

Peripheral Nerve: Pearls for Boards
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INJURY

Timing of Reconstruction: Rules of 3's + 1

- < 3 days – sharp injury, presumed laceration or transection (STAB WOUND)
If patient presents later, then operate at the time of initial evaluation
- 3 weeks – blunt or jagged transaction, rupture (e.g., propeller blade). Controversial.
Some prefer tagging ends on tension (operation 1 – immediately after injury) so that they don't retract. Better ability to delineate zone of injury subacutely at operation 2 – approximately 3 weeks later.
Others prefer doing definitive operation immediately after injury and making a decision about zone of injury based on intraoperative appearance.
- 3 – 6 months – closed injury, stretch and GSWs (note most GSW's do not transect nerve).
If no clinical/electrophysiological improvement. Explore and perform nerve action potential (NAP) recordings (see below)
- 1 year – secondary surgery/reconstruction (e.g., other procedures, such as tendon transfers or fusions). Nerve (primary) surgery works best done by 6 months, but does not work well after 9 months and especially after 1 year.

Options/Techniques

Neurolysis – circumferential dissection of nerve. Done as first part of procedure. If an NAP is obtained across a neuroma in continuity, neurolysis alone is performed. 90% of patients obtain favorable outcome at long-term f/u.

Nerve repair – direct repair performed to approximate nerve ends after transection or after focal neuroma resected (in the setting of an absent NAP). Mobilize stumps to obtain end to end repair if possible without tension. Techniques to shorten nerve gap: mobilize nerve ends by freeing up proximally and distally; transposition of nerve to make a straighter line (such as for ulnar or radial nerves); flex joint gently and immobilize postoperatively in that position if necessary for several weeks. Early repair facilitates direct repair. Align fascicles as best as possible. Several fascicular or epineurial sutures using microsurgical technique. 8-0 to 10-0 suture. Immobilize for 3 weeks postoperatively to protect suture line. Results with nerve repair (1 suture line) are better than with nerve grafting (2 suture lines).

Nerve grafting – if a gap exists: after stump retraction (following delay in treatment of transection/rupture) or after resection of a more lengthy neuroma in continuity (absent NAP). Resect neuroma back to normal nerve ends and good fascicular structure. Estimate gap between stumps. Estimate number of cable grafts needed to fill face of nerve (s). Harvest appropriate estimation of sural nerve from leg. Be generous with nerve harvest. Err on taking more. Nerve shrinks. Avoid tension in repair. Sometimes need or want an extra cable graft. Make incision in posterolateral leg obliquely from ankle to popliteal fossa as necessary. Nerve is identified midway between lateral

Ulnar nerve entrapment at elbow – elbow pain radiating into ulnar 2 digits of hand. Symptoms often worse with elbow flexion. Sensory abnormality on palmar (ulnar 1 ½ digits) and dorsoulnar aspect of hand (dorsal cutaneous branch arises 6 cm above wrist); weakness in extrinsic (forearm) and intrinsic (hand) ulnar-innervated muscles. Tinel’s sign at elbow; positive elbow flexion test. Negative Spurling’s sign. Negative thoracic outlet maneuvers. Confirmatory EMG/NCS.

Surgery – in situ decompression vs. transposition. Recently published studies show no significant differences in outcomes for primary cases; transposition has higher complications (infection, hematoma). Submuscular transposition generally performed for secondary cases.

Ulnar nerve entrapment at wrist – wrist pain radiating into ulnar digits of hand. Symptoms worse with wrist flexion (note cyclists, mechanics, e.g.). Presentations may include affect deep branch only producing isolated motor findings (NOTE – MAJOR DIFFERENTIAL DX WOULD BE amyotrophic lateral sclerosis. Know about ALS! (UMN AND LMN lesion); superficial branch only producing sensory symptoms only; or parent ulnar nerve producing motor and sensory symptoms. Sensory abnormality only on palmar side, not dorsally. Extrinsic muscles (flexor carpi ulnaris and flexor digitorum profundus to little and ring fingers) are normal clinically and electrophysiologically. EMG helpful in localizing and ruling out other pathology. MRI may reveal mass lesion.

Also distinguish ulnar nerve pathology from TOS (symptomatic and neurogenic forms) and Pancoast tumors as well as C8 or T1 radiculopathies.

Key point about peroneal nerve palsy:

Foot drop – know how to distinguish L5 radiculopathy vs. peroneal nerve palsy. Test posterior tibialis - have pt position foot down and in (innervated by L5, tibial nerve). If posterior tibialis is abnormal, then foot drop is not from peroneal nerve palsy. Short head of biceps is only peroneal-innervated muscle above fibular head/neck region. EMG it to help localize peroneal nerve lesions.

Unusual ones (except on boards)

Anterior Interosseous Nerve (AIN) Syndrome – weakness of flexor pollicis longus, flexor digitorum profundus (index and middle fingers), pronator quadratus. No cutaneous innervation. Can not make an “O” sign resulting in a “square pinch”

Posterior Interosseous Nerve (PIN) Syndrome – wrist can dorsiflex strongly in radial deviation. Can not dorsiflex in neutral position because of lack of extensor carpi ulnaris. Finger drop. No sensory loss.

(CONTRAST PIN palsy at arcade of Frohse in proximal forearm from wrist and finger drop characteristic of a radial nerve palsy from Saturday night palsy occurring at spiral groove in mid-arm level. In typical radial nerve palsy, normal triceps strength).

Suprascapular nerve entrapment – weakness of supraspinatus (shoulder abduction) and infraspinatus (external rotation) at transverse scapular ligament. MRI may show ganglion cyst from shoulder joint. Differential diagnosis – C5 radiculopathy, rotator cuff pathology.

NERVE IMAGING

Image nerves at unusual sites of compression (localized clinically, such as with percussion tenderness) to rule out undiagnosed mass lesion with high resolution ultrasound (US) or MRI.