ORIGINAL PAPER

S. Anand · L. Maini · A. Agarwal · T. Singh
A.K. Dhal · B.K. Dhaon

Spinal epidural abscess — a report of six cases

Accepted: 7 February 1999

Abstract Six cases of spinal epidural abscess are presented. All patients were young with no predisposing conditions. All were treated with laminectomy and intravenous antibiotics. The patients with no neurological deficit recovered completely, while patients with pre-existing neurological deficit had a poorer outcome. Emphasis is given to early detection and surgical management to prevent irreversible damage to the spinal cord.

Résumé 6 cas d'abcès épiduraux sont présentés. Tous les patients étaient jeunes et sans facteur prédisposant. Tous les patients ont été traités par laminectomie et antibiotiques injectables. Les cas sans déficit neurologique ont guéri sans séquelle, alors que la récupération des cas avec déficit neurologique a été moins bonne. L'accent est mis sur la détection et le traitement chirurgical pour prévenir les lésions irréversibles de la moelle épinière.

Introduction

Spinal epidural abscess (SEA) is a rare condition with potentially devastating consequences. Unfortunately the diagnosis is missed in about half of the cases at the initial examination [1, 10]. As many of these patients initially present to orthopaedic surgeons, an increased awareness might help to initiate intervention before the development of irreversible paraplegia. Thus there is need to review this condition, to remind clinicians of its existence, as these patients can be cured if the condition is recognised early.

S. Anand¹ (✉) · L. Maini · A. Agarwal · T. Singh · A.K. Dhal
B.K. Dhaon
Department of Orthopaedics, Maulana Azad Medical College and
Lok Nayak Hospital, New Delhi, India

Mailing address:

¹ 40/180, Chittaranjan Park, New Delhi, PIN 110019, India
Tel. +91-11-621-9652; Fax +91-11-621-9651

Case report 1

A 30-year-old soldier fell on his back. Seven days later, he developed a high fever. On examination there was diffuse tenderness in the thoracic region, no neck rigidity and no neurological deficit. Blood examination revealed a leucocytosis, with a raised ESR and sterile blood culture. On the ninth day he developed weakness in both lower limbs which deteriorated to paraplegia during the next 24 h. On admission there was flaccid paraplegia below the seventh thoracic level.

An MRI scan was reported as showing probable fractures involving the neural arches of T10-L1. There was an epidural collection extending from T7 to L2 (Fig. 1). The cord showed heterogeneous areas of hyperintense signals on T2 weighted images.

An urgent laminectomy was performed from T11-L1. Pus was evacuated and granulation tissue was seen covering the cord. Culture revealed *Staphylococcus aureus*. The patient was treated with appropriate antibiotics and was also given steroids in the immediate postoperative period.

Postoperatively sensory improvement was recorded. Three weeks later the patient died due to haemorrhage from a gastrointestinal ulcer.

Case report 2

A 26-year-old patient presented with fever and low back pain. On questioning, he gave a history of an infected skin lesion over the sacral area, which had healed one week previously. On examination, he was febrile with tenderness over the lumbar spine, where there was a boggy swelling. There was neck stiffness and a painful passive straight leg raise test. There were no abnormal neurological signs.

Investigations revealed a leucocytosis and a raised sedimentation rate. Blood culture was sterile. X-rays were normal. An MRI scan showed an abscess extending from L2 to S1. Pockets of pus were also seen within the posterior spinal muscles. Two level laminectomy (L3 & L4) was performed and the abscess drained. Culture revealed *Staphylococcus aureus*. Antibiotics were administered for three weeks. There was complete recovery.

Case report 3

An 11-year-old boy complained of fever and low back pain for ten days. On examination, a fluctuant abscess (7 cm×7 cm), was found overlying the sacrum. The abscess was incised and drained. Pus was found superficial to the deep fascia. Bacteriological stud-

Fig. 1 MRI of Dorso-lumbar spine, Case 1. Sagittal section showing epidural collection (marked with arrow) extending from Th VII to LII

ies revealed clusters of cocci. Postoperatively, he was treated with intravenous cloxacillin and gentamicin whilst awaiting culture and sensitivity. He continued with a high fever. Blood cultures showed no growth. Three days postoperatively he developed neck rigidity.

Suspecting a diagnosis of spinal epidural abscess, a lumbar puncture was performed. Pus was aspirated which grew *Staphylococcus aureus*. A contrast enhanced spiral CT scan was performed, which showed posterior epidural collection extending from LI to L5. A laminectomy was performed and pus was evacuated; granulation tissue was seen covering the cord. The patient was treated with appropriate antibiotics and recovered fully.

Case report 4

An 18-year-old patient was referred with complete flaccid paraplegia below T4, including bladder and bowel involvement. He gave a history of high fever associated with infected lesions of the right eyelid and the right leg. His condition deteriorated with the development of complete sensory loss and paraplegia within a few hours of admission.

An MRI scan showed an epidural collection extending from C7 to T5. A laminectomy was performed and pus growing *Staphylococcus* was evacuated. Postoperatively there was partial neurological recovery, with some residual weakness

Case report 5

A 30-year-old patient presented with a one week's history of the acute onset of flaccid paralysis below T7. There was a history of fever ten days previously with the subsequent development of

weakness. There was no history of infection. The weakness rapidly progressed to paraplegia and loss of sensation, with bladder and bowel involvement.

On examination, the patient was afebrile. Blood picture was inconclusive. X-rays were normal. A CT scan showed an epidural compressive lesion, extending from T2 to T8. There was no associated vertebral lesion. Urgent laminectomy was undertaken to decompress the spinal cord and to establish a diagnosis. Thick yellow pus was discovered on incising the ligamentum flavum. Gram staining revealed clusters of cocci suggesting *Staphylococcus*. There was no neurological recovery.

Case report 6

A 25-year-old man presented with weakness of both lower limbs of one day's duration. He complained of pain in the mid-spinal region lasting for 10 days and was unable to walk. He also gave a history of an infective skin lesion over the right knee one month previously. On examination, he was febrile, with tenderness in the mid-dorsal region. There was no sensory loss, superficial abdominal reflexes were absent and power in the lower limbs was fair (3/5). X-rays of the spine were normal. An urgent MRI scan was ordered. Before the scan could be performed there was further deterioration in the neurological state with paraplegia and loss of sensation below the xiphisternum. The scan revealed a dorsal SEA extending from T7 to T9.

An urgent laminectomy was performed. Pus was found in the fascial planes as in the epidural space. Thick granulation tissue was seen compressing the cord. Microbiological studies revealed *Staphylococcus aureus*. Neurological recovery started on the first postoperative day and a complete motor and sensory recovery was obtained within 10 days.

Discussion

Spinal epidural abscess (SEA) is uncommon, with an incidence of 0.2–1.2 per 10,000 hospital admissions [1]. It is particularly rare in children [7]. The epidural space, being filled with fat and loose areolar tissue and a rich venous plexus, offers a potential site for infection. The infective focus may reach epidural space by direct extension from local vertebral osteomyelitis [5, 7] or there may be hematogenous spread from a distant focus, usually a cutaneous or subcutaneous infective lesion (Cases 2, 3 and 6) [1, 5]. An abscess may also develop in a haematoma after local trauma as in Case 1 [6, 7]. The most common pathogen is *Staphylococcus aureus*, as seen in all our cases [1, 4].

Feldenzer's experiments [2] suggest that a compressive rather than an ischemic etiology is responsible for the initial neurological deficit, which may be reversible by decompression. However, later the combination of progressive compression and ischemia may produce a severe and permanent neurological deficit.

SEA mostly presents in the older population with an altered immune response and more than 50% have been found to have risk factors such as diabetes, cancer, degenerative spinal disease, tumours, AIDS, intravenous drug abuse, alcoholism, and steroid intake [1, 4]. However, all our cases were young previously healthy males, with no prior immunodeficiency.

It is important to diagnose this condition in its early stages and in patients presenting with fever, spinal pain and localised tenderness, SEA should be considered as a differential diagnosis.

Blood investigations suggest an infective process. X-rays are usually normal unless a vertebral osteomyelitic focus is present. Since the advent of MRI scanning it can be considered as the investigation of choice for SEA [3, 4, 10]. Gadolinium enhanced scans have increased the sensitivity of MRI to detect the infective process. The early use of MRI in suspected cases may lead to early diagnosis and to improved outcome; as can be seen in Case 6 [3]. Cord changes seen on MRI may also help to predict prognosis. In our cases the presence of cord changes was associated with a poor outcome. Urgent treatment is required to prevent further neurological deterioration. Surgical drainage with intravenous antibiotic therapy remains the treatment of choice [4, 7].

Some authors have claimed good results after medical management in selected patients [3, 9]. Leys et al. [9] recommended that medical management be considered in patients with no neurological deficit, complete deficit for more than 72 h, extensive multilevel abscess forma-

tion or in patients with severe concomitant disease. However, progressive neurological deficit despite appropriate antibiotic treatment occurred in 19–23% of patients described in the literature [1, 4, 8]. These findings and the possibility of rapid progression to paralysis, leading to a poor postoperative recovery has led many surgeons to recommend surgical intervention in addition to antibiotic therapy, in all medically stable patients [1, 4]. In two of our cases (Case 1, 4) there was partial neurological recovery after surgery, despite the presence of paraplegia for 48 to 72 h. Thus, it may be appropriate to offer surgical treatment even to patients with prolonged paraplegia.

Despite aggressive treatment, the morbidity and mortality from SEA remains significant. Modern series have shown mortality rates as high as 14–32% [1, 4, 8], with higher mortality rates in patients with complete paraplegia [4] or with generalised sepsis [8]. With regard to the neurological outcome, various factors seem to affect the prognosis. The prognosis is poorer in elderly patients [8] and patients with a previous history of steroid intake [1]. Thus, a heavy responsibility lies on the clinician first attending these patients. A high index of suspicion is required to recognise the condition and to treat it surgically at the earliest possible stage.

References

1. Danner RL, Hartman BJ (1987) Update of spinal epidural abscess: 35 cases and review of literature. *Rev Infect Dis* 9: 265–274
2. Feldenzer JA, McKeever PE, Schaberg DR, Campbell JA, Hoff JT (1988) The pathogenesis of spinal epidural abscess: microangiographic studies in an experimental model. *J Neurosurg* 69:110–114
3. Hanigan WC, Asner NG, Elwood PW (1990) Magnetic resonance imaging and the nonoperative treatment of spinal epidural abscess. *Surg Neurol* 34:408–413
4. Hlavin ML, Kaminski HJ, Ross JS, Ganz E (1990) Spinal epidural abscess: a ten year perspective. *Neurosurgery* 27: 177–184
5. Huesner AP (1948) Nontuberculosis spinal epidural infections. *N Engl J Med* 239:845–854
6. Hulme A, Dott NM (1954) Spinal epidural abscess. *Br Med J* 1:64–68
7. Jacobsen FS, Sullivan B (1994) Spinal epidural abscesses in children. *Orthopaedics* 17:1131–1138
8. Khanna RK, Malik GM, Rock JP, Rosenblum M (1996) Spinal epidural abscess-evaluation of factors influencing outcome. *Neurosurgery* 39:958–964
9. Leys D, Lesoin F, Viaud C, Pasquier F, Rousseaux M, Jomin M, Petit H (1985) Decreased morbidity from acute spinal epidural abscess using computed tomography and nonsurgical treatment in selected cases. *Ann Neurol* 17:350–355
10. Nussbaum ES, Rigamonti D, Standiford H, Namaguchi Y, Wolf AL, Robinson WL, (1992) Spinal epidural abscess: a report of 40 cases and review. *Surg Neurol* 38:225–231