

NEUROLOGIC SEQUELAE FOLLOWING REGIONAL ANESTHESIA

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Neurologic sequelae of anesthesia are becoming an increasing medicolegal problem.¹⁻⁵ Each regional technique has a unique set of potential risks and complications. Complications can arise as a result of medication or dosage errors, poor patient selection, or poor block technique. These complications include local anesthetic toxicity, neurologic trauma, compression injuries, and total spinal anesthesia. Numerous factors may contribute to perioperative nerve injury, and prevention is sometimes difficult. Nerve injuries after regional anesthesia are not always identified early in the postoperative period, often leaving doubt as to their possible cause. The incidence of nerve injury after regional anesthesia is very low, reported in about 0.1% of regional anesthesia cases.¹ Most of these problems are transient; the incidence of permanent injury is 0.02%.² It is important to understand these sequelae in order to obtain informed consent from the patient and to help prevent their occurrence.

- A. The first important evaluation occurs during the preoperative visit. Perform a thorough neurologic examination on patients with a history of neurologic problems (e.g., TIAs, RINDs, multiple sclerosis, polio, peripheral nerve deficit) and document all deficits. Any postoperative neurologic sequelae may in fact be due to the natural progression of a disease and not the result of surgery or anesthesia. After neurologic status is established preoperatively, obtain informed consent.
- B. There are many possible causes of postoperative neurologic sequelae: anesthetic, surgical, or underlying disease process. All of these must be included in the differential diagnosis. Most postregional anesthetic deficits are unrelated to the anesthetic, although regional techniques are often suspect as the cause of the injury. Allergic reactions to local anesthetics are rare (less than 1% of toxic reactions). Systemic effects of local anesthetics account for the vast majority of toxic reactions, usually caused by accidental IV or intraarterial injection. Neurologic signs and symptoms of systemic toxicity include perioral numbness or tingling, auditory and visual disturbances, flushing, and lightheadedness. Twitching, grand mal seizures, coma, and death are extreme manifestations of systemic toxicity.

Permanent neurologic injury can be caused by trauma, chemicals, ischemia, compression, and infection.⁶ A nerve can be traumatized by a needle or by an intraneural drug injection. A needle will elicit a paresthesia or pain; an intraneural injection will elicit pain. Do not inject during a paresthesia; rather, reposition

the needle slightly to relieve the paresthesia before injecting. Chemical neurologic injury can occur. Detergents, preservatives, and neurolytic agents act as irritants and may induce meningeal or arachnoid inflammatory responses. Verify that the local anesthetic you are using is appropriate, use preservative-free solution, keep equipment free of contaminants, and double-check the medication before injection. Compression injuries result from improper patient positioning, hematomas, or injection of large volumes of anesthetic into a relatively noncompliant space. Bacterial infection can occur whenever the integrity of the skin is broken and is a risk during any regional technique. Both hematoma formation and infection are of greatest concern when they occur in proximity to the spinal cord.

- C. When a deficit manifests itself, it is important for the patient to undergo an immediate and thorough neurologic examination, preferably performed by a neurologist or neurosurgeon. In general, the management of neurologic deficits includes maintenance of cardiorespiratory stability, careful observation and serial neurologic examination, clinical chemistry, hematology, and blood drug levels if indicated, and a detailed review of the patient's chart.³ Further evaluation may include electromyography (EMG), nerve conduction velocity (NCV), CT, magnetic resonance imaging (MRI), or plain radiologic studies. EMG, if done early, may demonstrate a preexisting neural injury.⁴ Because most postregional anesthetic neurologic sequelae resolve spontaneously,¹ patients may be reassured of this expected outcome.

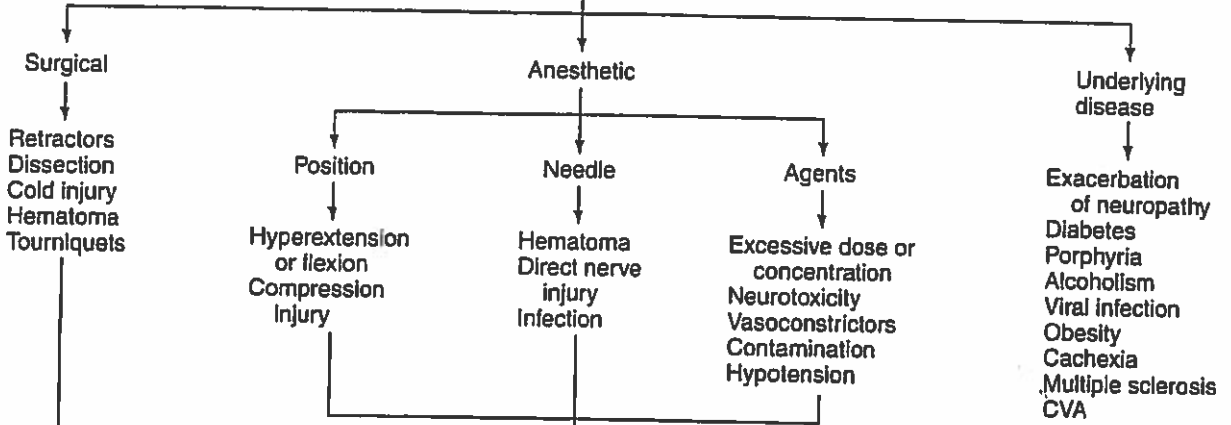
References

1. Thompson G. Perioperative nerve injuries. *Probl Anesth* 1987; 1:580.
2. Finucane BT. Regional anaesthesia: complications and techniques. *Can J Anaesth* 1991; 38:4:R3-R10.
3. Kafer E. Evaluation of neurologic problems following anesthesia. *Probl Anesth* 1987; 1:245.
4. Marinacci AA, Rand C. Electromyogram in peripheral nerve complications following general surgical procedures. *West J Surg* 1959; 67:199.
5. Kroll DA, Caplan RA, Posner K, et al. Nerve injury associated with anesthesia. *Anesthesiology* 1990; 73:202.
6. Shinsky CA. Complications of regional anesthesia. *CRNA* 1993; 4:170-175.

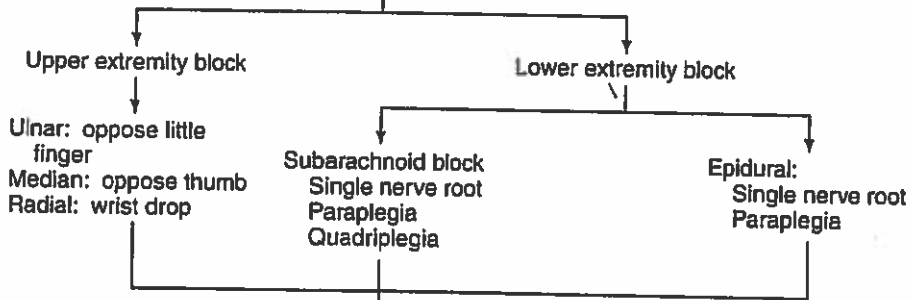
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(A) Clinical evaluation
 Document preexisting deficits
 Informed consent
 Incidence

(B) Possible causes of neurologic sequelae



Possible injuries from regional anesthesia



(C) Evaluation of nerve injury

