forming regional anesthesia into a "science". Nerve stimulation provided a considerable boost to those who were already drawn to regional techniques. Despite the advances, however, the fact remains that nerve stimulation-guided regional anesthesia has limitations. The technique relies on physiological responses of neural structures to electrical impulses which are subject to considerable inter-individual variation. Other factors, including the local anesthetic, its excipients, and various neurological diseases also may influence the response to electrical nerve stimulation. The ongoing search for improved methodologies to enhance the success rates of regional techniques is clinically justified.

Fortunately, ultrasound imaging (although in itself limited by subjective interpretation) adds the dimension of accurately visualizing local anesthetic spread and related anatomic structures to be avoided; thereby providing a new measure of clinical efficacy and safety. These may be factors to explain why nerve stimulation did not achieve a similar rate of growth in the practice of regional anesthesia that seems to be occurring with the introduction of high resolution ultrasound. Clinicians who have renewed their interest in regional anesthesia because of familiarity with ultrasound techniques, also may have utilized nerve stimulation as a 'tried and true' confirmation of their visual test. In this context, the related editorial would preferably have stated that: "Not surprisingly, the introduction of ES (electrical stimulation) failed to result in a renewed interest in regional anesthesia to the extent, and especially with such a rapid pace, as we are witnessing with ultrasound-guided techniques".

Finally, with respect to Dr. Williams' important points related to the strength and complexity of research related to patient safety, I concur that a consensus-based approach related to the study outcomes of safety and success rates would be important to help determine best clinical practices related to regional anesthesia. Adding to the research repertoire a focus of patient satisfaction with reliable and reproducible outcomes will ultimately determine improvements in overall patient care, and future advances in the practice of regional anesthesia.

Ban Tsui MD FRCPC
University of Alberta Hospitals, Edmonton, Canada
E-mail: btsui@ualberta.ca

Reference

1 *Tsui B*. Ultrasound-guidance and nerve stimulation: implications for the future practice of regional anesthesia. Can J Anesth 2007; 54: 165–70.

Spinal myoclonus associated with intrathecal bupivacaine and fentanyl in an infant

To the Editor:

Spinal myoclonus is most commonly caused by drugs. Other causes include spinal tumours, infections, vascular lesions, acquired immunodeficiency syndrome and demyelinating diseases, but in a few cases the etiology remains unknown.[1] There are very few reports of myoclonus following spinal anesthesia in adults,[2,3] and none involving an infant. Parental consent was obtained for publication of the following report.

A 45-day-old healthy male infant (5.1 kg) presented for bilateral inguinal hernia repair. His medical history and neurological examination were unremarkable. The hemoglobin was 128 g·L^{-1}. Following application of routine monitors, a subarachnoid block was performed under sterile conditions at the L5–S1 interspace using a 25-G, 25-mm spinal needle (Beckton Dickinson, Madrid, Spain), in the left lateral position. Clear cerebrospinal fluid was seen at needle hub. A 2-mg dose of 0.5% bupivacaine with fentanyl 2.5 µg was prepared in a tuberculin syringe to a volume of 0.46 mL. Injection took place after aspiration of a very small volume of cerebrospinal fluid, with no resistance. As the child was turned supine, he developed abnormal, asymmetrical rhythmic flexion and adduction movements of the left thigh and arm at an approximate frequency of 20–30·min^{-1}. There was no facial movement or any change in heart rate, and the child was alert during the episode while receiving oxygen by face mask. The level of sensory block was T8 bilaterally. After four minutes, the myoclonus resolved spontaneously without further intervention. Surgery was allowed to begin once the myoclonus had resolved, and was completed uneventfully within 45 min. Serum electrolytes, glucose and calcium were within normal limits. Postoperatively, a neurology consultation was obtained, and in the light of an absent history of seizures, and absent focal neurological signs, it was concluded that the myoclonus was not of epileptic origin. There was no recurrence and the child was discharged the following day. Magnetic resonance imaging studies of the spinal cord performed one week later did not reveal any abnormality.

Spinal myoclonus appears as stimulus-sensitive, repetitive jerks in a group of muscles supplied by one or several contiguous segments of the brainstem or spinal cord, and unlike other forms of myoclonus, is unaffected by sleep, anesthesia, or coma. The contractions are nearly rhythmic, and may be synchronous

in several muscles. The frequency is usually around $1 \cdot sec^{-1}$, but may vary from $1{-}2 \cdot min^{-1}$ to $600 \cdot min^{-1}$. The electroencephalogram remains normal.[4] Animal studies have demonstrated that the spinal cord can both initiate and maintain myoclonus. The various mechanisms postulated are trauma to the spinal cord with transient subacute spinal neuronitis,[2] spontaneous, repetitive discharges of the anterior horn cell groups, or the effect of local anesthetic on inhibitory neurons which causes heightened irritability of alpha motor neurons.[3] The mechanism of opioid-related myoclonus is probably similar to the mechanism of opioid-related tonic rigidity, involving opioid receptors in the brainstem and basal ganglia, and is not due to seizure activity. Both limb spasms and generalized myoclonus have been described following neuraxial administration of opioid drugs.[5] In view of absent history of seizure disorder, a normal neurological examination, and unremarkable follow-up imaging, intrathecal bupivacaine appears to be the most likely cause in this case. The local anesthetic may have induced spinal cord irritation resulting in spontaneous, repetitive discharges of the anterior horn cell groups. Electromyography would have been an ideal diagnostic tool but was impractical in this situation. We suggest that spinal cord imaging should be considered in the setting of newly-diagnosed spinal myoclonus to exclude potential pathological causes. Finally, the anesthesiologist should have an awareness of the potential for this very rare phenomenon to occur in the pediatric population during the conduct of spinal anesthesia.

Yatindra Kumar Batra MD MNAMS FAMS
Subramanyam Rajeev MD
Vanajakshi C. Lokesh MBBS
Katragadda L.N. Rao MS MCh FAMS
Postgraduate Institute of Medical Education and Research, Chandigarh, India
E-mail: ykbatra@glide.net.in

References

1 *Agarwal P, Frucht SJ.* Myoclonus. Curr Opin Neurol 2003; 16: 515–21.
2 *Menezes FV, Venkat N.* Spinal myoclonus following combined spinal-epidural anaesthesia for caesarean section. Anaesthesia 2006; 61: 597–600.
3 *Fox EJ, Villanueva R, Schutta HS.* Myoclonus following spinal anesthesia. Neurology 1979; 29: 379–80.
4 *Hoehn MM, Cherington M.* Spinal myoclonus. Neurology 1977; 27: 942–6.
5 *Bowdle TA, Rooke GA.* Postoperative myoclonus and

rigidity after anesthesia with opioids. Anesth Analg 1994; 78: 783–6.

Perforation of the soft palate using the GlideScope® videolaryngoscope

To the Editor:

While the efficacy of the GlideScope® videolaryngoscope (GSVL) has been clearly demonstrated[1,2] reports of complications associated with its use are now being reported. We recently observed an unusual complication following airway instrumentation with a GSVL.

A 31-yr-old male presented to the Emergency Department after sustaining a gunshot wound to the anterior mandible. He was awake, alert, and following commands. He was hemodynamically stable and not experiencing any respiratory distress despite some swelling of the soft tissues of his jaw and neck. Our anesthesia service was consulted to electively intubate the patient due to the potential for progressive airway difficulties given the location of the injury. An examination of the patient's airway revealed a Mallampati class I, with adequate thyromental distance, appropriate mouth opening, and good dentition. After a rapid sequence induction, an individual experienced with the GSVL used the device to introduce a styletted 7.5 mm endotracheal tube (ETT) (tip of stylet proximal to end of the tube) with a 90° bend proximal to the balloon, into the patient's mouth. The ETT tip was introduced into the mouth in a lateral position and then rotated anteriorly to be brought into view with the GSVL. The ETT was visualized on the screen at the glottic opening, the stylet was partially withdrawn, and the ETT was then advanced very easily into the glottic opening and through the vocal cords. Correct ETT placement was verified by the presence of end-tidal carbon dioxide and bilateral breath sounds.

The patient was then transferred to the operating room for exploration and removal of bullet fragments that had penetrated the mandible and esophagus. Upon direct laryngoscopy (performed by an otolaryngologist), the ETT was noted to be penetrating the soft palate before entering the glottic opening. The tube was changed in the operating room without incident, and the mandible and esophageal injury were repaired. Although the patient experienced transient postoperative swallowing difficulties, there was no need for surgical correction of the perforated palate.

Overall, reported complications with the GSVL are infrequent, and soft palate perforation has not been reported previously. However, a recent case report