International Journal of Obstetric Anesthesia (2019) 37, 118–128

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CASE REPORTS

Epidural hematoma following low molecular weight heparin prophylaxis and spinal anesthesia for cesarean delivery

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ABSTRACT
Epidural hematoma is a very uncommon complication of spinal anesthesia. Its incidence has been reported to be between 1:200 000–250 000 in the obstetric population following neuraxial anesthesia. Cesarean delivery increases the risk of maternal venous thromboembolism significantly and recommendations to decrease its incidence and morbidity have been developed. Strategies to decrease venous thromboembolism include pharmacologic prophylaxis with unfractionated or low molecular weight heparin. We report a case of spinal-epidural hematoma occurring in a parturient who received spinal anesthesia for a planned, repeat cesarean delivery after low molecular weight heparin thromboprophylaxis.

Keywords: Epidural hematoma; Spinal anesthesia; Thromboembolism; Low molecular weight heparin; Deep venous thrombosis prophylaxis; Complications of regional anesthesia

Case report

The patient was a 31-year-old gravida 3, para 2 parturient, at 39+0 weeks-of-gestation, who had undergone a previous cesarean delivery (CD) under general anesthesia approximately one year earlier. The current pregnancy had been unremarkable. The woman was admitted to the hospital one day before scheduled CD and was evaluated in a pre-anesthesia clinic. She was 162 cm tall, weighed 110 kg (body mass index (BMI) 41.9 kg/m^2) and had a Mallampati score of 2; her physical examination was otherwise unremarkable. Complete blood count (hemoglobin 11.6 g/dL; hematocrit 33%), platelet count (306×10^9/dL), coagulation tests (activated partial thromboplastin time (APTT) and prothrombin time (PT), s. fibrinogen 4.8 mmol/L) were all within normal limits. Her blood pressure was 120/70 mmHg, pulse rate 85 beats/min and the electrocardiogram was normal.

The evening prior to surgery, 14 hours before the scheduled delivery, a single prophylactic dose of low molecular weight heparin (LMWH) was given (0.3 mL nadroparine (Fraxiparine®), which is 2850 anti-factor Xa IU).

The next day an experienced anesthesiologist performed spinal anesthesia at the L3–4 level, with the patient in the sitting position. A 26-gauge Quincke needle was used and clear cerebrospinal fluid flow was obtained on the first pass of the needle. Anesthesia was induced with 11 mg 0.5% hyperbaric bupivacaine and 25 μg of fentanyl. The needle was withdrawn, the patient positioned supine with left uterine displacement, and a healthy male infant weighing 3570 g was delivered, with Apgar scores of 10 and 10 at 1 and 5 minutes. Surgery was completed uneventfully. The obstetrician considered her to be at elevated risk of deep venous thrombosis due to her increased BMI, so she received nadroparine 0.3 mL twice daily until discharge, beginning nine hours after the conclusion of surgery.

Her recovery was unremarkable until the third postoperative day, when she complained of pain in the back and both thighs. Physical examination showed no sensory or motor deficits and a mild fever of 38°C was attributed to a small hematoma (34 × 32 mm) in the abdominal wall. Her symptoms were treated with oral acetaminophen 500 mg 12-hourly and she did not

Accepted September 2018
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receive antibiotics. The fever and back pain abated over three days and she was discharged home on postoperative day seven.

On postoperative day 10 she presented to the hospital complaining of severe back pain, which made walking and sitting very painful. She had a low-grade fever (37.7 °C), and intermittent headache. Bladder and bowel function were normal and neurologic examination did not reveal any focal findings. Laboratory coagulation tests (PT, APTT, international normalized ratio (INR), and platelet count) were normal. Screening for von Willebrand's disease was negative. Serum C-reactive protein (CRP) concentration was elevated at 200 mg/L (normal value $\leq$5). A cervical swab revealed Staphylococcus aureus, so intravenous antibiotic therapy with ciprofloxacin (200 mg, two doses 12 hours apart) and metronidazole (500 mg, three doses at eight-hour intervals) was started, followed by a course of oral ceftazidime 2 g 12-hourly for three days, then 1 g 12-hourly for five days. Diclofenac (75 mg intramuscular, two doses), dexamethasone (4 mg intravenously, two doses), and pantoprazol (20 mg orally daily) were also started. A neurologist recommended a magnetic resonance imaging (MRI) scan of the thoracolumbar spine, which revealed an epidural hematoma measuring $10 \times 14 \times 30$ mm. It was situated dorsolateral to the right side of the dura, causing moderate dural compression at the L4 level (Fig. 1). There was also partial herniation of the L3–4 intervertebral disc, contacting both L4 roots in the lateral recesses, but without compression. Neurosurgical advice was that in view of only moderate impingement by the hematoma on the dural sac, and a subjective complaint of pain in the lumbar spine without neurologic deficit, surgical decompression was not indicated. Symptomatic improvement following diclofenac and acetaminophen prompted continued conservative management. Over several days, the severity of her pain continued to improve on conservative therapy and she was able to ambulate without difficulty.

Electromyography was performed on postoperative day 17, and showed radicular lesions in the L3 and L4 dermatomes, and at the L5–S1 level. The abnormalities were thought to be chronic and secondary to the minor disc herniation noted on the MRI, but unrelated to the epidural hematoma.

On neurosurgical advice, she remained hospitalized until a follow-up MRI scan had been performed on postoperative day 30. This showed minimal right-sided dorsolateral compression of the dural sac (Fig. 2). She was discharged in good condition on postoperative day 34. Her back pain had resolved, and she was able to ambulate and sit without problem.

Discussion

Epidural hematoma is a very uncommon complication of spinal anesthesia, with an incidence reported to be between 1 in 200 000 and 1 in 250 000 in the obstetric population following neuraxial anesthesia. It is more common after epidural than spinal anesthesia and is usually seen in conjunction with coagulation abnormalities or administration of anticoagulants.[1,5] Several societies including the American Society for Regional Anesthesia and Pain Management (ASRA); the Society for Obstetric Anesthesia and Perinatology (SOAP); and the Royal College of Obstetricians and Gynaecologists (RCOG) have published guidelines for the administration of anticoagulants, in conjunction with regional anesthetic techniques, to minimize risk.[3–6]

Thromboembolism continues to be highlighted as a significant cause of morbidity and mortality in the obstetric population, leading to recommendations that

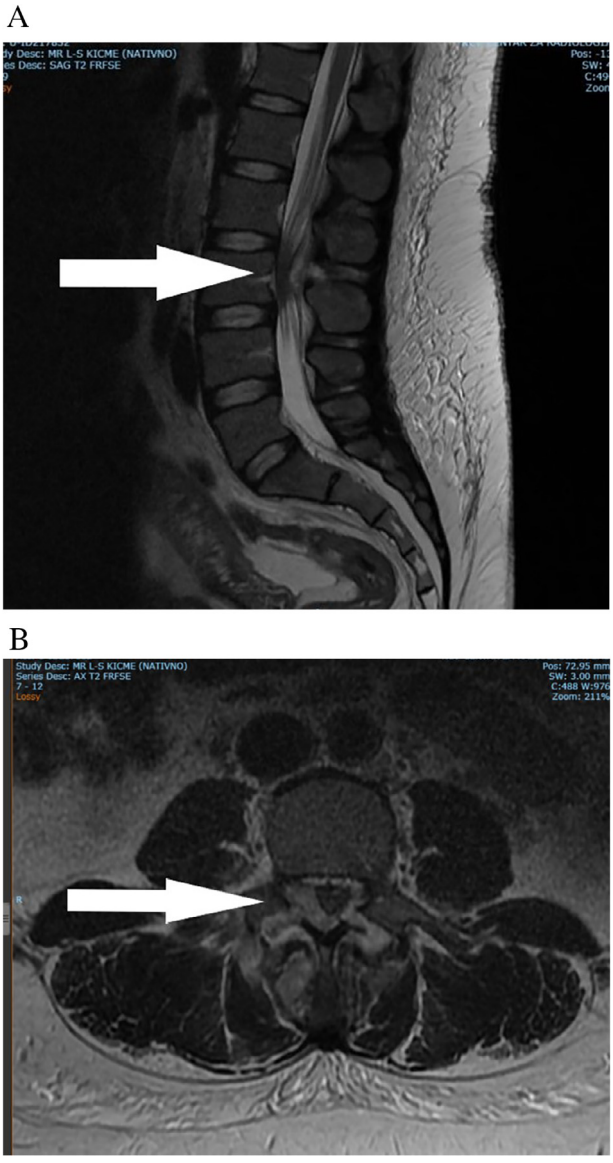

Fig. 1 Initial magnetic resonance image of the lumbar spine, 12 days after spinal anesthetic. A: sagittal section, B: axial section. White arrows indicate location of the epidural hematoma

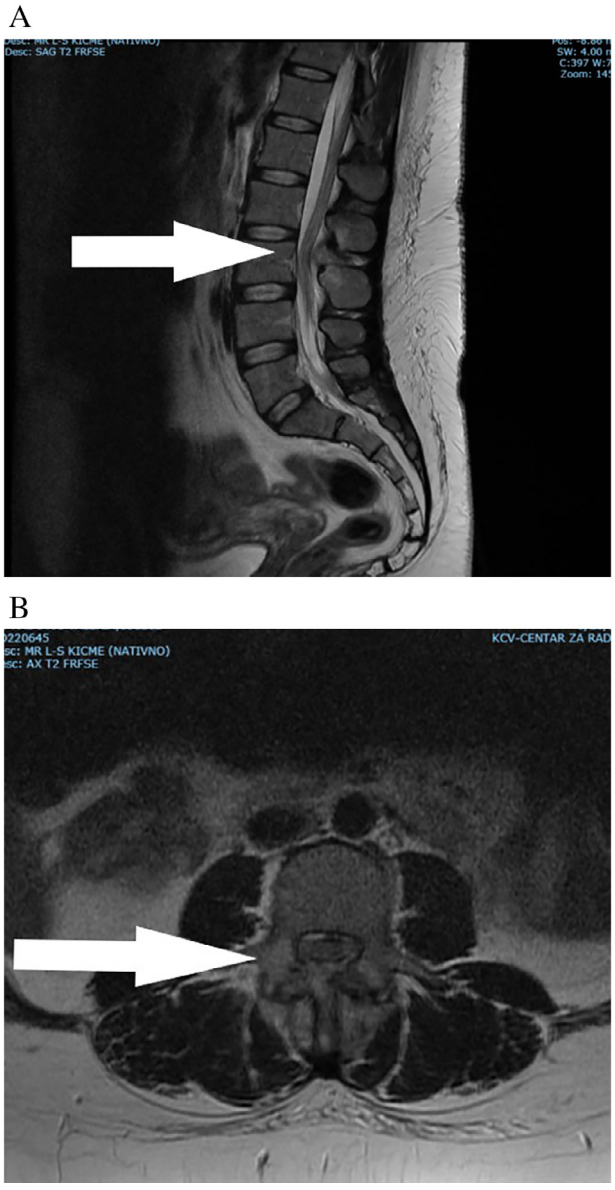

Fig. 2 Repeat follow-up image 30 days after spinal anesthetic. The epidural hematoma has decreased in size and density, with a decreased mass effect. A: sagittal section, B: axial section. White arrows indicate the location of the epidural hematoma

all parturients receive prophylaxis against it.[3–7] Strategies include stratification of risk factors, mechanical devices (sequential compression stockings and devices (SCD)) and pharmacologic prophylaxis. For elective CD, treatment regimens depend on the number and severity of risk factors.

In this pregnant patient, body weight and elective CD constitute two additional risk factors under the RCOG guidelines,[3] which advocate both mechanical and pharmacologic prophylaxis. The American College of Chest Physicians guidelines classify this patient as at increased risk, and similarly recommend mechanical and pharmacologic prophylaxis.[7] The American College of Obstetricians and Gynecologists (ACOG) guidelines are less precise but state that all parturients undergoing CD should receive mechanical prophylaxis, early ambulation and hydration; and that additional risk factors may warrant the use of pharmacologic prophylaxis.[4] None of the guidelines give precise timing about starting pharmacologic prophylaxis for women at elevated risk, although it is likely that mechanical prophylaxis would be instituted prior to incision at CD.

Although in developed countries mechanical prophylaxis is generally considered the most convenient means of prophylaxis, in many middle-income countries SCDs are cost-prohibitive and not readily available. In our Serbian institution SCDs were not available and the local protocol recommends pharmacologic prophylaxis with LMWH, administered at least 12 hours before surgery, for all elective CDs. This protocol conformed with both the ASRA[6] and SOAP guidelines.[5] There are few publications about how widespread the use of similar protocols is: one report from the Netherlands included 1500 women who received LMWH prophylaxis (dalteparin or one of two regimens with nadroparine) for CD, including pre-operative dosing with nadroparine.[8]

A 2017 literature review identified no reports of spinal-epidural hematoma in an obstetric patient receiving neuraxial anesthesia for CD following prophylactic therapy with either LMWH or unfractionated heparin, when the recommendations of either ASRA or SOAP had been followed.[9]

Several aspects of this case are notable. The preoperative dose of nadroparine administered was actually slightly lower than that recommended, based on weight and BMI.[10] However, following delivery, the dose was slightly higher than that recommended, but followed hematological advice based on the patient's weight. The first postoperative dose was given after the recommended delay period following neuraxial anesthesia. She received 0.3 mL twice daily for the first three days postoperatively, whereas 0.4 mL once daily for the first three days followed by 0.6 mL daily from the fourth postoperative day onwards is recommended.

The clinical presentation was also somewhat different from most previously published reports of spinal-epidural hematoma. She did not present with symptoms until postoperative day 10, after nadroparine therapy had already been discontinued for three days, and at the time of presentation her main complaint was back pain rather than sensory or motor deficit.

Finally, despite the MRI scan-documented presence of spinal-epidural hematoma and some mass effect within the spinal canal, the neurosurgical recommendation was for conservative management due to the lack of focal neurologic deficits. Immediate surgery and decompression are generally recommended if neurologic deficits are present.[11]

The lack of other reported cases of this complication does not allow any estimate of its overall incidence. Spontaneous spinal-epidural hematoma has been reported in a number of cases during pregnancy[12,13] and it is possible that this patient suffered a spontaneous lumbar epidural hematoma. There are, however, no reported cases of spontaneous epidural hematoma occurring after CD. Further, if this epidural hematoma was causally related to the nadroparine administered for prophylaxis, it raises questions about the safety of preoperative administration for these patients: it is possible that thromboembolism prophylaxis may be just as well served by keeping parturients as ambulatory outpatients until the morning of surgery.

In summary, a case of spinal-epidural hematoma after prophylactic therapy for the prevention of thromboembolism associated with CD is presented. All applicable guidelines for management of anticoagulation were followed. In a patient presenting with back pain after CD in this setting, the diagnosis of spinal-epidural hematoma should be considered, even if there is delayed presentation. In the absence of neurologic deficits, conservative management may be possible, although continued observation and neurosurgical consultation are essential.

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0959-289X/$ - see front matter
https://doi.org/10.1016/j.ijoa.2018.09.008