**Case Report** 

# Spinal Epidural Abscess after a Transurethral Resection of the Prostate: A Case Report

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**BACKGROUND:** A spinal epidural abscess (SEA) is a rare pathology that may have devastating consequences if unrecognized and untreated. It consists of an extensive purulent collection in the spinal epidural space. It is a major medical and surgical emergency that may be difficult to appreciate, especially early in the disease course. Magnetic resonance imaging (MRI) is currently the most sensitive and specific examination for the diagnosis of spinal epidural pathologies. If undertaken in a timely fashion, treatment can be successful.

**CASE PRESENTATION:** We report a case of a 64 years old male with a history of urinary tract intervention 2 months earlier, admitted for the management of spinal cord compression due to a dorsal spinal abscess. The patient was successfully treated with surgery and antibiotics after bacteriological study of pus samples.

**CONCLUSION:** Spinal epidural abscess is a rare and dangerous disease, it can be tricky to diagnose. If undertaken in a timely fashion, treatment can be successful.

KEYWORDS: Antibiotics, Laminectomy, Spinal epidural abscess, Staphylococcus aureus.

## INTRODUCTION

A spinal epidural abscess is a purulent collection located in the spinal epidural space. It may occur at any level, but most commonly within the thoracic and lumbar regions. It results from the hematogenous diffusion of the infectious agent to the epidural space or by contiguity with a nearby infectious site.<sup>1</sup> This rare pathology is constantly increasing in the last decades.<sup>2-6</sup> The reasons for this are unknown but may be related to some risk factors that increase the incidence of this disease such as the aging of the population, diabetes, immunosuppressive comorbidities, intravenous drug use, and spinal procedures.<sup>3,4</sup> The gender ratio is approximately 2:1 in favor of males.<sup>7</sup> It is more common in adults than in children with a peak between 50 and 70 years.8-10 The absence of risk factors for infectious diseases associated with SEA is the main difference between children and adults.11

The diagnosis is difficult to be quickly established because the neurological signs are not very noticeable initially, and also because it mimics other pathologies. Diagnosis has been facilitated by the more widespread availability of MRI and computed tomography (CT). Magnetic resonance imaging is currently the most sensitive and specific examination for the diagnosis of epidural space pathologies.<sup>1</sup>

## CASE PRESENTATION

We report a case of a 64 years old male admitted for the

Correspondence: Elmajdoub Youssef Department of Neurosurgery, Moulay Ismail Military Hospital, Meknès, MOROCCO Email: youssef.elmajdoub@usmba.ac.ma management of subacute weakness of both lower limbs progressively evolving for 15 days before admission. The patient had history of urinary tract intervention 2 months before his admission, The clinical examination revealed paraparesis graded 4/5 predominating in the proximal part, a T4 sensory level, with a pyramidal syndrome and a posterior cord syndrome. The patient also had urinary incontinence. All the manifestations evolved in a febrile and an altered general state with a Karnofsky performance scale estimated at 60%.

The patient's blood work revealed a biological infectious syndrome with 15,000 white blood cells predominantly neutrophilic, an erythrocyte sedimentation rate (ESR) of 105 in the first hour and >140 in the second hour, and a C-reactive protein (CRP) of 300. Blood cultures were positive for Staphylococcus aureus meti-S. His spinal MRI was in favor of a posterior dorsal epidural abscess extending in height from D4 to D7, pushing forward the spinal cord and compressing it with signs of spinal cord suffering in front.

The patient urgently underwent laminectomy from D4 to D7 with a pus sample for a bacteriological study that was positive for Staphylococcus aureus. The patient was put on antibiotic therapy based on culture and sensitivity. The immediate evaluation was marked by neurological state and infectious aspect improvement.

This case report has been approved for publication by the Research Ethics Committee of Sidi Mohamed Ben Abdellah University, Faculty of Medicine and Pharmacy of Fez, HASSAN II University Hospital Center, Department of Neurosurgery, Military Hospital Moulay Ismail. The patient has signed the consent for publication.



Fig 1: Sagittal spinal cord MRI, from left to right: A: T1-weighted sagittal MRI of the spinal cord showing a posterior epidural lesion with hypointense signal extending from D4 to D7. B: T2-weighted sagittal MRI of the spinal cord showing this same lesion with a heterogenous signal compressing the epidural space and pushing forward the spinal cord. C: T1-weighted sagittal MRI of the spinal cord after contrast injection showing the peripheral enhancement of the lesion.



Fig 2: Axial T1-weighted MRI of the spinal cord after contrast injection showing a dorsal posterior epidural collection with hypointense signal, peripheral enhancement, and pushing the spinal cord forward.



Fig 3: Intraoperative image showing exit of pus (asterix) at the beginning of the laminectomy.



Fig 4: Intraoperative image showing the laminectomy (blue arrow) from D4 to D7 after the evacuation of pus.

## DISCUSSION

A SEA is a suppurative central nervous system infection involving the space between the spinal dura and vertebral periosteum.<sup>12</sup> The first case of SEA in the medical literature has seen light in 1761 in Venice by the Italian anatomist Giovanni Battista Morgagni.<sup>13</sup> Until the 1930s, there was a lack of consistency in the terminology used to describe this condition. Mixter was the first to use the concept of epidural intraspinal abscess.<sup>14</sup>

Spinal epidural abscess is a major medical and surgical emergency. It is 50 times less frequent than spondylodiscitis.<sup>15</sup> This diagnosis is very uncommon as the incidence is approximately 2-8 cases per 10000 admissions.<sup>16,17</sup> A systematic review of 12 studies comprising 1099 patients revealed that the mean age was 57.2 years and male to female ratio was 1.66:1. Intravenous drug abuse was the most frequently associated risk factor (22%), diabetes was the most commonly associated medical comorbidity (27%), Staphylococcus aureus was the most common causative organism (63.6%), and the lumbar spine was the commonest location (48%). The most common presenting symptoms were back pain (67%) followed by motor weakness (52%), and 60% of patients were managed surgically.<sup>12</sup>

Various risk factors can contribute to the development of a SEA. These include immunosuppressed conditions such as diabetes mellitus, morbid obesity, alcoholism, cirrhosis, end-stage renal disease, or Human Immunodeficiency Virus (HIV) infection. Other factors include intravenous drug abuse and following certain procedures such as acupuncture, paraspinal or epidural injection, lumbar puncture, central nervous system (CNS) surgery or urinary tract surgery. Diabetes mellitus is the most common risk factor, however, the use of intravenous drugs and epidural catheter placement is becoming increasingly common and important factors.9,18,19 In children, certain underlying medical conditions have been identified as risk factors for SEA including sickle cell anemia, leukemia, long-term use of steroids, and other forms of immunosuppression.<sup>11,20</sup> However, it should be noted that these comorbidities are present in less than one-third of children with SEA.11

Spinal epidural abscess can be caused by hematogenous dissemination, contiguous spread, direct inoculation, or idiopathic causes. Hematogenous dissemination, which is the most common (In almost half of the cases), occurs when there is a primary nidus from the skin, soft tissue, and urinary or respiratory tract infections.16,17 Contiguous spread, direct inoculation, and idiopathic causes account for 10-30%, 15%, and 20% of cases, respectively.<sup>1,3,16,17</sup> In the presence of an epidural abscess, neurological involvement may be caused by direct compression of the spinal cord or nerve roots. This phenomenon can also be explained by damage to the microvasculature combining thrombosis of the vessels, septic emboli, or vasculitis induced by the inflammatory process.<sup>7,21</sup> These phenomenon help to explain the rather

random nature of neurological recovery despite rapid surgical management. The abscess most commonly occurs within the thoracic and lumbar regions due to the larger epidural space, abundance of infection-prone fat, and the presence of a low-pressure vertebral venous system, known as Batson's plexus, that communicates freely with the abdominal and pelvic venous systems in those regions.<sup>3,16,17</sup> It can occur in different locations such as anterior, posterior, or circumferential, with posterior abscess being the most common location, following hematogenous dissemination.<sup>16</sup>

Typically, the symptomatology begins with rapidly intense spinal pain and fever. Radiculopathy appears within two to three days, followed by motor deficits with sphincter disorders, and within few days or hours complete and definitive paralysis occurs.<sup>4</sup> Four stages have been described in the natural history of the disease; stage 1 includes back pain, fever, or spine tenderness, stage 2 includes radicular pain and nuchal rigidity, stage 3 includes neurological deficits, and stage 4 includes paralysis.<sup>17</sup> Stage 4 is observed in roughly 34% of patients.<sup>22</sup> Unexplained fever, neurological deficits, and active infective pathology are warning signs that should prompt medical attention and further investigations.<sup>23</sup> The main challenge with this disease is early diagnosis, that is because it mimics other degenerative disc diseases and canal stenosis, vertebral discitis and myelitis, meningitis, psoas abscesses, urinary tract infections, endocarditis, and other infectious conditions.<sup>1,4</sup>

As soon as the diagnosis is suspected, MRI with gadolinium enhancement is the imaging armamentarium of choice,<sup>17</sup> It has a sensitivity of more than 90%, helps determine the extension of the lesion, helps in management strategies, as well as differentiates SEA from other differentials. Images typically show a distinctive epidural mass that is isointense or hypointense on T1-weighted imaging and hyperintense on T2-weighted imaging. Gadolinium enhancement typically demonstrates linear enhancement surrounding non-enhancing purulent or necrotic matter.<sup>5,16</sup> The abscess usually extends over three to four vertebral levels, but panspinal forms exist.<sup>3</sup>

Hyperleukocytosis, elevated CRP and ESR have a sensitivity of >95% in SEA.16 Blood cultures and CT-guided pus aspiration have high yields.<sup>17</sup> Open or minimally invasive procedures cultures are positive in almost 78.8-90.5% of cases.16 Staphylococcus aureus is found in almost two-thirds of cases. It is also responsible for many other differential diagnoses such as osteomyelitis, discitis, sepsis, and endocarditis. Methicillin resistant Staphylococcus aureus (MRSA) infection is commonly seen among patients with spinal implants or vascular devices. Coagulase-negative staphylococci, such as Staphylococcus epidermidis, can be found after spinal procedures. Gram-negative bacteria, particularly Escherichia coli and Pseudomonas aeruginosa are sometimes present. Rarely anaerobic actinomycosis or nocardiosis, mycobacteria, candida, aspergillus, echinococcus are found.<sup>3,16,17</sup>

Once the diagnosis is established, now the main therapeutic dilemma is whether to operate or not. Historically, drainage of abscesses was a treatment principle shared by the disciplines of surgery and infectious diseases.<sup>6,24,25</sup> Accordingly, decompressive laminectomy and debridement combined with systemic antibiotics has been the method of choice. However, conservative management with antimicrobial therapy alone has become a viable option in an increasing number of patients over the past decade.1,19 SEA patients without neurologic deficit and a documented causative microbial organism can safely be treated with antimicrobial therapy alone.<sup>26,27</sup> Patients with neurological deficits should undergo immediate surgical decompression, as it is not known at which point in time the deficits become irreversible.27 The rate of failure with antimicrobial therapy without surgery (Conservative management) ranges from 30 to 41%.28,29

A study concluded that prolonged use of parenteral antibiotics alone or combined with percutaneous needle drainage yielded clinical outcomes at least comparable with antibiotics plus surgical intervention, regardless of patient age, presence of comorbid illness, disease onset, neurologic abnormality at the time of presentation, or abscess size. Thus, patients with SEA can be safely and effectively treated with conservative medical treatment without the need for surgery.<sup>24</sup> In contrast, other studies suggested that medical management alone has a very high risk for failure in patients older than 65 years, patients with diabetes, MRSA infection, active malignancy, or neurologic compromise.28,30-32 In the absence of these risk factors, non-operative management of SEA may be considered as the initial line of treatment with close monitoring.19

The complications of SEA include pressure sores, urinary tract infections, deep vein thrombosis, sepsis, meningitis, and increased mortality.<sup>3,17</sup> Recurrence of SEA following therapy is rare, around 6%. There is a high risk of recurrence among patients with intravenous drugs usage, bowel incontinence, and local spinal wound infections.<sup>33</sup> Mortality associated with SEA has significantly decreased in the era of advanced imaging techniques and efficient antibiotic therapy. With the current therapy models, the in-hospital mortality rate stands at 7% and the 90-day mortality is at 13%.<sup>4,34</sup>

### CONCLUSION

Spinal epidural abscess is a rare but serious and dangerous pathology. Its evolution is unpredictable and management is done as an emergency. Magnetic resonance imaging with contrast injection is the reference radiological examination to establish the diagnosis. Treatment is based on antibiotic therapy and surgical drainage when indicated.

#### List of abbreviations

CNS: Central nervous system. CRP: C-reactive protein. CT: Computed tomography. ESR: Erythrocyte sedimentation rate. HIV: Human immunodeficiency virus. MRI: Magnetic resonance imaging. MRSA: Methicillin-resistant Staphylococcus aureus. SEA: Spinal epidural abscess.

### Disclosure

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