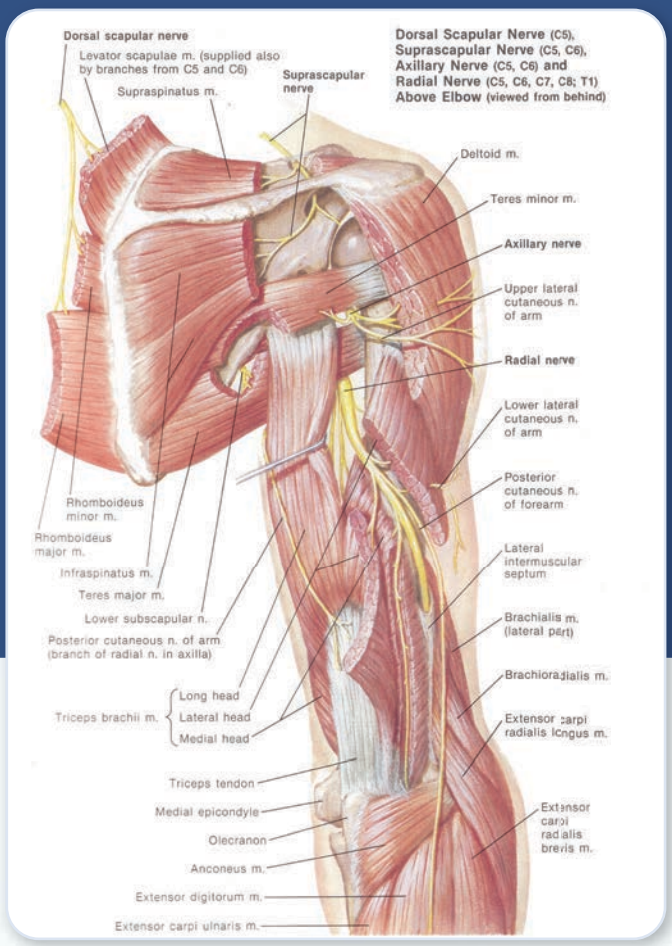
EMG LABORATORY
"COMMITTED TO EXCELLENCE IN NEURODIAGNOSTICS"

DRASKO SIMOVIC, M.D.

Radial Nerve Mononeuropathy

The radial nerve (RN) is derived from the posterior cord of the brachial plexus, primarily from the spinal nerve roots of C5 to T1. It travels along the posterior aspect of the arm and forearm. At the elbow, the radial nerve enters the cubital fossa and travels in the radial groove of the humerus. The nerve then continues its course, passing between the brachialis and brachioradialis muscles. Finally, the radial nerve divides into its superficial and deep branches in the distal forearm. The two main branches of particular interest are; the posterior interosseous nerve (PIN) and the superficial radial sensory nerve (RSN).



Common Etiology & Symptoms

RN trauma

Since RN runs deep inside the upper arm, fracture of the humerus shaft is the most common cause of radial nerve palsy. It is found in about 12 to 20 percent of all cases of humeral shaft fractures. Symptoms may include difficulty extending the elbow, wrist, and fingers with a loss of sensation along the back of the arm, forearm, and hand. The thumb, index finger, and middle finger may be particularly affected. Wrist drop and fingers extension weakness is a characteristic of RN injury.

External RN compression

Direct pressure on the RN in the upper arm can occur in "Saturday night palsy" or "Honeymoon palsy." These conditions arise if an inebriated person falls asleep with their arm hanging, or honeymoon palsy occurs due to overnight pressure from one person's head compressing the other person's radial nerve. Symptoms depend on the duration and severity of compression and may cause weakness in elbow flexion, wrist drop, and sensory changes in the dorsolateral hand and forearm. Other issues with similar signs and symptoms include "spiral groove syndrome."

PIN entrapment or supinator syndrome

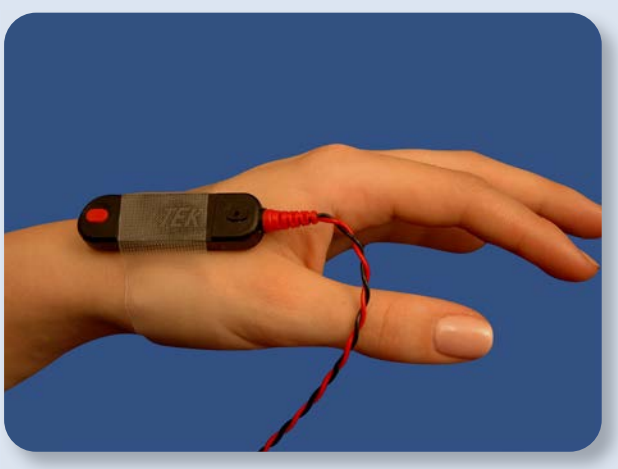
The PIN can become entrapped at the level of the supinator muscle at the Arcade of Frohse. This can be related to excessive supination or pronation and is more common in tennis players, violinists, and swimmers. It presents with painless wrist and finger drop with wrist extension weakness, but radial wrist extension and sensation are spared. PIN compression may also occur due to rheumatoid arthritis.

Superficial RSN compression

Compression of the superficial radial sensory nerve at the wrist is also variably termed "Handcuff palsy" or Wartenberg Syndrome. These conditions occur due to compressions, like tight handcuffs, fractures, lacerations, peripheral IV placements, or wristwatch bands. Only sensory symptoms, such as numbness and paresthesias in the dorsolateral hand, will be produced if the RSN is affected.

Diagnostic approach

Physical examination and functional tests demonstrate motor and sensory changes characteristic of RN injury or injury to its branches like a PIN or superficial RSN like wrist drop, fingers extension weakness, or impaired sensation over the dorsal radial aspect of the hand.



CAPE COD
51 Main Street #6
Hyannis, MA 02601
Tel: 508-775-2600

DRASKO SIMOVIC, M.D.
Board Certified in: Neurology, Clinical Neurophysiology, Electrodiagnostic Medicine, Disability Analysis

LAWRENCE
25 Marston Street #208
Lawrence, MA 01841
Tel: 978-687-2586

Role of Electrodiagnostic Testing

Electrodiagnostic testing can help localize the lesion and help with prognosis as well as to differentiate a radial neuropathy from other diagnostic possibilities. Common differential diagnoses include C7 radiculopathy, posterior cord/ plexus lesion, or central causes.

Spiral groove:

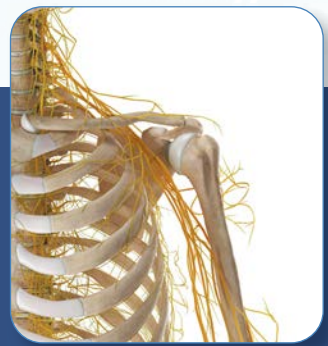
- Conduction block across the spiral groove if demyelinating lesion, decreased Extensor Indicis Proprius (EIP) CMAP if axonal loss.
- Reduced superficial radial nerve SNAP amplitude.
- Abnormal spontaneous activity and neurogenic findings in the RN distribution excluding the triceps and anconeus.

PIN syndrome:

- Conduction block across the elbow if demyelinating lesion, decreased EIP CMAP if axonal loss
- Normal superficial radial nerve SNAP amplitude.
- Abnormal spontaneous activity and neurogenic findings in the PIN distribution.

Wrist:

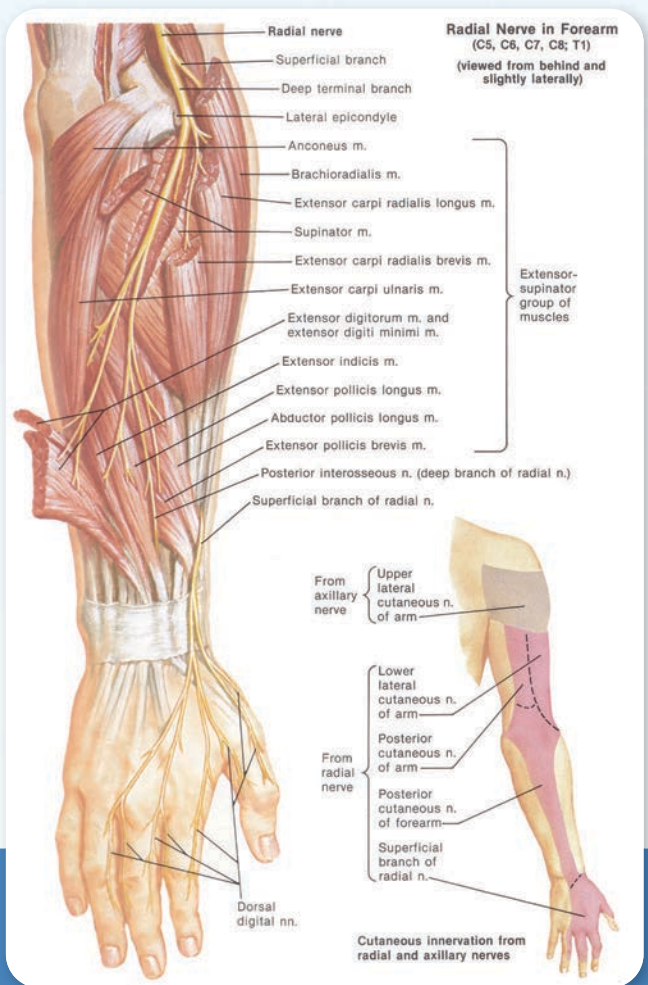
- Normal CMAP
- Decreased/ abnormal superficial radial SNAP
- Normal EMG findings



Outcomes & prognosis

Quick localization of lesions using EMG and prompt conservative or surgical treatment may also influence outcomes.

- **Neurapraxia:** normal function is regained in the majority of cases, usually in 2-8 weeks.
- **Axonotmesis:** recovery will generally take longer, but recovery is excellent in most cases. Regrowth of axons, if it occurs, happens at a rate of about 1 mm per day.
- **Neurotmesis:** with discontinuity of the axon and surrounding connective tissue, there is poor recovery, even with surgical repair.



Treatment approach

RN trauma secondary to humeral fracture:
If the fracture is closed, conservative treatment for 6-12 weeks may help. However, early nerve exploratory surgery might be required in the case of an open fracture. If the patient does not recover after a few months, revision surgery would be needed to identify the site of nerve compression, followed by surgical correction or re-anastomosis, if needed.

Saturday night palsy/Honeymoon palsy/Spiral groove syndrome:
Choice treatment is conservative. However, in the absence of recovery, exploratory surgery would be needed.

PIN entrapment or supinator syndrome:
In most cases, patients would benefit from prolonged conservative treatment, including rest, stretching, splinting, and NSAIDs. If compression is ruled out, then one may also consider local lidocaine/steroid injections. If conservative treatment for months fails, exploratory surgery may be considered.

Distal RSN lesion:
Most patients would benefit from conservative treatment. A thump spica splinting trial may be initiated. Rest, activity modification, stretching, splinting, and NSAIDs can help in most instances.

Radial tunnel syndrome:
Prolonged conservative treatment is indicated. If pain does not resolve after 12 weeks, surgery may be chosen.

Literature:

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EMG Laboratory
Drasko Simovic, M.D.
Lawrence: 978-687-2486
Hyannis: 978-775-2600
www.emglaboratory.com
Comments or suggestions?
info@emglaboratory.com