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CASE REPORT

A subdural abscess and infected blood patch complicating regional analgesia for labour

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SUMMARY. We report two very unusual cases of infection complicating labour analgesia. The first case was a subdural abscess presenting with deep-seated backache seven days after combined spinal-epidural analgesia for labour. The second was a painful lumbar swelling and septicaemia that presented three days after a blood patch for a post dural puncture headache. Because of their complicated and unusual presentation, the diagnosis and management of both were initially delayed.

INTRODUCTION

Infection of the neuraxis is a rare but very serious complication of regional analgesia for labour. Although infection can present with neurological deficit, early detection can prevent this devastating and often permanent complication. Early detection can only occur if clinicians have a high index of suspicion when a mother presents in the post partum period unwell with deep-seated backache.[1]

Infection associated with a blood patch, given for the treatment of a post dural puncture headache, is also rare and a feared complication of administering autologous blood into the epidural place. The second is a highly unusual case of deep-seated backache, which arose when the patient developed a septicaemia shortly after a blood patch.

CASE ONE

A 38-year-old para 2 mother requested regional analgesia in advancing labour. She had had an uneventful pregnancy and was well apart from a mild chronic dermatitis thought to be associated with latex allergy, and an allergy to penicillin. She was admitted to the delivery suite with a cervical dilatation of 8 cm, but 5 h later, after two further vaginal examinations, she was still not fully dilated and a Syntocinon infusion was started. At this stage she requested further analgesia and the anaesthetist thought that a combined spinal epidural (CSE) was the technique of choice in this situation. Her temperature was not taken immediately before the insertion of her CSE but her admission temperature had been 36.7 °C.

The skin was prepared with a single application of a spray containing chlorhexidine 0.5% in 70% industrial methylated spirit, which was administered from a hand-powered container, and draped with a large sterile self-adhesive paper cover with a ready-cut single opening in the centre. The anaesthetist wore a surgical hat and new mask and washed his hands with a chlorhexidine soap hand wash then donned gown and gloves. All parts of the sterile equipment were disposable including the anaesthetist's gown, drape, epidural pack and needles.

There were some technical difficulties and three punctures of the skin in two different interspaces were attempted before the epidural space was found at L2-3 using loss of resistance to saline, although we would normally discourage the practice of intrathecal injection at this level. A 119-mm Becton Dickinson 27-gauge needle was inserted through the Tuohy needle and cerebrospinal fluid (CSF) found on first pass. A 3.5-mL dose of a solution containing 0.1% bupivacaine and fentanyl 2 μg/mL was injected with rapid onset of good analgesia. An epidural catheter was then easily placed. Neither the intrathecal injection or epidural catheter placement were complicated by noticeable bleeding.

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The intrathecal injection was the same solution that is used in our unit for epidural analgesia and is prepared under sterile conditions by our pharmacy department in a 50-mL syringe. A small amount was injected by the assistant into a sterile container found in our epidural pack and drawn up by the anaesthetist through a bacterial filter needle just before administration.

The intrathecal analgesia lasted for 75 min and over the following 90 min the mother was given two epidural top-ups of 5 mL then 10 mL of our standard analgesic mixture, from the same syringe that had been used for the intrathecal injection. The attending anaesthetist gave the epidural injections intermittently through a bacterial filter attached to the epidural catheter. This was followed 3 h after first administering the intrathecal injection by a 10-mL epidural top-up of 0.5% levobupivacaine for a ventouse delivery. Four hours after her CSE, the epidural catheter was removed.

She was reviewed the following day and was happy with her regional analgesia, although she complained of mild discomfort over her lumbar spine. On examination, her skin was bruised by the three attempts at finding the epidural space so she was reassured and discharged home the following day.

The day after discharge she saw her general practitioner because of a fever and back pain. It is unclear if her general practitioner examined her back, but he thought her problem was probably related to either a urinary tract infection or endometritis and started her on a five-day course of oral cefalexin. Over the next 4 days her back pain became more constant and increased in intensity and on the seventh day post partum, her general practitioner contacted the delivery suite and she was readmitted.

She was reviewed immediately and was found to be apyrexial, 36.6°C, with a white cell count of 11.2×10^9/L with a neutrophilia of 8.5×10^9/L, her ESR was 88 mm/h and C-reactive protein 159 mg/L. She described a generalised illness with a headache and pain behind her eyes, but the headache was not postural in nature. Her backache was constant, deep-seated and severe, with shooting pains that radiated into her thighs and buttocks; she required morphine to ease her pain. On examination of her back, her skin was very dry with a discharging superficial abscess through a puncture site. Her case was discussed with the on-call obstetric consultant anaesthetist who thought an immediate review by a neurosurgeon was essential because of the possibility of an epidural abscess. A neurosurgeon reviewed her within the hour but felt that because of the obvious superficial discharging abscess and lack of hard neurological findings, an epidural abscess was unlikely. Her back pain worsened over that night and a neurosurgical review was again requested; again further investigations were not thought to be required. Ten hours after admission, a consultant obstetric anaesthetist reviewed her. On examination she remained neurologically normal but in view of her history, an urgent magnetic resonance imaging (MRI) scan was requested. This was performed within four hours and showed an extensive subdural collection from T10-L2 compressing the cauda equina by approximately 30% (Fig. 1a & b).

She was immediately referred back to the neurosurgical department, was taken to theatre within 4 h and had a L2-3, L1-2 laminectomy for decompression and evacuation of the abscess.

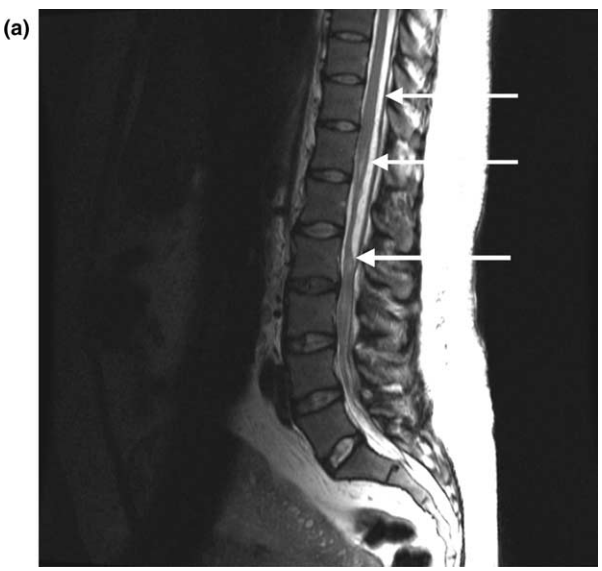

Fig. 1a Sagittal T2 weighted images showing an extensive subdural collection from T10-L2 with a tract entering the epidural space at L2-3.

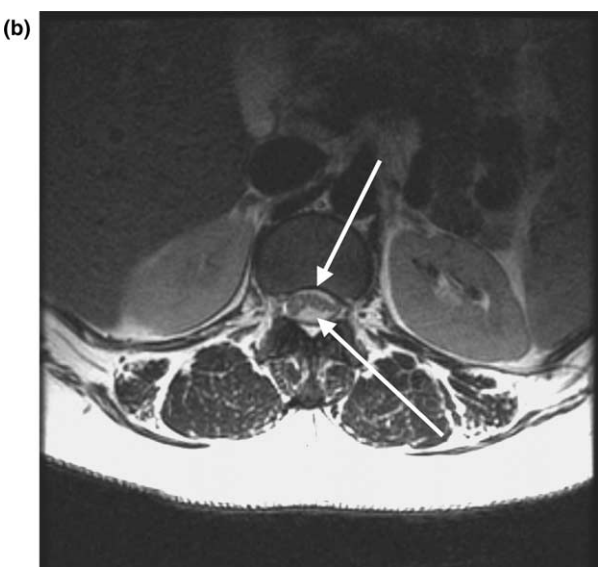

Fig. 1b Axial image at L1 showing a posterior subdural collection compressing the cauda equina and an anterior rim.

She made a rapid recovery from her surgery and was mobile within 7 days. She was given intravenous vancomycin for 2 weeks for a Staphylococcus aureus that was sensitive to all antibiotics except penicillin. She went home neurologically intact on a 3-month course of sodium fusidate and cefotaxime. At a 6-month neurosurgical review she remained well.

CASE TWO

A 30-year-old G6, P3 mother was admitted in spontaneous labour at 38 weeks' gestation. Her pregnancy had been largely uncomplicated, except for a diagnosis of anti-phospholipid syndrome for which she received subcutaneous enoxaparin 20 mg (low molecular weight heparin) and aspirin 75 mg daily, up to 36 weeks. She requested epidural analgesia for labour when the cervix was 4 cm dilated. The skin was prepared with a spray of chlorhexidine 0.5% in 70% industrial methylated spirit and the anaesthetist wore a surgical hat and new mask and washed his hands with a chlorhexidine soap hand wash then donned gown and gloves for the procedure. An epidural catheter was sited at the L3/4 interspace with some difficulty on the second attempt, using a 16-gauge Tuohy needle and loss of resistance to saline. The catheter was secured with 3.5 cm remaining in the epidural space and catheter aspiration for CSF and blood was negative. Following a 10-mL test dose of 0.1% bupivacaine and 2 μg/mL fentanyl, a further 20 mL of the same mixture in divided doses was injected into the epidural space to establish a sensory block to ice cold of T12 to L1 on the right and T10 to L3 on the left side. Initial progress during the first stage of labour was slow but once an i.v. Syntocinon infusion was started her labour progressed rapidly. She received a further five top-ups of 0.1% bupivacaine and 2 μg/mL fentanyl at roughly hourly intervals for the remainder of her labour, which provided effective analgesia for a spontaneous vaginal delivery. A total of 80 mL of the epidural solution was used. The epidural catheter was removed within the first hour following delivery approximately $6\frac{1}{2}$ h after initial placement.

Eleven hours post partum and 17 h after epidural insertion, she complained of a severe frontal headache, which radiated to her occiput and was associated with neck stiffness, nausea and photophobia. The headache was significantly worse when sitting or standing. She admitted to a history of migraine-type headache, which had similar features to her present symptoms, but not normally as severe. She was initially treated with regular analgesia, intravenous fluids, bed rest and oral caffeine-containing drinks and was offered sumatriptan, which she declined because of not wishing to stop breast-feeding for 24 h. In addition, she complained of severe pain in her buttocks, which she described as worse than her labour pains. On examination, an area of erythema was noted over the right buttock, with extreme localised tenderness, but she remained apyrexial, 36°C. The general surgeons reviewed her but as there was no obvious subcutaneous fluid collection, an abscess or infected focus was dismissed. No cause for her buttock pain was found.

Her headache remained severe, with minimal relief from regular paracetamol/codeine phosphate combined tablets and diclofenac. In view of the fact that her epidural insertion had been difficult and her headache was quite typical of a post dural puncture headache, an epidural blood patch was offered and performed on the second post partum day. She was apyrexial. Both operators followed strict asepsis guidelines wearing a surgical hat, new mask, gown and gloves. A single application of chlorhexidine 0.5% in 70% industrial methylated spirit spray was used to clean the skin over the lumbar spine and ante-cubital fossa and a surgical drape was used over both areas. The epidural space at L4/5 interspace was identified with a 16-gauge Tuohy needle and loss of resistance to saline at 7 cm. Twenty millilitres of autologous blood was then injected into the epidural space, to the point when a degree of discomfort was noted by the patient in her lower back. Blood taken simultaneously was sent for culture and sensitivity. Two hours following the epidural blood patch, her headache had almost completely resolved and she was discharged home.

Three days after the epidural blood patch, she returned to hospital following a rigor at home. Her headache had returned over the previous 24 h, although not as severe as before the blood patch, and she had deep-seated lumbar back pain. On examination, she was pyrexial, 37.3°C, and shivering. Examination of her back found a painful boggy mass over her lumbar spine, but no erythema and no discharging sinus. Neurological examination demonstrated decreased sensation to cold and pin-prick from T8 to T12 dermatomes on the left side, normal sensation L1 to L5 dermatomes bilaterally and decreased sensation to cold and pin-prick S1 to S5 dermatomes bilaterally. Over the right buttock area, where severe pain had been described on the first post partum day, she had markedly reduced sensation to cold and increased sensitivity to pin-prick. All reflexes were normal. Investigations showed a white cell count of 15.7×10^9/L and C-reactive protein of 115 mg/L. Midstream urine microscopy and culture were normal. There had been no growth from the blood cultures taken at the time of her epidural blood patch; further blood cultures were taken.

In view of her pyrexia, back pain, odd neurological signs and continuing headache, a neurological review was urgently sought. A consultant neurologist was

worried about her continuing headache and ordered a CT head angiogram, which was normal. He did not think her backache was significant and didn't feel an MRI of her lumbar spine was indicated. Over the next 24 h her temperature rose to 38.8°C, she had a further rigor and back pain continued to be severe. MRI of her lumbar spine was urgently requested. This showed no evidence of a collection within the epidural space but marked soft tissue swelling in the deep aspect of the subcutaneous fat (Fig. 2), which corresponded to the subcutaneous mass that was felt on her back and her pain. Blood cultures taken at the time of the rigor grew Escherichia coli from the anaerobic bottle. She was given i.v. vancomycin and, as she remained pyrexial, i.v. ciprofloxacin was added after 24 h. Following this, her temperature returned to normal and her back pain became less intense; she made a slow recovery over the next 7 days and was discharged home. However, her lumbar back pain and headache remained a problem 6 months later.

DISCUSSION

These cases demonstrate that, despite usual precautions, infection at the time of regional analgesia in labour and associated with a blood patch for the treatment of post dural puncture headache are a real risk. They also both demonstrate that the clinical picture can be far from straightforward and urgently seeking help from other specialities can add to the confusion and cause delay in making a diagnosis.

Regional analgesia is given in delivery rooms where because of cramped conditions and soiling of bed linen, sterile conditions may not be ideal. Thankfully, infective complication during labour seems to be rare despite this. The diagnosis of a subdural rather than an epidural abscess is especially unusual. We could not find a specific case report citing this complication, although in a non-English case report a non-specific reference in the abstract was made to subdural infection, but it is possible the authors were describing infection within the cerebrospinal fluid.[2] The exact incidence of serious neuraxial infection after labour analgesia is unknown and, although it appears to be less common than after general surgical procedures, there are many individual case reports. In the closed claims report from the USA in the 1980s and 1990's, there were 84 injury complications of the neuraxis. Twenty-four occurred in the obstetric population, which were not associated with haematoma problems and if epidural abscess and meningitis claims were combined, infection was the leading complication ($n = 11$).[3] Factors that may increase the risk of infection are multiple attempts at epidural insertion[4] and abnormal skin.[5] Our first mother had both of these problems. Despite our usual skin preparation, spraying the skin where the epidermis is flaking may be inadequate. This may be particularly so if, due to technical problems, the anaesthetist repeatedly touches the skin. Possible causes of skin flora causing infection are migration of bacteria down the catheter track from the patient's skin or contamination of the epidural catheter from the anaesthetist's hands during insertion. In view of the very short time the epidural catheter was in situ, the latter certainly seems possible and has been previously noted.[6]

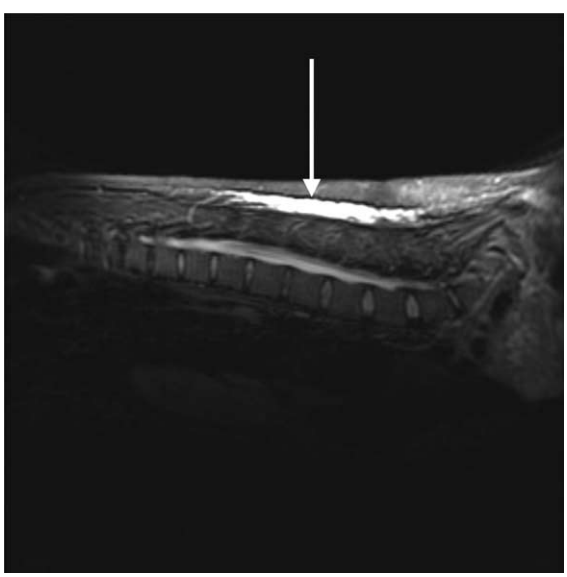

Fig. 2 Sagittal T2 weighted image of lumbar thoracic spine showing an extensive fluid collection in the deep aspect of the subcutaneous fat five days after a blood patch.

The use of combined spinal-epidural analgesia in this case allowed bacteria into the subdural space. It has been proposed that the routine use of a combined spinal-epidural technique for labour analgesia is not acceptable because the dura is too vulnerable to breach.[7] In this mother's case, her labour had become delayed in the later stages and many anaesthetists would consider CSE an ideal choice in this situation. It is certainly true that she had rapid complete analgesia and on review the following day she was very pleased with her pain relief. This type of case report will probably continue to fuel the debate.

It has now been indicated by our consultant microbiologist that the skin should be sprayed, wiped then sprayed again and the spray must be allowed to dry naturally between applications before regional analgesia. This may be particularly important if a combined spinal epidural technique is to be used, the patient is immunocompromised or has poor skin. The issues surrounding the preparation of skin before regional analgesia in obstetrics have been reviewed.[8] In this article it was strongly recommended that the skin should be double prepared, as each application of sterilising solution reduces bacterial contamination by 99.999%, so a double

application would reduce the number of micro-organisms from 10^4 bacteria per cm^2 to 10^{-6} bacteria per cm^2. In a straw poll of consultant obstetric anaesthetists, however, we found no one who routinely double prepared the skin before regional analgesia.Although the conservative management of an epidural abscess has been described,[9,10] compression of the cauda equina and radicular pain are considered to be grounds for surgical decompression[1] and once the diagnosis had been made in this case, the neurosurgeons felt a surgical approach was essential.

In the second case, an epidural blood patch was offered as it has long been recognised as the best method to treat an unresolved post dural puncture headache, with success rates of 70–98% if carried out more than 24 h after the suspected dural puncture.[11] Fortunately, serious complications following epidural blood patch are rare. Although the presence of fever, infection on the back, coagulopathy and patient refusal are considered to be contraindications to epidural blood patch, interestingly we were unable to find a specific infective complication.[12] The patient we described had been apyrexial since delivery and blood cultures taken as a precautionary measure at the time of the blood patch were negative. We do not routinely check the white cell count before a blood patch, as we are uncertain at what level one would consider an epidural blood patch to be unsafe. In some respects the second case is similar to infection of the paraspinal space that has been well described after labour analgesia.[13,14]

The underlying cause of her coliform septicaemia was never established, but the gluteal pain she described on the day after delivery led us to suspect in retrospect that a gluteal or perianal abscess may have been present. The clinical picture that followed raised concerns that the epidural blood patch might have seeded infection into the central nervous system, with the development of an epidural abscess or meningitis.

The marked soft tissue swelling seen on the MRI scan corresponded to blood seeping out into the subcutaneous tissues after a blood patch. This feature was demonstrated by Beards et al.,[15] who performed magnetic resonance imaging on five patients following epidural blood patches and found extensive leakage of blood from the injection site into the subcutaneous tissues in all patients 18 h after patching. We feel, however, that the marked swelling, oedema and pain in our patient raised the possibility that the fluid collection was infected; this could have been either the focus of her septicaemia or seeded by her septicaemia. In retrospect it is possible that her continuing pain problems might have been reduced if surgical drainage of the blood patch had been performed. It was considered, but due to the initial rapid improvement of her symptoms, pyrexia and settling C-reactive protein, we felt at the time it was unnecessary.

The other major issue that arose with both our cases was whether an MRI was indicated if a patient presented with epidural-associated back pain. The first mother gave a clear history of deep-seated back pain, which had become constant and severe. There were few other clues, however, as to the severity of the situation, although some of the findings may have been altered because of the antibiotics her general practitioner had prescribed. She had only a slightly raised white cell count and was never pyrexial at any stage during her admission, and although she described a radiculopathy-type pain, she had no clear motor or sensory deficit. The neurosurgeons thought her pain was related to an obvious, discharging superficial abscess and were unconcerned. The obstetric anaesthetist was concerned because the severity and history of the pain were typical of an epidural abscess.[1,16] In the second case, the decision to exclude an epidural infection and start treatment with antibiotics was delayed because of the recurrence of her headache with a normal CT head angiogram. Both situations can be very difficult to assess, especially in the post partum period, when tearfulness and fatigue are commonly ascribed to "the maternity blues." Both cases demonstrate that a high index of suspicion has to be maintained.

An MRI scan can be difficult to arrange because of the severe shortage of scanning facilities in the UK. However, most radiologists should consider an emergency scan as they appreciate that early detection of an epidural abscess can prevent permanent neurological injury.

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