Combined spinal–epidural in the obstetric patient with Harrington rods assisted by ultrasonography

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We describe a patient with severe scoliosis, which had been corrected partially with Harrington rods, who requested epidural analgesia for labour. With no palpable landmarks, the use of ultrasound enabled identification of the vertebral midline and allowed provision of regional anaesthesia.

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Moderate or severe scoliosis is uncommon in women of childbearing age. However, patients with corrected scoliosis present to the antenatal clinic and delivery suite. Regional anaesthesia is difficult in these patients, with an increased incidence of complications and failure to obtain satisfactory analgesia. To our knowledge, this is the first reported case of ultrasound use to aid regional anaesthesia placement in a parturient with abnormal spinal anatomy.

Case report

A 37-yr-old woman was referred by her obstetrician to the anaesthetic assessment clinic at 36 weeks' gestation in her first pregnancy. Her 32-week ultrasound scan had shown a fetus above the 90th percentile for both size and age. Macrosomia was diagnosed and induction at 37 weeks was planned. She had a history of severe congenital scoliosis corrected partially at 11 yr of age with Harrington rods (Figs 1, 2). Her previous anaesthetic and medical history was otherwise unremarkable.

On examination she weighed 95 kg, height 162 cm (body mass index 35.8 kg m⁻²) and palpation of her spine revealed no useful landmarks. There were no radiological images available at this time.

Airway assessment gave a Mallampati score of 1 and a thyromental distance greater than 6 cm with good neck and jaw movements. It was explained that regional analgesia would be difficult and that general anaesthesia might be required for Caesarean section. However, her labour plan involved natural delivery with as little medical intervention as possible.

She was admitted 1 week later for induction and over the subsequent 48 h received vaginal prostaglandins followed by infusion of Syntocinon to augment contractions. Initial analgesia with Entonox and pethidine i.m. was inadequate and an epidural was requested. She was very distressed at this stage and it was decided to attempt a single-shot spinal to allow initial pain control before attempting epidural placement. Palpation of her spine revealed no landmarks other than iliac crests. Two attempts at spinal analgesia with a 27-gauge Whitacre spinal needle and Yale 18-gauge introducer were unsuccessful.

Assisted by the obstetric registrar, we carried out an ultrasound of her spine using a portable Toshiba Capasee scanner and a 3.75-MHz linear array probe. The two Harrington rods were easily located in the thoracic region (Fig. 3), and these were followed down until the right rod disappeared just above the lumbar region. At the level of the iliac crests, we used the left rod as a lateral marker for the vertebral midline (Fig. 4). CSF was aspirated successfully with a 27-gauge Whitacre on the first attempt and bupivacaine 2 mg with fentanyl 25 μg were administered.

As the spinal block regressed, an epidural was sited at the same location using loss of resistance to saline with an 18-gauge Tuohy needle and a 20-gauge catheter. This gave patchy block inadequate for pain control. The epidural was removed and a 20-gauge intrathecal catheter was introduced via an 18-gauge Tuohy needle. She received intermittent bolus doses of bupivacaine 2 mg with fentanyl 25 μg which produced excellent analgesia. Clonidine 30 μg was added to prolong the block.

Failure to progress resulted in Caesarean section. She required 0.5% heavy bupivacaine 4 ml over 20 min in four 1-ml doses with fentanyl 15 μg to produce adequate block
Spinal–epidural anaesthesia in the obstetric patient with scoliosis

Fig 1 A thoracic AP radiograph obtained post-partum.

Fig 2 A lumbar AP radiograph obtained post-partum.

Fig 3 Transverse view of the Harrington rods in the thoracic region.

to T3. An uneventful abdominal delivery resulted in a baby girl weighing 4770 g.

Morphine 200 µg was administered via the intrathecal catheter after operation. She received diclofenac 100 mg suppositories twice a day and Panadeine Forte tablets when required. The intrathecal catheter was removed before return to the ward.

She did not develop a post-dural puncture headache and had an uncomplicated recovery period with good postoperative analgesia. She was discharged on day 5 after operation.

Discussion

The incidence of scoliosis in North American is 4 per 1000.1 It is usually idiopathic and occurs seven times more frequently in females than males. School screening for scoliosis among adolescent girls in Ireland showed an incidence of 2.6 per 1000 with a surgical intervention rate of 4.7 per 10 000 population.3 The natural history of untreated severe scoliosis is early death from cardiorespiratory failure.4 Surgical correction is usually achieved with insertion of a metal rod such as a Harrington, Luque or Cotrell–Doubousset as a child, and vertebral fusion may require autologous grafts from iliac bone.

In these patients, pregnancy may exacerbate the cardiorespiratory abnormalities, and maternal morbidity and mortality correlate well with the degree of functional impairment before pregnancy. Although patients with corrected scoliosis cope well with pregnancy, labour and delivery, studies have shown an increased incidence of instrumental and abdominal deliveries, with a Caesarean section rate 2.4 times greater than the normal parturient.2 Our patient presented with severe scoliosis corrected partially by Harrington rods but she did not exhibit cardiorespiratory compromise before or during her pregnancy. However, she experienced failure to progress and required delivery by Caesarean section.
The increased risk of instrumental and abdominal delivery suggests that regional anaesthesia at an early stage of labour is prudent. Reviews have shown clearly that abnormal vertebral anatomy results in complicated epidural insertions,\textsuperscript{2, 5} but in the majority of cases the epidural was eventually sited successfully with the aid of previous radiological images. There is limited literature on the use of ultrasound to assist in epidural placement\textsuperscript{6–8} and this work was done in patients with normal vertebral anatomy. To our knowledge, this is the first use of sonography to aid regional anaesthesia in a parturient with abnormal spinal anatomy.

Abnormal vertebral anatomy is associated with a significant failure rate and increased risk of dural puncture.\textsuperscript{5, 9} Interestingly, post-dural puncture headache in such patients has yet to be reported. The successful use of continuous spinal anaesthesia for labour and Caesarean section has been described previously.\textsuperscript{10} Our experience in this case supports its use. The use of intrathecal catheters in the general surgical population has been a source of debate, with limited catheter length insertion and use of bupivacaine solutions up to 0.5% being suggested.\textsuperscript{11} In the obstetric population, the use of an epidural catheter placed intrathecally to ‘salvage’ an accidental dural puncture has been described and observations have been made that this technique may reduce the incidence of post-dural puncture headache.\textsuperscript{12} The mechanism by which it may produce this effect remains uncertain.

Current applications for ultrasound are numerous, including diagnosis of spine and soft tissue abnormalities.\textsuperscript{13} The technology is improving rapidly and its ease of use, non-invasive nature and low cost make it popular. Its use in the obstetric population is now established and accepted as a common investigative procedure with which the majority of pregnant women are comfortable. Studies have shown that ultrasound can be used to give an accurate depth to the epidural space before performance of the block.\textsuperscript{6–8} Identification of the midline by sagittal scan of the lumbar vertebral laminae has also been shown to be possible.\textsuperscript{8} The technique appears simple but scan performance, as we experienced, has its limitations. In our case, the Harrington rods were the only visible images on the ultrasound, but sufficient to aid midline location with the degree of scoliosis present. Subsequent scans have produced better images, and with assistance from the radiology department our anaesthetists are presently developing sonographic skills. Our assumption that the rod position would be close to the midline is reasonable at either end of the rod, where it is anchored to the vertebrae. In the middle part of the rod the vertebral column may be laterally displaced by a significant distance and this should be borne in mind if trying to reproduce this technique.

The majority of obstetric epidurals are placed successfully using ‘blind’ methods. Therefore, the need for an imaging technique may be questioned. The acquisition and maintenance of skills in uncomplicated circumstances allows an anaesthetist to manage difficult or unusual cases when these are encountered. This case demonstrates that ultrasound can be a useful addition to the armamentarium of the obstetric anaesthetist and we would suggest that practitioners in this area explore its use.

References