CASE REPORT

Spinal epidural abscess and meningitis following short-term epidural catheterisation for postoperative analgaesia

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SUMMARY

We present a case of a patient with a spinal epidural abscess (SEA) and meningitis following short-term epidural catheterisation for postoperative pain relief after a laparoscopic sigmoid resection. On the fifth postoperative day, 2 days after removal of the epidural catheter, the patient developed high fever, leucocytosis and elevated C reactive protein. Blood cultures showed a methicillin-sensitive *Staphylococcus aureus* infection. A photon emission tomography scan revealed increased activity of the spinal canal, suggesting *S. aureus* meningitis. A gadolinium-enhanced MRI showed a SEA that was localised at the epidural catheter insertion site. Conservative management with intravenous flucloxacillin was initiated, as no neurological deficits were seen. At last follow-up, 8 weeks postoperatively, the patient showed complete recovery.

rigidity and no neurological deficits such as sensibility loss and muscle weakness were reported.

INVESTIGATIONS

Blood tests showed a leucocytosis of $12.5 \times 10^9/L$ and C reactive protein (CRP) 245 mg/L. Other causes of infection were excluded by urine sediment, chest X-ray, and transthoracic and transoesophageal echocardiogram. A sigmoidoscopy and a CT of the abdomen were made to exclude possible abdominal causes, such as anastomotic leakage and bowel ischaemia. Blood cultures were positive for methicillin-sensitive *Staphylococcus aureus*, and treatment with 6 g flucloxacillin a day over a central venous line was administered at day 8 postoperatively.

BACKGROUND

Part of the enhanced recovery after surgery (ERAS) protocol following major colon surgery is the use of postoperative epidural analgaesia, which has a positive impact on bowel function, mobilisation and quality of life.¹ Adverse effects and potential complications may occur, ranging from paraesthesiae and post-puncture headache to spinal cord damage, epidural haematoma and spinal epidural abscess (SEA).²

SEA is a rare and severe condition that may develop in approximately 1 of 500 000 patients receiving epidural anaesthesia.³ An ageing population and the increased use of an epidural catheter suggest that the frequency of infectious complications associated with neuraxial techniques in Europe is increasing,⁴⁻⁷ which will confront us more often with SEA in the future. In the following case, we present a patient with a SEA after epidural catheterisation for postoperative care following colon surgery.

CASE PRESENTATION

A 59-year-old woman with hepatogenic metastatic sigmoid carcinoma T3N+M1 underwent a laparoscopic sigmoid resection. Prior to surgery, the patient received epidural catheterisation as part of the ERAS protocol.¹ On the third postoperative day, the catheter was removed. Postoperative recovery was uneventful until the fifth postoperative day, when the patient developed fever with severe headache, neck pain, nausea and vomiting. No nuchal

DIFFERENTIAL DIAGNOSIS

Owing to persistent fever and in absence of a focus, Photon emission tomography CT was obtained 2 weeks postoperatively, which showed a remarkable cervical to lumbar leptomeningeal enhancement, suggesting a diagnosis of *S. aureus* meningitis, with the epidural catheter as possible entry point (figure 1). Lumbar puncture and cerebrospinal fluid (CSF) culture were not performed because of their poor yield and the risk of spreading the infection through the subdural and sub-arachnoid spaces.

To treat the meningitis, intravenous therapy with flucloxacillin was started, but despite antibiotic therapy, the patient developed head, neck and lower back pain, as not experienced before. Further neurological examination showed no nuchal rigidity, no sensibility loss and normal strength in all muscle groups. Therefore, a gadolinium-enhanced MRI was obtained, which revealed a SEA over a length of 7.5 cm (at the level of Th11 to L1), and three small abscesses in the lower back musculature (figure 2).

TREATMENT

Conservative management was advised by the neurosurgeon, as ultrasonography of the lumbar region failed to show an abscess that could be punctured and the patient experienced no neurological deficits. Antibiotic therapy was increased to 12 g flucloxacillin a day and patient's core temperature normalised after 1 week.

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Figure 1 Photon emission tomography CT scan showing a cervical to lumbar leptomeningeal enhancement, confirming the diagnosis of *Staphylococcus aureus* meningitis with the epidural catheter as possible entry point.

Figure 2 A T1-weighted MRI with gadolinium contrast revealing a spinal epidural abscess over a length of 7.5 cm at the level of Th11 to L1.

OUTCOME AND FOLLOW-UP

The patient could be discharged from the hospital after 2 weeks, with a central venous line for the administration of antibiotic therapy. Five days after discharge, the patient returned to the hospital with increased lower back pain. A new MRI showed a slight increase of the dorsal SEA at level Th12/L1 and an increased abscess ventral of the dura behind corpus Th12. The abscesses in the lower back musculature were gone. Neurosurgical referral advised no surgery, since no compression of the conus medullaris and no motor loss was observed. After 7 days, the patient was discharged from the hospital with intravenous administration of flucloxacillin 12 g/day for an additional 4 weeks. At last follow-up 8 weeks later, the patient experienced complete recovery.

DISCUSSION

Pathogenesis

Frequently reported causes for SEA are haematogenous dissemination of an infection from elsewhere in the body, such as urinary or respiratory tract infections, or contiguous spread from a neighbouring infection site such as vertebral osteomyelitis or psoas abscess. Predisposing risk factors such as diabetes or trauma may produce a 'weak zone' in the epidural space, which contributes to the formation of an abscess. Iatrogenic causes such as epidural anaesthesia are seldom reported.⁶

When inserting an epidural catheter, a contiguous port of entry is created for microorganisms into the epidural space.⁸ The risk of an epidural haematoma exists, especially in anticoagulated patients and after difficult insertion, which could provide a locus for bloodborne infection.⁹

Kindler *et al* published an evaluation of the literature from 1974 to 1996 on 42 patients with SEA following epidural anaesthesia or analgesia. Of the 42 reported patients, 15 (36%) had one or more predisposing risk factors for infection, and the duration of the catheter in situ varied from a few hours to 10 weeks (median catheter time 4 days). The time interval between catheter insertion and first symptoms varied between

1 and 60 days (median 5 days).⁹ *S. aureus* is by far the most common infecting organism in catheter-related epidural abscess formation, accounting for about two-thirds of all cases.^{6–9} Other common organisms are *S. epidermidis* (5%) and *Pseudomonas aeruginosa* (7%).⁹ Spinal epidural abscesses are more likely to develop in larger epidural spaces that contain infection-prone fat and are thereby more common in posterior than anterior areas, and are more seen at the thoracolumbar than cervical level.^{6 10}

Clinical features and investigations

SEA is a progressive disease, starting with localised back pain and fever during the first stage; radicular irritation occurs in the second stage. Neurological deficits such as muscle weakness, sensory deficits, and bladder and bowel dysfunction occur in the more severe third stage, followed by paralysis in stage 4.⁸ Unfortunately, due to the infrequency and non-specific nature of early symptoms, the early identification of SEA remains difficult. Leucocytosis and increased levels of erythrocyte sedimentation rate and CRP are supportive investigative findings.¹¹

Improved imaging modalities such as CT and MRI are highly sensitive (>90%) in diagnosis of SEA.^{12 13} MRI with intravenous administration of gadolinium is the imaging method of choice, because it is less invasive, delineates both the longitudinal and paraspinal extension of the abscess, which is essential for planning surgery, and may help differentiate infection from cancer on the basis of appearance and the signal intensity of the image.¹⁴ Lumbar puncture and CSF culture are of less importance in the diagnosis of SEA. Not only do Gram staining and culture of CSF have a poor yield, there is a risk of spread of infection from the abscess through the subdural and subarachnoid spaces. It is only recommended in selected cases and when myelography is performed.¹⁴ To confirm the diagnosis of meningitis, however, a lumbar puncture at a different site can be an option.

Prognosis and treatment

SEA is a potentially devastating disease due to the high potential for permanent neurological disability. Almost half of the survivors are left with neurological deficits and 15% with paresis or complete paralysis,⁸ and mortality rates of 5–16%^{6 8 15} have been reported.

Surgical drainage together with systemic antibiotics is the treatment of choice when neurological deficits occur. Rapid surgical intervention such as laminectomy, hemilaminectomy, interlaminar fenestration or laminoplasty minimises not only neurological damage but also the spread of infection. Early diagnosis is therefore crucial and the index of suspicion among medical attendants must be raised when a patient presents with (lower) back pain, increased infection parameters, fever or neurological deficits following the insertion of an epidural catheter. They should then include SEA in their differential diagnosis. This should lower the morbidity of infection caused by anaesthesia equipment.¹⁶

Conclusion

SEA is a rare but severe complication of spinal epidural analgesia. Urgent MRI, serological studies and early involvement of the microbiologist is vital, as timely antibiotic management improves the outcome and prevents neurological deficits.

Selected cases without neurological deficits can be treated successfully with aggressive antibiotic therapy. When neurological deficits do develop, prompt surgical intervention and decompression is essential.

Learning points

- Spinal epidural abscess (SEA) is a rare and severe condition, and may seldom be seen as a complication after epidural postoperative analgesia in, for example, ERAS protocol.
- An MRI with intravenous administration of gadolinium is the imaging method of choice, and may be essential for planning surgery.
- Systemic antibiotics are the treatment of choice, but when neurological deficits occur, rapid surgical intervention such as laminectomy is indicated.

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