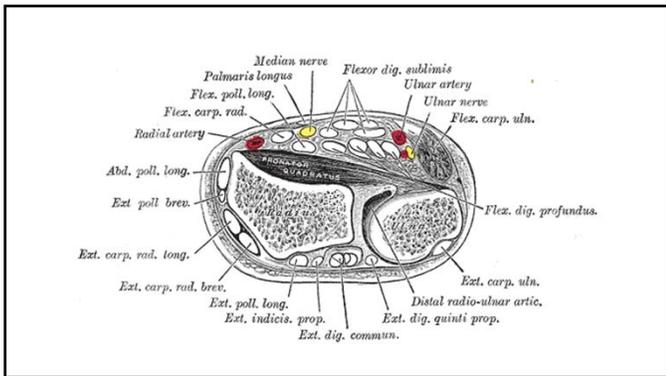
Veins of the upper extremity

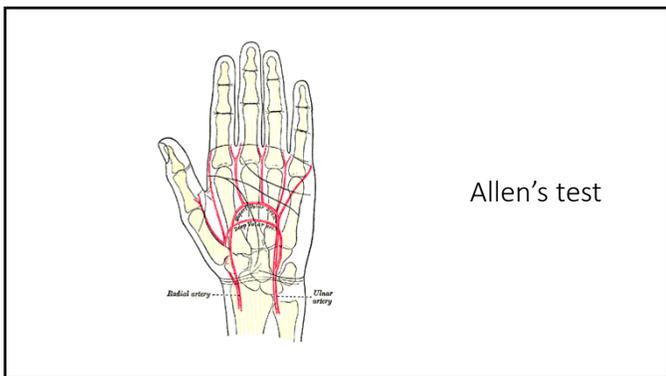


Deep forearm









Symptoms of CTS

- Nerve symptoms: pain, paresthesia, autonomic dysfunction
- PAIN: aching, deep, occasionally lancinating (electric jolt)
- PARESTHESIA: altered sensation (tingling, numbness, impaired 2 point discrimination)
- AUTONOMIC DYSFUNCTION: loss of sweating in the affected digits

Differential Diagnosis

- Nerve Related
 - Cervical radiculopathy (C6 or C7)
 - Spinal Cord: cervical spondylotic myelopathy: numb, clumsy hands
 - Brachial plexopathy
 - Median nerve in the forearm (pronator teres syndrome)
 - Median nerve at the wrist (carpal tunnel syndrome)
 - Ulnar nerve at the wrist (Guyon's canal syndrome)

Differential diagnosis, continued:

- Musculoskeletal causes:
- Flexor tenosynovitis of wrist tendons or thumb tendon
 - Non specific wrist pain
 - Extensor tenosynovitis (6 dorsal compartments)
 - Carpometacarpal joint arthritis (base of thumb)
 - Scaphoid osteonecrosis or fracture

Associated systemic conditions

- Hypothyroidism (myxedema)
- Pregnancy-related (edema)
- Diabetes mellitus (frequent association)
- Acromegaly (rare)
- Familial: occurs in multiple family members (genetic)

- Acute carpal tunnel syndrome:
- Related to fracture of wrist with swelling causing rapid onset

Diagnostic Testing

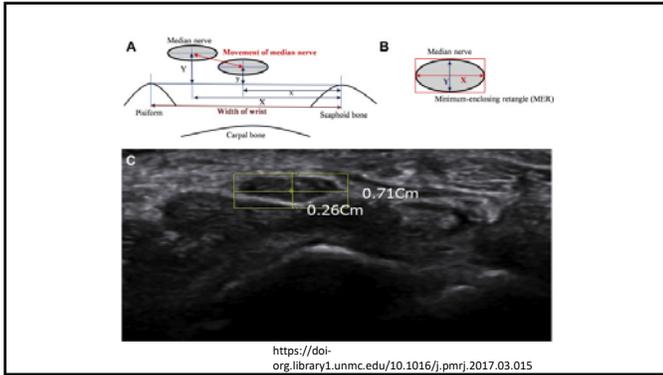
- History and physical examination are always most important methods to start

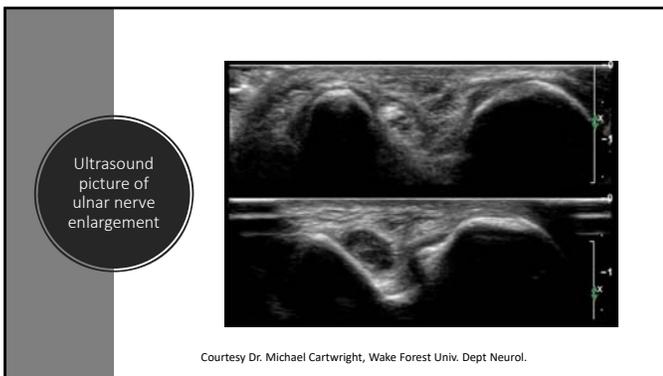
- Physicians must diagnose carpal tunnel syndrome because there are many other possible causes for pain or numbness/tingling in the upper extremity.

Diagnostic Testing

- Electrodiagnostic testing:
- Nerve conduction studies
- Needle EMG examination of the arm and hand muscles

- Purpose of EDX testing:
- Define severity of carpal tunnel entrapment
- Look for other causes such as ulnar neuropathy, cervical radiculopathy, brachial plexopathy.





Treatment Options

- Treatment non surgical:
 - Wrist splinting at nighttime for 3-6 months
 - Injection of corticosteroids into the carpal tunnel
- Treatment surgical:
 - Open carpal tunnel release
 - Endoscopic carpal tunnel release

Surgical choices

- Orthopaedic hand surgeons
- Neurosurgeons
- Both groups have experience with carpal tunnel surgery and can get equally good results.
- Most studies show 95% success with surgical decompression.

Which would a hand therapist choose?

- Methods: Five hundred twelve CHTs were surveyed regarding their experience, volume, and referral base along with their subjective assessments and preferences regarding open versus endoscopic carpal tunnel release (CTR). Results: The average CHT surveyed had 15.2 years experience and had a referral base of 7.7 different hand surgeons.
- Twenty-seven percent of respondents perceived superior pain control and incisional tenderness following open CTR compared to that of endoscopic CTR. However, 68% of CHTs would elect to undergo an open CTR themselves.

Schreiber, J.J., Clark, S. & Yao, J. HSS JrnI (2018) 14: 29.
<https://doi-org.library1.unmc.edu/10.1007/s11420-017-9569-1>

Does nerve mobilization work?

- The findings from this review described 3 techniques of median nerve mobilization in the CTS literature. Different approaches to median nerve mobilization appear to affect treatment outcomes differently.
- However, there is insufficient evidence to determine the comparative effectiveness of each mobilization technique in relation to control or comparison interventions. Future research must address the noted methodological issues in the current body of research if we are to understand the true effectiveness of median nerve mobilization in the treatment of CTS.

<https://doi-org.library1.unmc.edu/10.1016/j.jht.2017.06.019>

Results

Table 3 Between-group analyses

Primary outcome	Repeated measurement ANOVA (between group)
VAS	0.399
Median DML	0.03
Inlet CSA	0.512
Boston	0.756

Note: Bold variable represents a significant difference between groups after treatment.

Abbreviations: ANOVA, analysis of variance; CSA, cross-sectional area; DML, distal motor latency; VAS, visual analog scale.

Dutch study of normal EDX and clinical symptoms of CTS: randomized trial

- The aim of this study was to determine whether this category of patients will benefit from surgical treatment. 57 patients with clinically defined CTS and normal EDX were randomized for surgical treatment (n = 39) or non-surgical treatment (n = 18). A six-point scale for perceived improvement as well as the Boston Carpal Tunnel Questionnaire was completed at baseline and at follow-up after 6 months.
- A significant improvement of complaints was reported by 70.0% of the surgically treated patients and 39.4% reported full recovery 6 months after surgery. Furthermore, both Functional Status Score and Symptom Severity Score improved significantly more in the surgically treated group ($p = 0.036$ and $p < 0.001$, respectively). This study demonstrates that most patients with clinically defined CTS and normal EDX results will benefit from carpal tunnel release. Therefore, this group of CTS patients must not a priori be refrained from surgery.

De Kleermaeker, F.G.C.M., Meulstee, J., Claes, F. et al. J Neurool (2017) 264: 2394. <https://doi.org.library1.unmc.edu/10.1007/s00415-017-8637-2>

Neurophysiological recovery 5 years after carpal tunnel release in patients with diabetes.

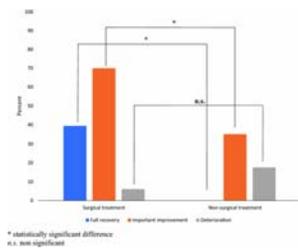
- Question is whether persons with diabetes and diabetic peripheral nerve disease will benefit from surgical decompression?

Neurophysiological recovery 5 years after carpal tunnel release in patients with diabetes.

- Outcome Measures
- The primary outcome was change of neurophysiological parameters from baseline to 5 years after carpal tunnel release. Secondary outcomes were difference in neurophysiological improvement between patients with and without diabetes and neurophysiological status at 5 years.

Thomsen, N. O.B., Andersson, G. S., Björk, J. and Dahlin, L. B. (2017), Neurophysiological recovery 5 years after carpal tunnel release in patients with diabetes. *Muscle Nerve*, 56: E59–E64. doi:10.1002/mus.25633

Results



Smokers have worse outcome after CTR

- Erik Dahlin, Malin Zimmerman, Anders Björkman, Niels O.B. Thomsen, Gert S. Andersson & Lars B. Dahlin
- [Journal of Plastic Surgery and Hand Surgery](#) Vol. 51, Iss. 5, 2017
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Journal of Plastic Surgery and Hand Surgery Vol. 51, Issue 5, 2017

Table 3. Logistic regression of hands with carpal tunnel syndrome (CTS) treated with open carpal tunnel release.

	Change in QuickDASH total score *#	Postoperative QuickDASH score >#
	OR	OR
Smoking	1.61 (0.98–2.62)	2.40 [1.42–4.06]b
Model 1	1.63 (0.99–2.75)	2.31 [1.33–4.03]a
Model 2§	1.82 (0.93–3.57)	2.47 (1.11–5.50)
SNAP middle fingers	1.05 (1.00–1.10)	1.03 (0.99–1.08)
Model 1	1.06 (1.00–1.11)	1.04 (0.99–1.10)
Model 2	1.01 (0.94–1.08)	1.02 (0.95–1.10)
SCV median nerve at wrist level§	1.02 (1.00–1.04)	1.01 (0.99–1.03)
Model 1	1.02 (1.00–1.05)	1.01 (0.99–1.04)
Model 2	1.02 (0.99–1.05)	1.00 (0.98–1.04)
