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Case Report

## Accidental subdural block after epidural anesthesia in obstetric patient: Case report

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### Abstract

**Background:** Although often overlooked, subdural anesthesia is a relatively common complication. It can present with a wide range of symptoms, from unexpectedly high sensory and limited motor blocks to significant hemodynamic and respiratory effects.

**Case Presentation:** This case report documents the labor and delivery of a 26-year-old primigravida at 40 weeks gestation who requested an epidural at 4 cm. A 500 ml lactated Ringer's solution bolus was initiated prior to the procedure and a Tuohy needle, size 18-gauge, was utilized to locate the epidural space. Following a negative aspiration and falling meniscus test, a bolus of 8 ml containing a combination of 0.2% ropivacaine with 2 mcg/ml fentanyl was administered, resulting in a brief drop in blood pressure, which responded to ephedrine. An epidural infusion of 0.2% ropivacaine with 2 mcg/ml fentanyl was then started and continued until the decision was made to perform a caesarean section due to lack of progress. Prior to surgery, the epidural was supplemented with 15 ml of 0.75% ropivacaine and 50 mcg of fentanyl. Following the successful delivery of a healthy baby, the patient reported difficulty breathing, and her oxygen saturation dropped to 90%. She was intubated without medication and later extubated after the completion of surgery. The epidural provided pain relief for six hours postoperatively and the patient recovered fully without any neurological deficits.

**Conclusion:** The case report describes an epidural anesthesia that resulted in respiratory depression and unconsciousness without sympatholysis. The local anesthetic diffused into the dura- arachnoid interface, or the subdural space, which facilitated the movement of the anesthetic cephalad. However, the patient experienced complete neurological recovery. This case demonstrates the importance of careful monitoring and prompt intervention in the event of complications during epidural anesthesia.

**Keywords:** subdural anesthesia, primigravida, ropivacaine, unconsciousness.

## INTRODUCTION

Labour analgesia using the epidural technique is growing in popularity among women in the UAE. In our institute, almost 30% of all labouring women opt for epidural analgesia. Its safety is well-established in all clinical settings and the complication rates for epidural remains low.<sup>1,2</sup> Complications of lowering of blood pressure, heaviness of legs, accidental dural puncture resulting in headache, and transient neurological symptoms are often anticipated, discussed with the patient, and documented in consent forms. However, rare complications that may arise are less well recognised and so management can be a challenge. We present a case of an epidural complication that resulted in the patient being completely unconscious due to a presumed subdural spread or a multicompartamental block.

## CASE REPORT

A 26-year-old primigravida presented to the labour ward at 40 weeks gestation in active labour. An epidural was requested at 4 cm. A 500 ml bolus of lactated ringer's solution was started 10 minutes prior to the procedure. An 18-gauge Tuohy needle was used for the procedure at L3-4 interspace. The epidural space was identified without difficulty at 6 cm using the loss of

resistance technique to air, and a 20-gauge multi-orifice catheter (portex) was threaded 5 cm into the space. A test dose of 3 ml 0.5% bupivacaine was given after confirming negative aspiration and a falling meniscus test. After 3 minutes, no evidence of subarachnoid or intravascular placement were apparent and a bolus of 8 ml 0.2% ropivacaine with 2 mcg/ml fentanyl was injected via the catheter. There was a brief drop in blood pressure to 80/65 mm Hg but it responded to 5 mg ephedrine. There were no further complications and the labour continued with an epidural infusion of 0.2% ropivacaine with 2 mcg/ml fentanyl running at 6 ml/hr providing adequate pain relief.

After about one hour, the decision to conduct a caesarean section for failure to progress was made. The epidural infusion was stopped 10 minutes prior to transfer to the operating room. No motor block was demonstrable, and the patient moved to the operating table by herself. After a discussion with the patient and the obstetrician and after a further negative aspiration test, the epidural was topped up with 15 ml 0.75% ropivacaine and 50 mcg fentanyl. Urinary catheterisation was done with no patient discomfort. After confirming a block height of T5 to touch, surgery began, and a healthy baby was delivered after three minutes. Carbetocin 100 mcg was given as per hospital policy. Five minutes after

delivery of the baby, the patient started to complain of difficulty breathing. The saturation also began to fall to 90%. Her breathing was supported with bag and mask ventilation with the anaesthesia circuit. Her saturation picked up straight away and she was hemodynamically stable. After about a further five minutes, the patient stopped responding to verbal commands. Her GCS was found to be three and she was intubated without using any drugs.

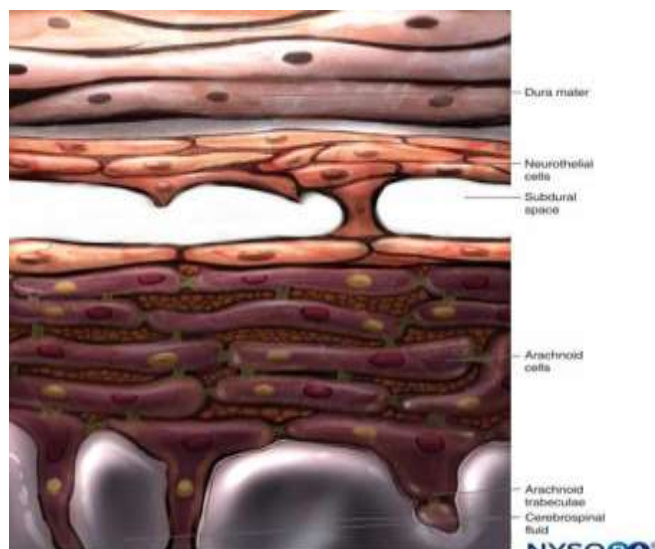
The surgery was completed in another 20 minutes without any undue incidents. After a further 10 minutes, the patient started obeying verbal commands and demonstrating good motor power in both her upper limbs. Subsequently, she was extubated and moved to the ICU for further observation. The epidural catheter was removed prior to transfer.

The epidural was working, as evidenced by a pain-free stay in the ICU for the next six hours. The patient's motor block had completely disappeared by then. A neurological exam revealed no sensory/motor deficits or cranial nerve disturbances. Rescue analgesia with intravenous fentanyl covered her pain for the night and she was moved to the maternity ward the next morning. She made a complete recovery and was discharged home on the fifth postoperative day.

## DISCUSSION

Causes of unconsciousness after epidural anesthesia are subdural spread and complete spinal or transiently impaired sensory input.<sup>7</sup>

Characteristic presentations of subdural spread are reported to be delayed or rapid onset, limited or marked motor block, a 'patchy' block, moderate to severe hypotension, progressive respiratory depression, unconsciousness, and rapid recovery of neurologic function.<sup>8,9,10,11</sup> Horner's syndrome and trigeminal nerve palsy have also been reported following subdural spread of the local anesthetic.<sup>12,13</sup>



Subdural space

The actual incidence of subdural block likely remains unknown, but studies have estimated it to be as low as 0.1% when using clinical criteria alone, while some report a higher incidence of 7% when using radiological diagnosis.<sup>3,4</sup> When fluoroscopy was used to assess spread, a single center study showed that out of around 2,500 epidurals, 0.53% catheters were inadvertently placed in the subdural space.<sup>5</sup> In a prospective study of 145,550 obstetric epidurals performed over a period of 17 years, the incidence of subdural injection was found to be 0.024%.<sup>6</sup> In this study, the subdural injection

was diagnosed in cases of unexpectedly high block, often asymmetrical and involving the face and arms, but with sacral sparing. No radiological confirmation was used for the diagnosis.

The lumbar subdural space is a potential space; it is not present under normal physiological conditions.<sup>14</sup> The space can be opened by the separation of the arachnoid mater from the dura mater as the result of trauma or a pathologic process. It has been increasingly studied in pregnant women. The dura is composed of elongated, flattened fibroblasts and extracellular collagen, whereas the arachnoid layer is composed of large cells with no extracellular collagen. The dura-arachnoid junction is characterized by flattened fibroblasts and no extracellular collagen. The inner dura is thus structurally weaker than its external portions. However, under normal conditions, there is no evidence of a naturally-occurring space existing at the dura-arachnoid junction. Electron microscopy of the dura-arachnoid interface showed that a "space can appear as neurothelial cells break up because of pressure exerted by mechanical forces creating fissures within the amorphous substance of the interface." These fissures could grow larger and create a dura-arachnoid space.<sup>15</sup> A local anesthetic injection into the subdural space in the lumbar region can result in anesthesia in the thoracic and cervical regions. Brainstem involvement is even possible as the subdural space extends from the second sacral vertebrae into the cranial cavity, up as high as the floor of the third ventricle.

In our case, the epidural catheter may have migrated subdurally. It has been observed that catheters migrate inwards at almost twice the incidence of outward migration.<sup>16</sup> Subdural migration has been reported subsequent to initial successful epidural analgesia.<sup>17</sup>

An understanding of the anatomy of the subdural space can explain the usual sparing of sympathetic and motor functions.<sup>18</sup> The space extends laterally over the exiting dorsal nerve roots. The dura mater is fixed distal to the dorsal ganglia and the arachnoid mater, proximal to it. This extends the subdural space over the dorsal root ganglia. The dura and arachnoid mater are adhered together on the ventral root and so the potential space ventrally is much smaller. This causes subdural injections to collect in the posterior segment, sparing the sympathetic and motor nerve fibers in the anterior nerve roots. Thus progressive respiratory discoordination is often seen rather than sudden apnoea.

The subdural placement of an epidural catheter can be confirmed radiologically. As the subdural space is a potential space and normally not visible on scans, the presence of contrast media in the space is required to confirm the subdural placement. A subdural injection of contrast media can be seen as a dense collection confined to the posterior aspect of the spinal canal, spreading mostly cephalad. An anteroposterior view of the lumbar spine x-ray will show subdural contrast medium similar to subarachnoid spread. However, a lateral view will show contrast in the subarachnoid space rapidly descending with gravity in the CSF and outlines the exiting nerve roots. The subdural contrast tends to be more opaque as the CSF dilutes it in the subarachnoid space. If the contrast is within the epidural space, a wide distribution is seen which tends to flow outward through the intervertebral foramina. It has been argued that radiological confirmation of a subdural catheter has no therapeutic benefit and is so unnecessary and may contribute to further complications. We did not wait for a radiological confirmation and the catheter was removed at the end of the caesarean section.

The possibility of the subdural spread of fentanyl was considered but it was neither sufficient nor necessary to explain her coma. Her pupils were mid-dilated and reacting, and moreover, we decided against giving naloxone since she was postoperative.

## CONCLUSION

This case report describes an epidural anesthetic complicated by respiratory depression and unconsciousness without sympatholysis. The spread of the local anesthetic into the subdural space, or the dura-arachnoid interface allowed movement of the anesthetic cephalad. The mechanical stretch of the soft tissue may have resulted in microscopic trauma to the dura-arachnoid junction. The injection of air under pressure for the epidural test or the local anesthetic may have resulted in dissection of the dural layers, resulting in subdural spread or multicompartmental distribution. The clinical symptoms are usually transient and permanent neural damage is rare but can occur as a result of subdural injections due to the compression of nerve roots or the radicular arteries traversing the space, causing ischaemia of neural tissues.<sup>19</sup> Complete neurological recovery is most common, as happened with our patient. A high index of suspicion and early detection could prevent further complications.

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