Editorial

Interscalene Block: The Truth About Twitches

Anethesia of the brachial plexus was first accomplished more than one century ago when surgeons (the first ‘‘regional anesthetists’’) dissected, then directly and separately injected the roots of the brachial plexus in the neck. Subsequently, percutaneous techniques for brachial plexus block that involved multiple separate injections of local anesthetic were described and practiced. Perhaps the most significant conceptual advance in brachial plexus anesthesia, both in terms of our scientific understanding as well as practical clinical application, can be attributed to Alon Winnie. Winnie promoted the concept of the brachial plexus as being enveloped by a fascial sheath. This conceptual sheath serves to isolate the plexus in a functional anatomical compartment. Based on this concept, he proposed that a single injection of local anesthetic anywhere along the tubular plexus sheath would result in successful brachial plexus anesthesia. The sheath concept paved the way for Winnie's original description of the interscalene technique of brachial plexus block in 1970. [1] Brachial plexus block thus became analogous to epidural anesthesia; i.e., once the compartment is entered, a single injection of an adequate volume of local anesthetic results in successful anesthesia in the vast majority of cases. The consistent objective for the anesthetist performing the block reduced simply to reliably ascertaining that the needle tip is within the confines of the brachial plexus sheath. Whereas this problem appears to be straightforward, traditional teaching has included misconceptions and myths with regard to which paresthesias or twitches are acceptable when performing interscalene blocks. Only recently have some misconceptions been disproved by careful clinical research.

Although often misreferenced to include the use of a nerve stimulator, Winnie's original technique of interscalene block was in fact a single paresthesia technique. In his writings, Winnie emphasized that ‘‘only a paresthesia *below* the level of the shoulder is acceptable, since a paresthesia to the shoulder could result from stimulation of the suprascapular nerve inside *or* outside the sheath.’’ [2] Regional anesthesia textbooks also recommended that shoulder paresthesias be ‘‘discarded’’ and that more distal paresthesias be sought.[2-5] Winnie's technique has since been modified following the advent of the use of a peripheral nerve stimulator to incorporate this useful aid.

Nigel Sharrock first promoted the acceptance of a shoulder paresthesia in clinical practice when performing interscalene block. He emphasized that nerve roots supplying sensory innervation to the shoulder were more superficial and, upon advancing the needle, were therefore more characteristically encountered earlier than were more distal paresthesias. Indeed, work in his department by Roch et al.[6] in 1992 reinforced his clinical experience; a shoulder paresthesia was the first paresthesia encountered in 45% of patients in this study of 45 patients who underwent interscalene block. These results indicated that a shoulder paresthesia was as effective as a more distal paresthesia. The investigators discussed that further needle probing in search of a distal paresthesia may increase patient discomfort and theoretically increase block-related neuropraxia.

Accepted for publication October 26, 1999.
doi:10.1053/rapm.2000.4402
See Silverstein et al. page 356
Regional Anesthesia and Pain Medicine, Vol 25, No 4 (July–August), 2000: pp 340–342 340.In this issue of *Regional Anesthesia and Pain Medicine,* Silverstein et al.[7] report on interscalene block with a peripheral nerve stimulator. In a prospective study of 160 patients, they found that a deltoid twitch was as successful an indicator of correct

needle placement within the brachial plexus as was a biceps twitch. They found that an isolated deltoid twitch was elicited in 34% of patients. These investigators also emphasized that acceptance of a deltoid twitch may result in less needle trauma and less patient discomfort.

The importance of careful clinical studies in regional anesthesia such as that performed by Silverstein et al. cannot be overemphasized. The practice of regional anesthesia has always been considered an art. However, it is crucial that the science of regional anesthesia is not ignored or sacrificed by the artist. A thorough understanding of the relevant anatomy as well as what actually occurs when we perform regional anesthesia despite long-held biases, improves our success and protects our patients.

By accepting a more proximal deltoid twitch or shoulder paresthesia, we are doing far more than reducing extra needle probing. The search for a more distal evidence of brachial plexus innervation by paresthesia or twitch may require the needle to pass through the more proximal nerve roots of C5 or C6 to reach C7, C8, or T1 (Fig 1). The nerve roots at the level of the cricoid cartilage (where interscalene block is typically performed) are narrowly stacked in a cephalocaudad orientation. Once this anatomy is understood, it can be readily appreciated that acceptance of evidence of more proximal innervation when performing intersca-lene block may in fact be preferable. This is especially true if the patient is sedated, as was the case in the study by Silverstein et al., where patients received up to 3 mg intravenous midazolam and up to 50 µg fentanyl.

In a study by Urmey et al.[8] on 20 unsedated patients undergoing interscalene block, a simple paresthesia technique was used. However, immediately after elicitation of the paresthesia, an attached peripheral nerve stimulator was turned

Fig 1. The search for a more distal evidence of brachial plexus innervation by paresthesia or twitch may require the needle to pass through the more proximal nerve roots of C5 or C6 to reach C7, C8, or T1.

on and the amperage slowly increased in 0.1-mA increments to 1 mA. Despite a 100% block success rate, only 25% of patients showed evidence of a twitch (2 deltoid, 2 arm, and 1 combined biceps/finger). Therefore, evidence of sensory nerve contact (paresthesia) and presence of the needle tip within the brachial plexus sheath (inferred from successful block) translated to ability to elicit a twitch in only 25% of patients. The first elicited paresthesia was to the shoulder in 85% of patients in this study. The authors concluded that placement of blocks in heavily sedated patients may be an unsafe practice. When a nerve-stimulating technique is used on a sedated patient, the patient may be unable to report such paresthesias that are not associated with evidence of motor response. It can also be stated that, if the shoulder paresthesias/deltoid twitches were discarded in this study, further advancement of the needle could have theoretically pierced the C5 or C6 nerve roots in up to 85% of the patients.

An anesthesiologist must have a thorough knowledge of the anatomy for every block in his or her repertoire. Decisions to accept or discard any twitch or paresthesia must be made with attention to this anatomy. Careful attention to anatomy serves not only to increase success but to limit complications and discomfort as well.

Importantly, use of a peripheral nerve stimulator should be considered as technical support when performing regional blocks. The nerve stimulator should never be regarded as a substitute for detailed knowledge of the anatomy or proper and careful technique. Rigorous clinical research is needed to eliminate subjective bias and preconceived notions that have been perpetuated far too long without scientific basis or adequate study. Thanks to Silverstein et al. for telling us the truth about twitches and interscalene block.

William F. Urmey, M.D.
Department of Anesthesiology

Weill Medical College of Cornell University
New York, New York

References

1. Winnie AP. Interscalene brachial plexus block. *Anesth Analg* 1970;49:455-466.
2. Winnie AP. *Plexus Anesthesia, Perivascular Techniques of Brachial Plexus Block.* Philadelphia, PA: Saunders; 1990:176.
3. Raj PP. *Practical Management of Pain.* Chicago, IL: Year Book; 1986:610.
4. Scott DB. *Techniques of Regional Anaesthesia.* East Norwalk, CT: Appleton & Lange; 1989:92.
5. Wildsmith JA, Armitage E. *Principles and Practice of Regional Anesthesia.* New York, NY: Churchill Livingstone; 1987:144.
6. Roch JJ, Sharrock NE, Neudachin L. Interscalene brachial plexus block for shoulder surgery: A proximal paresthesia is effective. *Anesth Analg* 1992;75:386-388.
7. Silverstein WB, Saiyed MU, Brown AR. Interscalene block with a nerve stimulator: A deltoid motor response is a satisfactory endpoint for successful block. *Reg Anesth* 2000;25:356-359.
8. Urmey WF, Stanton J, O'Brien S, Tagariello V, Wickiewicz TL. Inability to consistently elicit a motor response following sensory paresthesia during interscalene block adminis-tration (abstract). *Reg Anesth* 1998;23:7.