

# How to Manage Neurologic Complications Associated With Ambulatory Surgery

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## Disclaimer

I have no relationship with any company that advocates injuring nerves

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## Learning Objectives

- Choose reasonable investigations and treatments as necessary
- Choose subspecialty assistance as necessary
- Choose reasonable timelines for recovery

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## Case Presentation

- A previously healthy 44 year old male is scheduled for rotator cuff repair under GA with interscalene catheter which is placed preoperatively uneventfully under US guidance. After the catheter is removed he reports residual numbness on the lateral arm and forearm. There is no motor deficit.
- What are your suggestions for investigations/management?

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## Case Presentation

- Neurology consult?
- Nerve conduction studies/EMG?
- MRI?

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## See the Patient

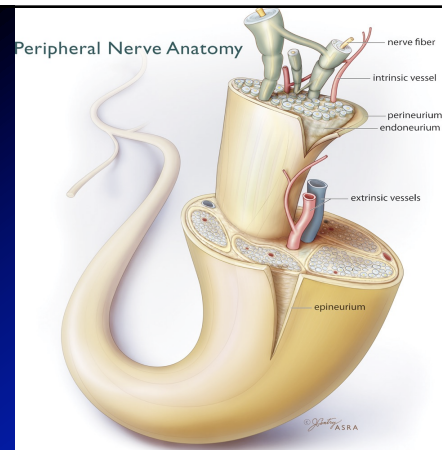
- If the patient calls with a neurologic concern arrange for a convenient time to assess the patient (?early surgical followup appointment)
- If the patient is seeing the surgeon in the clinic have someone break you to assess the patient. If you are away have a regional colleague assess the patient for you and follow up yourself later
- Followup by YOURSELF is ESSENTIAL

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## Seddon Classification of Peripheral Nerve Injuries

- Neuropraxia-demyelination with axon intact-most mild injury-expectant full recovery
- Axonotmesis-axonal degeneration-slow but significant recovery
- Neurotmesis-disruption of nerve-no recovery possible unless nerve continuity reestablished

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“The vast majority of neural injuries associated with surgery are transient. Most injuries result from a short list of causes such as direct nerve trauma, positioning, stretch, retraction or compression from hematoma or dressings”

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Has the Introduction of  
Ultrasound Guided regional  
Anesthesia Impacted  
Complications Associated with  
Regional Anesthesia Practice?

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LAST - YES – less LA  
Administered

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Neurologic Injury - NO

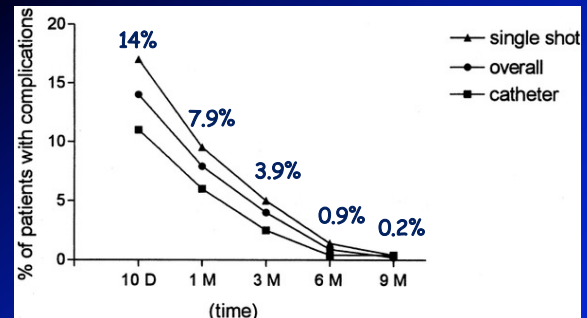
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## Neurologic Abnormalities after ISB for Shoulder Surgery

- Very common-up to 14% initially (Borgeat)
- Consensus with minor sensory abnormalities is expectant observation for gradual resolution. No investigations are recommended. No treatment affects convalescence

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## Acute and nonacute complications associated with interscalene block and shoulder surgery. A prospective study.

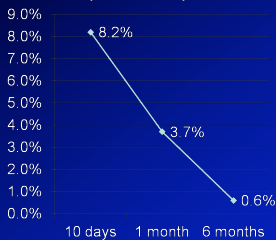


Borgeat A, Ekatothramis G, Kalberer F, Benz C. Anesthesiology 2001;95:875-880.

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## Neurological complication analysis of 1000 ultrasound guided peripheral nerve blocks for elective orthopaedic surgery: a prospective study.

### New Neurological Symptoms (All Causes)



- Ultrasound guided
- 6 months: 6/1010 patients (0.6%)
- 2/1010 possibly related to PNB (could not rule out)

Fredrickson M.J, Kilfoyle D.H. Anaesthesia 2009;64:836-844.

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## Evaluation of Nerve Injury

- Clinical examination
- EMG
- Nerve conduction studies
- MRI neuroradiography
- High resolution ultrasound in appropriate cases ( suspected superficial lesions)

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## Electromyography

- Measures muscle electrical activity at rest and after stimulation
- Normal innervated muscle is silent at rest
- Denervated muscle develops spontaneous fibrillatory activity after 2 weeks
- Reinnervation restores normal electrical activity ( activity recurs prior to function )

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## Nerve Conduction Studies

- Diagnose focal and generalized disorders of peripheral nerves
- Aid in differentiation of primary nerve and muscle disorders
- Classify nerve conduction abnormalities due to axonal degeneration, demyelination, and conduction block
- Prognosticate regarding clinical course

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## Nerve Conduction Studies

- Different nerves have different latencies, amplitudes, and conduction velocities
- Normal values relating to specific nerves and age have been derived.

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## Nerve Conduction Studies

- Axonal degeneration usually manifests as decreased amplitude
- Demyelination usually manifests as reduced conduction velocity

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## Case Presentation

- Same patient however after removal of catheter has significant motor/sensory deficit
- What are current consensus recommendations?

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## Case Presentation

- Urgent assessment of the patient to R/O treatable factors such as hematoma, entrapment by sutures, tight cast (other orthopedic procedures)
- Immediate candid conversation with surgeon regarding any possible surgical intervention that may have contributed to the deficit eg retraction, difficult repair etc
- Consider MRI to define treatable etiologies

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## Case Presentation

- Neurologic consultation for examination, ordering and interpretation of investigations such as nerve conduction studies and EMG (good both diagnostically and prognostically)
- Patient centered team approach with surgeon, anesthesiologist, neurologist, physical therapy specialist and others as needed

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**What is recommended if there is no evidence of resolution of the major deficit after 3 months?**

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If no evidence of resolution is present after 3 months consideration for referral to a peripheral nerve surgeon is recommended

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What do you do if your patient has a minor deficit which significantly increases after a few weeks?

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### Postsurgical Inflammatory Neuropathy (PSIN)

- Probable autoimmune reaction which involves nerves
- Consensus recommends urgent neurologic consultation
- Neurologists often initiate high dose antiinflammatory treatment ( steroids) as well as possible immunoglobins
- No firm evidence of efficacy
- Fortunately usually resolves

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### Prognosis of neurologic injury

- Majority resolve
- With axonotmesis rate of recovery depends on length of nerve involved-recovery 1 mm/day
- It is essential for the patient to understand this-discuss analogies.
- If necessary EMG followup will show evidence of reinnervation

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What does RG recommend?

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### Own the Patient

- YOU are the best patient advocate to liase with the patient and address any/all concerns. Maintain regular scheduled contact with the patient. Be honest and respectful. The vast majority of lesions will improve/resolve. The patient will be grateful for your involvement/reassurance.
- DON'T defer to others regardless of their subspecialty experience

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### Chose a Regional Anesthesia Friendly Neurologist

- A neurologist should appropriately diagnose the deficit, appropriately choose and interpret investigations, and appropriately recommend followup/investigations commensurate with recovery eg further EMG's of little benefit if significant recovery is progressing
- Neurologists should NOT overtly speculate on cause outside their area of expertise

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### Blame Games with the Surgeon Are Never Positive

- The patient is a shared responsibility and care should be focused on recovery. Many instances of neurologic abnormality previously ascribed to anesthesia have been demonstrated to be compression or stretch injuries caused by surgical manipulation (MRI neurography)
- Work as a team to support the patients convalescence

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### Summary

- Choose appropriate followup/investigations/consultations commensurate with the initial neurologic presentation
- Be the respectful, compassionate team leader for the patient. The patient will be grateful for this.
- Blame games are irresponsible and have no place in the practice of medicine

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