She had a normal vaginal delivery 80 h after DP without further anaesthetic intervention. However, her symptoms of PDPH remained in the postnatal period. An EBP was performed 30 h after delivery (110 h after DP) using a 16-gauge Tuohy needle one space below the original insertion site, and 17 mL of autologous blood was injected. She was discharged home after 24 h and remained asymptomatic.

This case raises a number of questions about the management of PDPH in late pregnancy before labour. A literature search identified few relevant case reports.\(^1\)–\(^5\) Our management had to balance the risk of leaving an untreated dural defect against that of performing an EBP in a parturient. Conservative management was likely to lead to continuing symptoms, and may have led to increased CSF leak during pushing in the second stage of labour.\(^2\) However, performing an EBP included risks of failure, further DP, infection and nerve damage. There is uncertainty about timing or likelihood of failure of neuraxial techniques after EBP.\(^4\)–\(^7\)

We suggest initially managing PDPH conservatively. Pain relief in labour could be provided using nitrous oxide/oxygen, pethidine, remifentanil PCA or epidural analgesia. Spinal or general anaesthesia could be considered. If an EBP is performed and the patient subsequently requests labour analgesia, she should be offered nitrous oxide/oxygen, pethidine, or remifentanil PCA. It would seem prudent to avoid epidural analgesia due to the presumed increased risk of epidural failure and infection, and the difficulty in interpreting neurological symptoms that may arise after a combination of an EBP and neuraxial local anaesthetic administration. If caesarean section were required after an EBP, spinal or general anaesthesia could be considered. A multidisciplinary approach is required using continuous involvement of obstetricians, midwives, anaesthetists and the patient in order to make decisions at appropriate times to provide an optimal outcome.

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References


Combined spinal-epidural technique for caesarean delivery of a parturient with Currarino triad

Currarino triad is a rare congenital syndrome consisting of sacral bone abnormalities, a presacral mass and anorectal malformation,\(^1\) although expression is variable.\(^2\) The triad is also associated with Arnold Chiari malformation type I and other neuro-anatomical defects such as tethered cord, which may contraindicate neuraxial anaesthesia. There is just one report of spinal anaesthesia in this condition, where the need for careful neurologic and radiologic evaluation was highlighted.\(^3\)

We have successfully used a combined spinal-epidural (CSE) technique for caesarean delivery of a nulliparous women with Currarino triad.

The patient, aged 20 years, was referred for anaesthetic assessment at 28 weeks of gestation. She had undergone a total of 89 general anaesthetics for gastrostomy, colostomy, reversal of colostomy, anal dilatation followed by a pull-through procedure, closure of gastrostomy and plastic surgery for revision of abdominal scars. She also had duplex kidneys. Neurologically she was under limited surveillance of her bladder, but had normal function of bladder and limbs. A decision was made for caesarean delivery given the presence of a sizeable pre-sacral meningocele, prior colorectal surgery and, latterly, breech presentation at term. The patient expressed the wish to be awake for her caesarean section if possible. It was considered that a single-shot spinal would be unlikely to provide sufficient duration of anaesthesia for the potentially prolonged surgery (due to adhesions); therefore, a CSE technique was preferable, if not contraindicated by pathology such as tethered cord. Examination of her back revealed a sacral dimple suggestive of spina bifida (which may also interact with neuraxial anaesthesia).\(^4\)
Airway assessment was unremarkable, and we were confident with a back-up plan of general anaesthesia.

A radiologist was asked to review the magnetic resonance imaging (MRI) scans of her whole spine performed almost five years previously. A focal central defect of the sacrum just below S3 and an anterior meningocele at the same level and extending inferiorly were shown. The anatomy at the base of the brain was normal, excluding Arnold Chiari type 1 malformation. The exact end point of the spinal cord was unclear, and the radiologist recommended a further lumbar spine MRI scan. We were also concerned that local anaesthetic injected into the subarachnoid space might pass into the meningocele, resulting in inadequate block. Another MRI scan was performed at 35 weeks of gestation. This revealed normal appearance of the lower spinal cord, spinal cord conus and cauda equina. The cord terminated at L1–2 with normal alignment of the lumbar spine. The anaesthetist conferred with the radiologist and noted that the lower sacral vertebrae were atrophied, but there seemed to be no communication between the upper canal and the anterior meningocele (Fig. 1). It was agreed that there was no contraindication to the CSE technique, the best insertion level being the L3–4 interspace.

Delivery was scheduled for 38 weeks of gestation, reducing the likelihood of spontaneous labour given the potential surgical and anaesthetic difficulties. A Portex CSE pack (Smiths Medical, Ashford, Kent, UK) was used with strict aseptic technique. With the patient in the sitting position, the epidural space was easily located in the midline at the L3–4 interspace by advancing a 16-gauge Tuohy needle using loss of resistance to saline. A 26-gauge pencil point spinal needle was inserted through the Tuohy needle into the subarachnoid space, locating cerebrospinal fluid at first pass; 0.5% hyperbaric bupivacaine 2.3 mL (11.5 mg) plus 0.4 mg preservative-free diamorphine were injected. The spinal needle was then withdrawn and an epidural catheter secured with 5 cm remaining in the epidural space. There was no paraesthesia at any point of the procedure. The subarachnoid injection produced a bilateral T4 sensory block with excellent motor blockade.

The operation was uncomplicated and a healthy baby was delivered through a transverse lower uterine segment incision. Two boluses of oxytocin 5 U were given slowly, later followed by ergometrine 0.5 mg, to produce satisfactory uterine tone. Fortuitously, the duration of surgery was only 35 min, so the epidural component of the CSE was not required. The epidural catheter was removed at the end of surgery. There were no postoperative complications.

We wish to highlight the need for multidisciplinary input in this case and emphasise that recent imaging is mandatory.

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Fig. 1 Magnetic resonance imaging of lumbar spine. Thin arrow: conus; Striped arrow: L5; Fat arrow: anterior meningocele; Star: atretic sacrum
Use of continuous fetal heart rate monitoring during discectomy at 24 weeks of gestation

Cauda equina syndrome is a neurologic condition in which damage to spinal nerve roots below the conus medullaris causes various degrees of sensory or motor nerve dysfunction. Although it can be caused by a range of pathological processes that cause injury or compression of the cauda equina, herniation of a lumbar disc is the most common. In the acute setting, cauda equina syndrome may require emergency surgical intervention to prevent permanent neurologic damage or lower motor neuron dysfunction.

A 40-year-old G2P1 woman at 24 weeks of gestation presented to the emergency room with acute onset of bilateral leg and lower back pain and urinary retention. Her first pregnancy with cesarean delivery was uneventful. Examination at presentation demonstrated perineal sensory nerve dysfunction (“saddle anesthesia”), lack of rectal tone and worsening lower back and leg pain. Magnetic resonance imaging showed a large disc extrusion with significant spinal canal compromise at L5–S1 (Fig. 1). The decision was made to proceed with emergency surgical decompression with monitoring of the fetal heart during surgery and to optimize maternal hemodynamics if required.

After antacid administration, the patient was placed supine with left uterine displacement in the operating room. General anesthesia was induced via rapid-sequence intubation with propofol and succinylcholine. During, and immediately following, induction the fetal heart rate decreased from 150 to 130 beats/min with decreased variability. This was considered to be related to effects of the anesthetic agents on the fetal autonomic system and was not of immediate concern. Subsequently, the patient was placed prone, carefully avoiding compression of the abdomen. After positioning, fixation of the cardiotocographic monitor proved impossible and so an obstetric nurse sat under the operating room table and applied the fetal heart rate monitor manually for the duration of surgery. The patient underwent uneventful partial laminectomies at L5 and S1 and a posterior discectomy with complete removal of both sequestered and herniated fragments of the L5–S1 disc; the procedure took three hours. Anesthesia was maintained with desflurane and intermittent intravenous boluses of fentanyl. As reductions in maternal arterial pressure are known to cause reduced uteroplacental blood flow, we used an infusion of phenylephrine at 0.1–0.5 μg/kg/min during the operation to maintain maternal mean arterial pressure within the range of 65–92 mmHg. Intraoperatively, the fetal heart rate remained between 130 and 140 beats/min with no decelerations. At the end of surgery, the patient was returned to a supine position with left uterine displacement, the trachea was extubated and she returned to the recovery area. After the cessation of general anesthesia, the fetal heart rate increased to 150 beats/min with increased variability. Her postoperative course was uneventful and follow-up two weeks later revealed complete resolution of leg pain and autonomic dysfunction. She underwent uneventful cesarean delivery under general anesthesia of a healthy boy at full term.

The primary perioperative aim was to optimize maternal and fetal safety. Previous reports have described back surgery in parturients, and the prone position was required for surgical access in this case. Due to the gestational age of 24 weeks, the patient specifically requested the fetus not be delivered in the event of fetal distress. Therefore, in the event of fetal heart rate abnormalities, we planned to increase maternal arterial pressure as a surrogate marker for increased uteroplacental perfusion. Fortunately no fetal

Fig. 1 Imaging of L5/S1 disc herniation. Sagittal T2 weighted magnetic resonance image of the lumbosacral spine showing central herniation of the L5/S1 intervertebral disc into the spinal canal (arrow), causing significant spinal stenosis and compression of the cauda equina at that level.

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