

## Clinical Notes

### Spinal hematoma as a result of spinal anesthesia for cesarean section

*Gülcan Erk, MD, Vildan Taşpınar, MD, Melih Akay, MD, Zeki Gökçil, MD.*

Regional anesthesia improves cardiovascular, pulmonary, gastrointestinal, coagulative, immunological, and cognitive functions, and provides perioperative pain management. Its popularity has increased over the last 30 years. However, these techniques have their own risks. Neurological complications are rare and potentially catastrophic complications of spinal anesthesia. These occur 0.5 in 10,000 in general surveys of spinal anesthesia,<sup>1</sup> and the incidence of neurological complications in obstetric spinal anesthesia is higher than that of general surveys. It is 35.4 in 10,000 in obstetric patients, which includes reversible neuropathies, permanent neuropathies, and reversible sixth cranial nerve palsies.<sup>2</sup> If these complications are not recognized in time, the patient may be exposed to considerable risk from regional anesthesia.

A 28-year-old woman at 40 weeks gestation was urgently admitted for cesarean section with 7 cm dilated cervix. She had a history of cesarean section 2 years ago. She had no history of any bleeding disorder. The patient's physical examination on admission was unremarkable. Her blood pressure was 110/70 mm Hg, heart rate 75 bpm. The blood values on admission were as follows; hemoglobin = 10.8 mg/dl, platelets = 271,000 per mm<sup>3</sup>, prothrombin time = 124%, international normalized ratio (INR) = 0.96, partial thromboplastin time 32.2s. A senior experienced anesthesiologist performed spinal anesthesia using a 26 gauge Atraucan needle at the level of L2-3 where the inter space was best palpated. During insertion of the spinal needle, the anesthesiologist felt the spinal needle piercing the dura approximately 85 mm beyond the skin, but failed to obtain cerebrospinal fluid (CSF). At this stage, she complained of a shooting pain radiating from the lumbar region, down to the back of the left leg, and foot. When the spinal needle was withdrawn 2-3 mm, CSF flowed freely. Then, 2.5 ml of bupivacaine 0.5% was injected through the spinal needle without resistance, pain, or any problems. Pinprick test was used to confirm loss of sensation, which extended T4 bilaterally 10 minutes after the spinal injection. The cesarean section was completed successfully under spinal anesthesia. Maternal blood pressure was well maintained throughout surgery, and sympathomimetics were not required. Review the following morning was unremarkable; she was mobilized with no headache or back pain. On the second post-operative day she complained of back pain, and causalgiform pain radiating to the left leg. Her walk was painful. The knee (patella) and ankle (Achilles) reflexes were weak. She was unable to distinguish between touch and pinprick at the

L3 and L4 dermatomes. Neurological examination of the other leg was normal. Bladder sensation was intact. No fever, neck stiffness, back pain, or tenderness of the back was noted. Her MRI scans showed a hyper-intense lesion (small hemorrhage) at the rostral end of the spinal cord (conus medullaris) (Figure 1). There was moderate edema around the lesion. The epidural space at the lesion level was normal. With advice from the neurosurgical team, treatment with 30mg kg<sup>-1</sup> of methylprednisolone intravenously was given. Treatment was continued by 5.4 mg kg<sup>-1</sup> methylprednisolone hourly for 24 hours. She was able to walk without assistance, but still suffered from mild pain in her left leg. She was prescribed paracetamol and vitamin B. Her complaints diminished gradually. Two months after surgery, there was no pain, and neurological function had fully recovered.

Regional anesthesia is commonly administered to patients undergoing obstetric surgical procedures. It provides higher quality pain relief for labor than any of the alternatives and anesthetic mortality during cesarean section is approximately 17 times greater when general anesthesia is used. The main advantage of spinal anesthesia, which is technically quicker and easier to perform, is a rapid onset with complete motor and sensory block. It is claimed that it is as safe as epidural anesthesia, but superior in terms of reliability. In our patient, spinal anesthesia was chosen because of its lower onset time with complete and sensory block. Neurological complications are fortunately uncommon, provided that the contraindications to regional anesthesia are observed correctly, and obvious technical errors are avoided.<sup>3</sup> Although neurological deficits may



**Figure 1** - A hyperintense lesion at the conus medullaris (arrow) shown on the T2-weighted sagittal MR scan of the patient.

either develop spontaneously or as a result of the labor and delivery process;<sup>2</sup> if neurological complications occur, the block is usually considered causative until proven otherwise, and the etiology of the complication seen in our patient appears to have been traumatic. We carried out the spinal anesthesia between the L2 and L3 vertebral space to avoid cord damage, however, the swollen cord seen on MRI is alarming. The spinal cord usually ends at the level of the first lumbar vertebral disc and injection should not occur at this inter-space or above, however, in parturients identifying the spinal inter-spaces by physical examination alone can be unreliable; and in 10% of the patients, it may extend lower to the level of the disc between the second and the third lumbar vertebrae. Despite this, the spinal cord is rarely traumatized when the chosen interspinous space is above the end of the cord.<sup>3</sup> In our patient, MRI showed that the spinal cord ended at the lower end of the L1 as in the normal population. Direct needle trauma rarely results in permanent or disabling neurological injury. In a retrospective study, the presence of paresthesia during needle placement was reported as 6.3%, and neurological deficits as 0.13%.<sup>4</sup> The sequel of a single puncture of a nerve root or even the spinal cord may be minimal, with a nerve deficit that resolves over days to months. Symptoms of neurological injury may resolve in 4-6 weeks in 92-97% of patients in over 99% by one year. It is unknown whether the clinicians should abandon the procedure if paresthesia is elicited (rather than replacing the needle) in an effort to decrease the risk of nerve injury. The neurological injury may occur even though the injection is not continued in the presence of pain.<sup>4</sup> Just as described in our case, although paresthesia was present during the needle insertion when we withdraw the spinal needle 2-3 mm, we saw free flow of CSF and there was no pain on injection of local anesthetic. In our patient, the anesthetic might have been injected into the nervous tissue and might have traveled upwards in the cord resulting in extensive edema of the cord. But, injection did not cause pain, which is the main diagnostic symptom for intraneural injection. On the other hand, adequate anesthesia for cesarean section was achieved with subarachnoid injection, indicating that there was appropriate distribution of the anesthetics in the subarachnoid space. The risk of spinal hematoma after obstetric regional anesthesia is also very low. In the general population, meta-analysis estimated the risk for a spinal hematoma to be 7 per million following epidural anesthesia, and 5 per million after spinal anesthesia. However, the incidence of spinal hematoma after obstetric spinal block is unknown.<sup>2</sup> Another possibility in our case is that the spinal needle pierced the nervous tissue and damaged a blood vessel, which bled into the nervous tissue giving the increased signal seen on the MRI. However, as she did not have a bleeding tendency, and had not taken thrombolytic therapy during her

pregnancy, this explanation is unlikely. However, it must be kept in mind that, approximately 10-15% of cases of spinal bleeding occur in patients without identifiable risk factors (including vertebral column abnormality, clotting disorder, or difficulty with needle insertion). In most cases, the bleeding is insignificant and requires no treatment.<sup>5</sup> The unilateral paresthesia, causalgiform pain, and involvement of multiple nerve roots in the left leg would indicate that the site of the lesion was in the spinal cord. The cause of the causalgiform pain may be damage in the lateral spinothalamic tractus.

In conclusion, despite the low incidence of complications related to the use of spinal anesthesia, this case, and the literature review illustrate that serious morbidity may occur. When they do occur, they are of great concern to both the patient and the practitioner. We recommend that prevention and management of neurological complications must begin during the preoperative visit with a careful of evaluation of the medical history and appropriate preoperative discussion of the risk and benefits of the anesthetic techniques. Postoperatively, patients must closely be followed to detect potentially treatable sources of neurological injury. New neurological deficits should be evaluated promptly by a neurologist or neurosurgeon to document formally the patients evolving neurological status, arrange further testing or intervention and provide long-term follow-up. Spinal anaesthesia should be administered cautiously in patients whose physical examination is unreliable for identifying inter-vertebral spaces, and pain upon needle placement is a warning that cannot be ignored.

*Received 2nd August 2008. Accepted 24th November 2008.*

*From the Department of Anesthesiology and Reanimation (Erk, Taşınar), Ankara Numune Training and Research State Hospital, and the Department of Neurosurgery (Akay, Gökçil), Gülhane Military Medical Academy School of Medicine, Ankara, Turkey. Address correspondence and reprint requests to: Dr. Gülcan Erk, Ziya bey cad, 2 Sok, Yonca Sit, B bl D.4, Balgat 06520, Ankara, Turkey. Tel. +90 (312) 2870006. Fax. +90 (312) 4270467. E-mail: gulcanerk@hotmail.com*

## References

- Hyderally H. Complications of spinal anesthesia. *Mt Sinai J Med* 2002; 69: 55-56.
- Loo CC, Dahlgren G, Irestedt L. Neurological complications in obstetric regional anaesthesia. *Int J Obstet Anesth* 2000; 9: 99-124.
- Rajakulendran Y, Rahman S, Venkat N. Long-term neurological complication following traumatic damage to the spinal cord with a 25 gauge whitacre spinal needle. *Int J Obstet Anesth* 1999; 8: 62-66.
- Horlocker TT, Wedel DJ. Neurologic complications of spinal and epidural anesthesia. *Reg Anesth Pain Med* 2000; 25: 83-98.
- Barak M, Fischer D, Gat M, Katz Y. Retroperitoneal hematoma after spinal anesthesia with the paramedian approach. *Anesth Analg* 2004; 98: 851-853.