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Spinal epidural abscess following blunt pelvic trauma

Received: 1 June 1999
Revised: 11 October 1999
Accepted: 22 October 1999

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Abstract A 17-year-old patient with pre-existing grade II spondylolisthesis of L5/S1 sustained a partial disruption of the left sacroiliac joint with haematoma of the iliac muscle after a fall. The haematoma probably led to occlusion of the left ureter, resulting in a urinary tract infection. After initial conservative treatment the patient developed fever and radicular pain of the left leg. Magnetic resonance imaging (MRI) revealed a left-sided epidural abscess at L5/S1, which had probably spread from the infected iliac haematoma along the injured sacroiliac joint. Prompt surgical drainage and antibiotic coverage with cefuroxime and flucloxacillin led to rapid clinical improvement. *Staphylococcus aureus* was identified as the pathogen. At follow-up 6 months postoperatively

all symptoms had resolved, while MRI still revealed residual osseous oedema of the sacroiliac joint. The haematoma of the iliac muscle resolved without surgical intervention.

Key words Epidural abscess · Pelvic trauma · Complication · Urinary tract infection

Introduction

Spinal epidural abscess is an uncommon disease, with a reported incidence of 0.2–1.96 per 10,000 hospital admissions [1]. As the presenting symptoms are often non-specific, a high level of suspicion is needed to initiate the appropriate diagnostics and provide prompt treatment. A recent review of the literature reports a suspected diagnosis of spinal epidural abscess in only 40% of cases [1]. Delayed diagnosis and treatment may, however, result in unexpected rapid neurological deterioration, even in patients without prior neurological deficit [1–3].

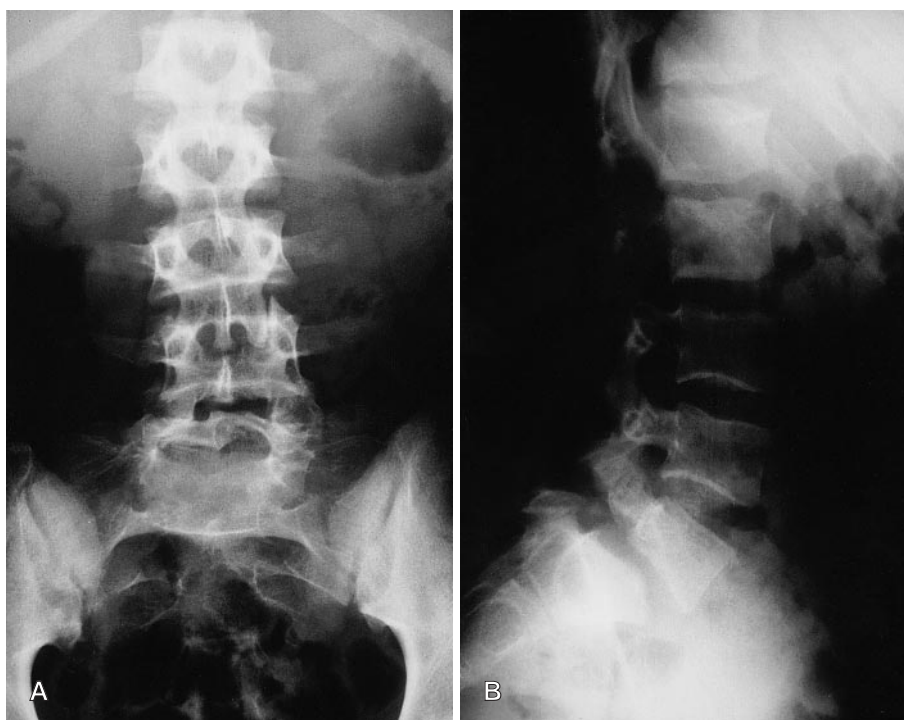
We report an unusual case of blunt pelvic trauma with involvement of the sacroiliac joint and delayed diagnosis of a complicating epidural abscess of the lumbosacral

spinal canal in a young man with a coexisting urinary tract infection.

Case report

A 17-year-old adolescent fell from a height of approximately 1.5 m out of a tree onto his left side and rear pelvic region. Besides pain while walking on the left leg, no serious injury was noted. There was no loss of consciousness and there was no open injury. Twenty-four hours after the accident, pain increased in the lower back and radiated to the dorsal aspect of the left thigh. Three days after the accident, the patient was admitted to the orthopaedic department of another hospital because of persistent symptoms and elevated temperature of 40°C. On admission, the patient complained of the above-mentioned symptoms. The patient was alert and oriented. No motor or sensory deficit was noted on examination. Plain film radiographs of the spine showed a non-traumatic,

Fig. 1 Frontal (A) and lateral (B) plain radiographs of the lumbar spine taken on admission, demonstrating the pre-existing grade II spondylolisthesis of L5/S1 without clear evidence of a sacroiliac fracture



isthmus-type grade II spondylolisthesis of L5/S1 (Fig. 1). Computer tomographic (CT) scanning of the lumbar spine afforded no evidence of a fracture. No pelvic fracture was seen on plain film radiograph. A urinary tract infection (UTI) was diagnosed; however, ureteral patency was not assessed. Conservative treatment was initiated and the patient was discharged after 8 days under antibiotic treatment (ofloxacin). The symptoms, however, persisted, and a week after discharge sonography of the abdomen and magnetic resonance imaging (MRI) of the pelvic region were performed as an outpatient to rule out intra-abdominal and pelvic pathology. A haematoma of the iliac muscle measuring 3–4 cm in diameter was found in close proximity to the left sacroiliac joint. Marked subchondral osseous oedema of the left sacroiliac joint was demonstrated, suggesting disruption of the joint. No pathology was seen in the abdominal and pelvic organs. Neither examination provided a remarkable finding of the kidneys or ureters. The lumbar spine was not included in the MRI scan. The patient was subsequently admitted to our spinal surgery department, because of increasing left-sided sciatica and lumbosacral pain.

On admission, the patient was alert and oriented, but in poor general condition. Weight bearing of the left leg produced severe pain in the region of the left sacroiliac joint, as did palpation of this region. There was no sensory or motor deficit and there was no evidence of disturbance of bowel or bladder function. However, the patient revealed pain radiating to the lateral aspect of the left ankle during straight leg raising at less than 20°. There were no positive signs of meningitis. Rectal temperature was 37.6°C. Apart from these findings, physical examination was unremarkable. Sedimentation rate was 100 mm/h, leukocytes 8,400/μl, C-reactive protein (CRP) 13.9 mg/dl. Urine analysis revealed bacteria and pyuria. Plain radiographs of the lumbar spine and pelvis were repeated and confirmed the diagnosis of a pre-existing grade II spondylolisthesis of L5/S1 and no apparent pelvic fracture. A new, gadolinium-DTPA enhanced MRI scan of the lumbar spine and lumbosacral junction was obtained the same evening, on account of the radicular pain on the straight leg raising test. On this occasion, a left-sided epidural collection of fluid was found at L5/S1 with compression of the cauda equina (Fig. 2). Surgery was performed the

next day through a microsurgical left-sided interlaminar approach to L5/S1. Intraoperatively, an epidural empyema was found, reaching from L5 to S2. The empyema was drained and irrigated. Cultures and histology samples were taken during drainage, after which cefuroxime (3 × 1.5 g) and flucloxacillin (3 × 2 g) were administered intravenously. Two-hundred milligrams of gentamicin were applied locally through a collagen sponge (Sulmycin). Postoperatively, pain was markedly reduced and the course of wound healing was uneventful. Histology confirmed a chronic inflammatory lesion. *Staphylococcus aureus* was cultured from the intraoperative sample and proved susceptible to the chosen antibiotic treatment. The urine culture taken on admission revealed 10^{4–5}/ml coagulase-negative *Staphylococcus* species susceptible only to vancomycin. However, due to clinical improvement, the antibiotic regime was not changed. CT-guided drainage of the iliac haematoma was attempted, but was unsuccessful due to the viscous consistency of the haematoma. Surgical drainage was not performed, as the patient showed rapid clinical improvement. Intravenous antibiotics were continued for 3 weeks, after which only flucloxacillin was given orally for a total of 4 months. Limited weight bearing commenced after a week under physiotherapeutic guidance. The postoperative course was uneventful, and the patient was discharged after 4 weeks without neurological deficit. At discharge, sedimentation rate was 32/61 mm/h, leukocytes 4,500/μl, and CRP 0.6 mg/dl. Follow-up was conducted at monthly intervals with clinical examination, MRI and blood chemistry. Six months postoperatively, the patient appeared in good health and had returned to sports activities, all symptoms having resolved. There was no tenderness of the sacroiliac joint on examination and no painful limit to straight leg raising. At this stage, the MR image displayed only minimal residual epidural enhancement, complete regression of the iliac haematoma and a reduction of the periarticular enhancement of the left sacroiliac joint (Fig. 3).

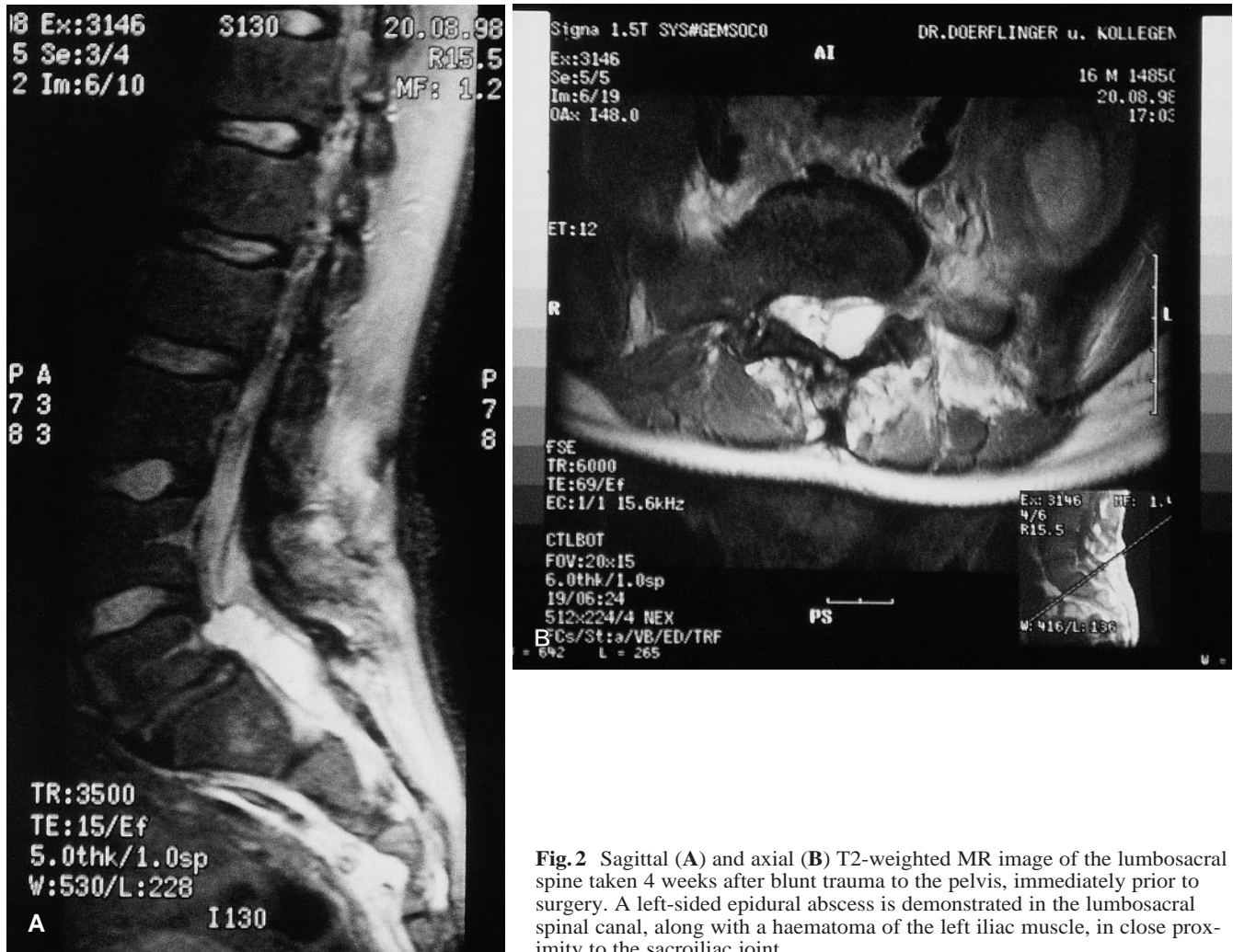


Fig. 2 Sagittal (A) and axial (B) T2-weighted MR image of the lumbosacral spine taken 4 weeks after blunt trauma to the pelvis, immediately prior to surgery. A left-sided epidural abscess is demonstrated in the lumbosacral spinal canal, along with a haematoma of the left iliac muscle, in close proximity to the sacroiliac joint

Discussion

Blunt trauma to the pelvis may result in disruption of the sacroiliac joint and retroperitoneal haematoma. A haematoma in turn is susceptible to bacterial seeding. In this case, the infection of the haematoma may have been induced through the diagnosed UTI. Although an uncommon source, especially in a young male, in this case it appears to be the most likely cause, in the absence of other foci. A possible explanation may be that the haematoma caused occlusion of the ureter, which in turn resulted in a high UTI. The initial MR images suggest a connection between the haematoma, the left sacroiliac joint and the left sacral foramen of the S1 nerve – although a fracture line could not be identified beyond doubt (Fig. 2B). The infection possibly spread directly from the haematoma along a bony lesion into the spinal canal. The resulting epidural abscess caused an irritation of the left-sided lumbosacral nerve roots – as evidenced by the radicular pain in the straight leg raising test.

As the strains cultured from the urinary tract and the abscess are different, it is likely that both were present initially, and that the coagulase-negative strain persisted in the urinary tract due to drug resistance, while *Staphylococcus aureus*, being more prone to metastatic seeding, flourished in the iliac haematoma. Unfortunately, further differentiation of the coagulase-negative strain was not obtained, which may have yielded *Staphylococcus saprophyticus*, which shows selective tropism for the epithelial lining of the urinary tract, and is thus very unlikely to be involved in bacterial seeding of other organ systems.

As in most described cases, our patient was male, had an abnormality of the spine (grade II spondylolisthesis of L5/S1; Fig. 1B) and suffered from an underlying infection (UTI) [1–3, 7, 11, 12]. However, our patient was much younger than the median reported age of 52 [1]. Our patient presented with backache, which is a common symptom in spinal epidural abscess, whereas the displayed radicular pain is often not initially present [1, 7, 12]. Without the symptom of radicular pain, the diagnosis may

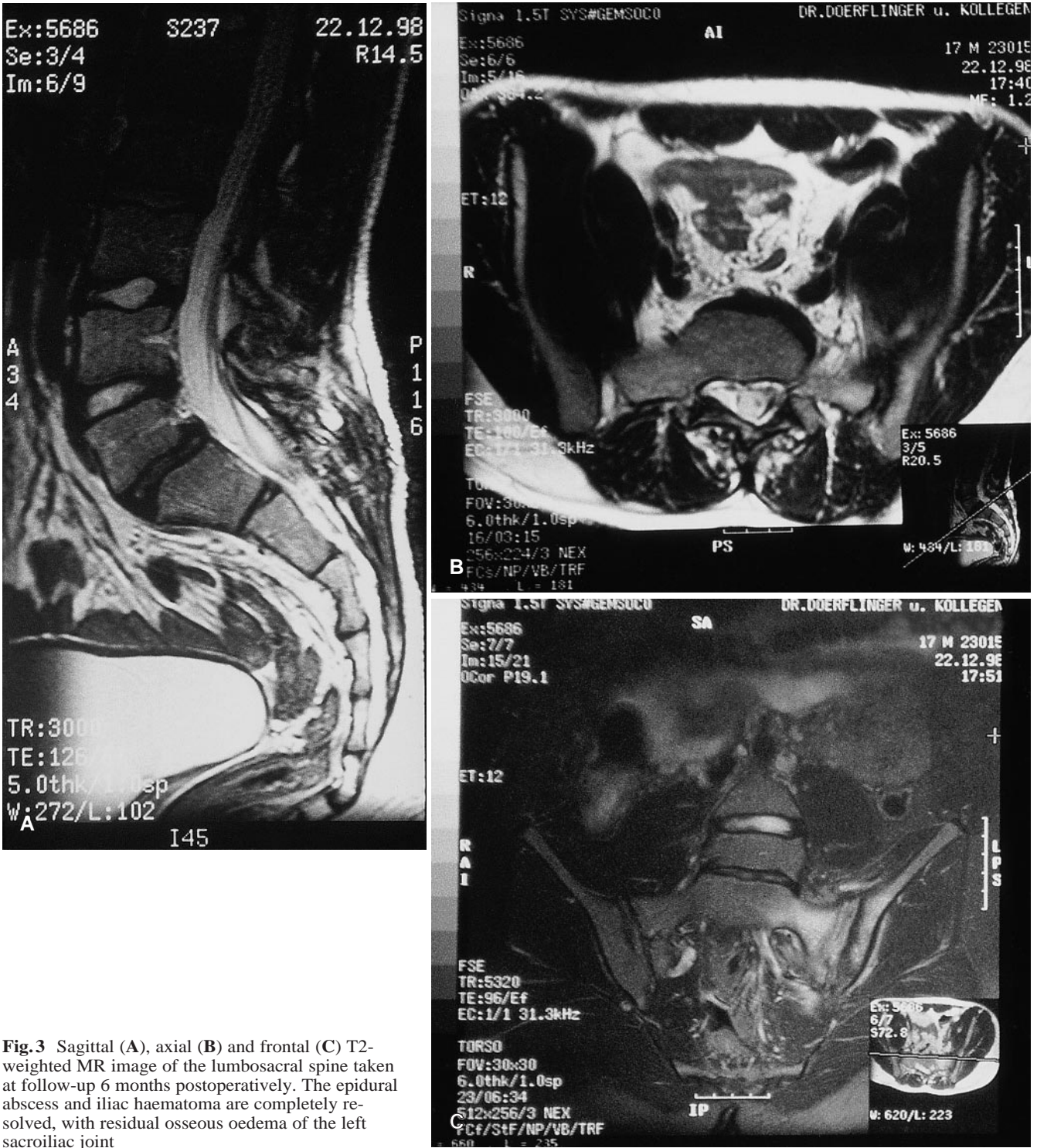


Fig. 3 Sagittal (A), axial (B) and frontal (C) T2-weighted MR image of the lumbosacral spine taken at follow-up 6 months postoperatively. The epidural abscess and iliac haematoma are completely resolved, with residual osseous oedema of the left sacroiliac joint

have been further delayed, as no meningitic or other neurological signs were present, and an explanation for the fever could be found in the potentially infected pelvic haematoma. In addition, the lumbar spine was not included in the MR images obtained before admission. In-

formation from the additional enhanced MRI study ultimately led to the correct diagnosis. Plain radiographs (Fig. 1) and the initial CT scan did not give any evidence of intraspinal pathology – which may, however, not have been present at the stage of the initial scan. Myelography

was not necessary for diagnosis, and we agree with other authors on MRI having taken over the position of radiologic procedure of choice [1, 3, 5, 6]. The intraoperative samples proved *Staphylococcus aureus* to be the pathogen, as in most cases [1, 3–5, 7–9, 12]. Despite the history of pelvic trauma, the urogenital tract was not assessed for patency. This would likely have led to the diagnosis of an occluded ureter, resulting in a high UTI. The unremarkable imaging of the renal tract after discharge from the primary hospital may be due to the antibiotic treatment having improved the local inflammatory reaction.

In summary, an epidural abscess is a rare complication of pelvic trauma. Bacterial seeding from a distant source has been well documented, whereas direct spreading along a pelvic injury has not been described to our knowledge. The importance of the pre-existing spondylolisthe-

sis is, however, not clear, despite the documented prevalence of degenerative and traumatic lesions of the spine in patients with epidural abscess [1, 3, 7, 10, 12]. A high level of suspicion is needed for diagnosis, especially in patients presenting without neurological deficit, meningeal signs or even radicular pain. The serious nature of the disease is pointed out by the cases in which even initially neurologically intact patients deteriorated rapidly, with resulting paralysis or even death [1–3]. We believe that patients presenting with symptoms of neural irritation and signs of infection following trauma should undergo enhanced MRI of the spinal canal – even if earlier scans were negative. As advocated by previous authors, prompt surgical drainage and intravenous antibiotic coverage led to rapid clinical improvement and ultimately full recovery in the described case.

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