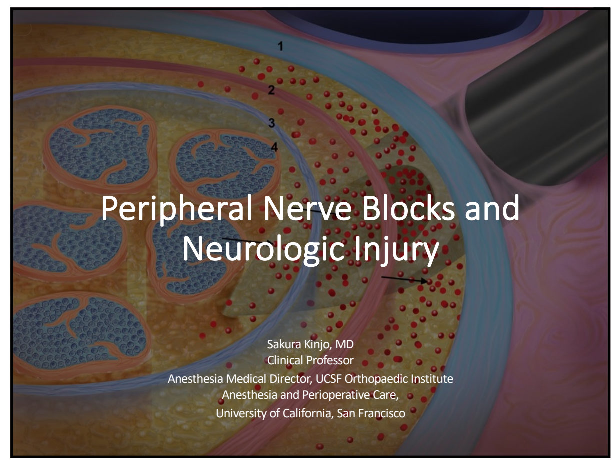

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Disclosures

None.

2

Objectives

- Describe the typical causes of peripheral nerve injury (PNI)
- Describe the risk factors and preventative measures of PNI
- Describe how to assess and manage PNI

3

A surgeon's email says…

"I have a patient that has developed what seems to be a nerve injury related to a nerve block. Can you please take a look and let me know what you would recommend?"

4

A 40-year-old woman presented for a left ACL reconstruction

PMHx: Asthma, depression/anxiety

PSHx: Endometriosis s/p hysterectomy, chronic back pain with left L5/S1 radiculopathy s/p microdiscectomy (2020), s/p breast surgery complicated with MRSA infection, implant removal (2021), developed chronic pain in her chest.

Anesthesia & surgery: GA and femoral and sciatic blocks. No tourniquet.

POD3: Severe pain, numbness, tingling, and increased swelling of her left leg.

PE: Decreased sensation below the knee. Motor intact.

5

Neurologic complications after PNB are NOT necessarily from a PNB

Postoperative Neurologic Symptoms (PONS)

Short Term Neurologic Symptoms…Common

Incidence of PNI after nerve block is RARE (1.5-4/10,000)

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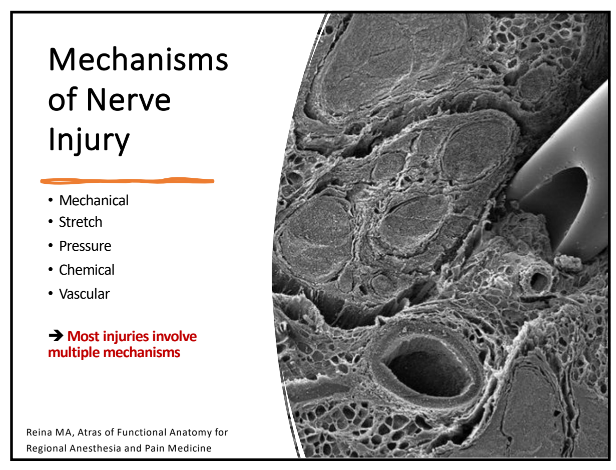

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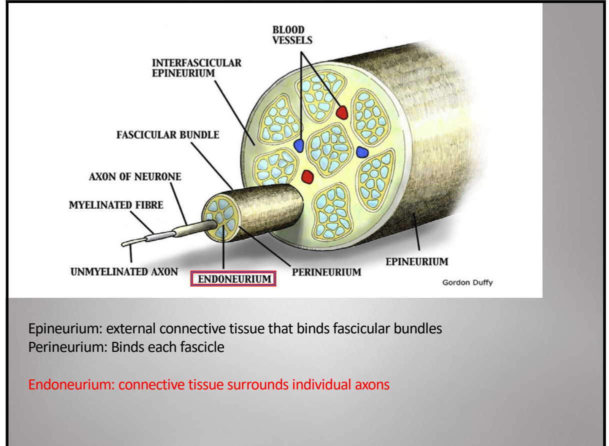

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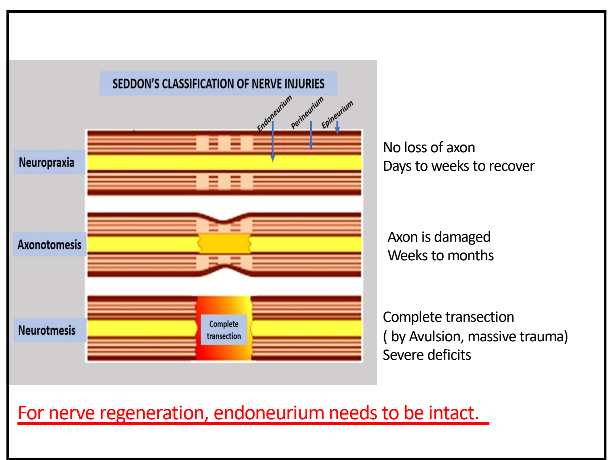

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Perioperative Neurologic Injury is Multifactorial

- Pre-operatively—nerve block, pre-existing pathology
- Intra-operatively—surgical injury, positioning, tourniquet injury
- Post-operatively—bandage/cast too tight, hematoma

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Risk Factors: Patient Characteristics

- Pre-existing neuropathies
- Peripheral vascular disease
- Smoking
- Hypertension
- Obesity

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Postsurgical Inflammatory Neuropathy

- Immune mediated response to surgery.
- Symptoms outside of the expected surgery, intense pain, weakness.
- Within 30 days of surgery.
- Dx: Nerve biopsy.
- Tx: Steroids, IVIG.

A

Staff NP et al. Brain 2010.133;2866-2880

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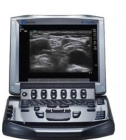
Prevention:
Does Regional Anesthesia Technique Matter?



No Difference

Non-Specific

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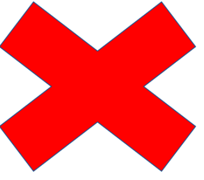
Prevention: Do NOT do this…

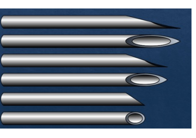


1. Intraneural injection

Needle should not go inside of endoneurium or perineurium, or even epineurium.

2. Do not use long bevel needle

3. Do not inject if you encounter high pressure



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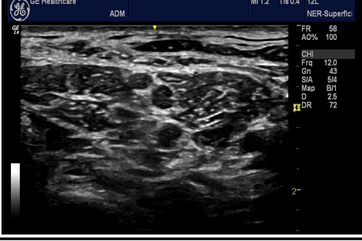
Prevention - Do NOT do this…

- **Interscalene block:** avoid intraplexus injection, do not pierce long thoracic nerve, dorsal scapular, and phrenic nerve. Always confirm the location of vessels with color doppler.



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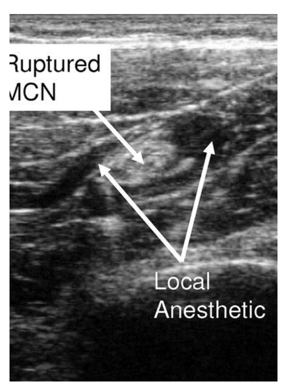
Assessment/Diagnosis

- **Electrophysiological studies**: electromyography (EMG) and nerve conduction studies (NCS) can help determine the site, severity, and chronicity of the injury and monitor for nerve recovery.
- **MR neurogram**: can indicate the site and severity of the injury (lower sensitivity for milder forms of nerve injury (neuropraxia).
- **Ultrasound**: looks for hypoechoic, nerve swelling, neural interruptions and compressions.



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Timing of Electrophysiology Studies

- <2 weeks: NCS may be useful if there is a question about whether early surgical nerve repair is necessary
- **>3 weeks**: Waiting at least 3 weeks will allow the site of the pathophysiology to be localized according to the pattern of EMG denervation.

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Management

Assess urgency

New onset of neurologic deficits, block lasting longer than anticipated. Severe pain, motor function affected, symptoms progressively worse

Consultation

- Peripheral nerve expert: surgeon (e.g., neuro, ortho, plastic) and neurologist.
- Chronic pain physician

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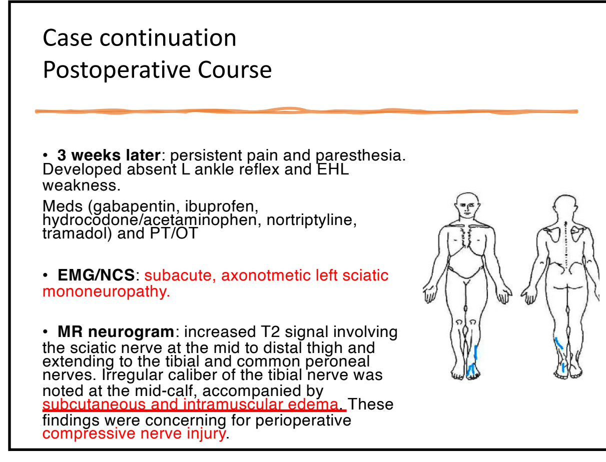

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CRPS Type2

Meds) gabapentin,nortriptyline, lidocaine cream, vitamin C and fish oil.

PT/OT, cognitive behavior therapy, TENS unit.

6 weeks: Decompression Surgery

EHL signal to electrical stimulation that recovered during surgery

4 months: PO steroid, lumbar sympathetic block (not effective).

6 months: temporal peripheral nerve stimulator (80% effective for pain, improvement in ankle strength)

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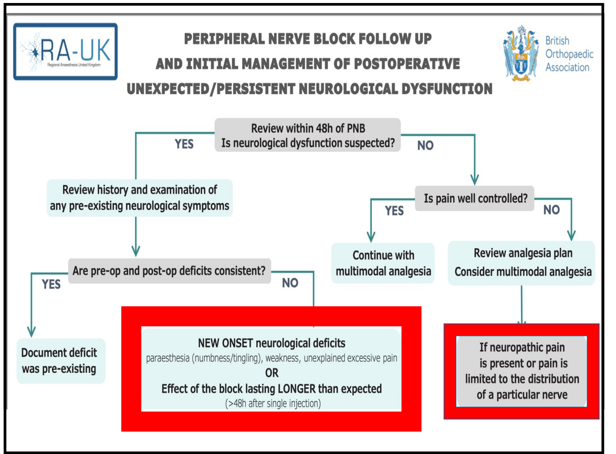

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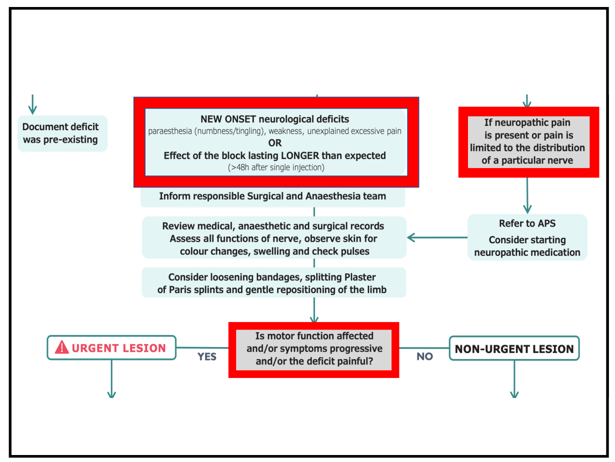

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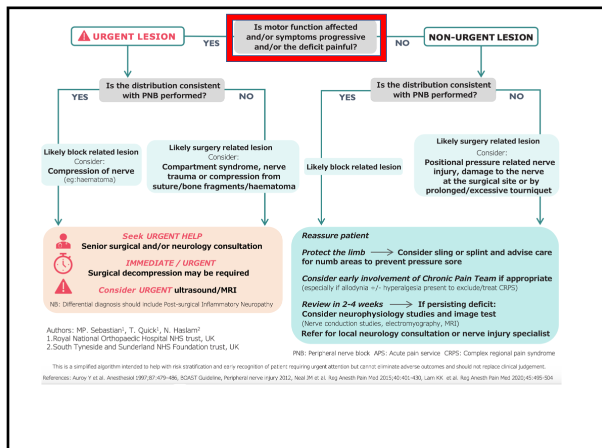

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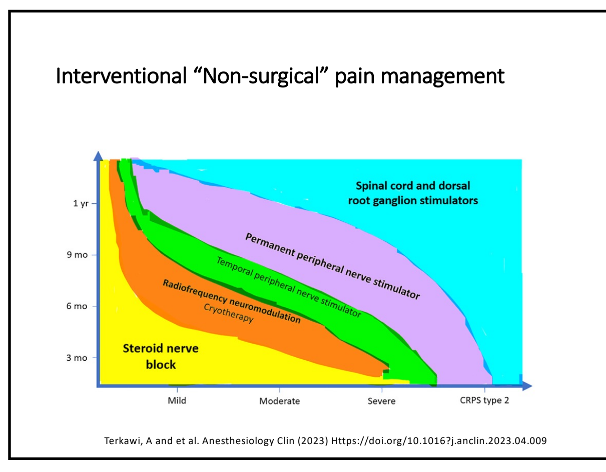

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Summary

- **Etiology:** Though nerve injury is a potential complication of peripheral nerve blockade, the majority of PNIs are due to other causes.
  Actual discrimination between surgical, anesthetic and patient factors is often difficult.
- **Prevention:** Avoid intraneural injection, use short bevel needle. Be vigilant about patient positioning and tourniquet time, check cast.
- **Assessment:** Monitoring of symptoms, patient counselling, MR neurogram and EMG/NCS.
- **Management:** In severe cases, early consultation to peripheral nerve specialists is important.

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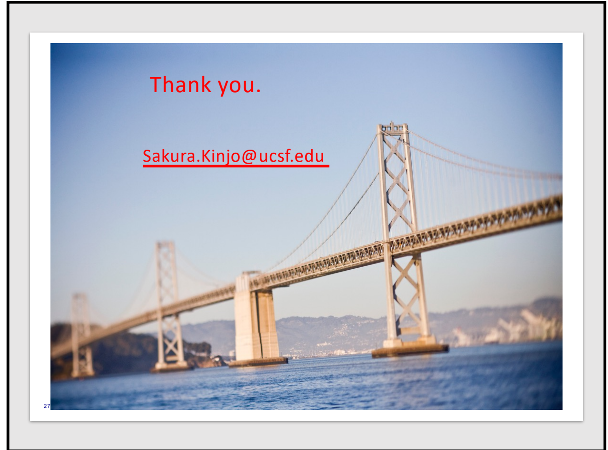

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