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A rare case of spinal epidural abscess: diagnostic challenges and rehabilitation outcomes

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Abstract

Introduction: Spinal epidural abscess is a rare clinical entity with considerable morbidity. Even with prompt diagnosis and treatment, many patients are left with persistent residual neurological deficits.

Case report: The purpose of this article is to report a rare case of primary pyogenic spinal epidural abscess. The patient admitted to our clinic because of lumbar pain of increasing severity and fever. Case management consisted of surgical and medical treatment with antibiotics. Postoperatively, with proper rehabilitation program, he markedly improved.

Conclusions: Despite a correct management, spinal epidural abscess is associated with a high degree of morbidity and mortality. Proper treatment, rehabilitation programs and long-term follow-up is critical for a better outcome.

Key words: *spinal epidural abscess, spinal infection, rehabilitation,*

Introduction

Spinal infection (SI) is defined as an infectious disease affecting the vertebral body, the intervertebral disc, and/or adjacent paraspinal tissue. Spinal epidural abscess (SEA) is a life-threatening infection localized adjacent to the dura mater and accounts for 0.2 to 2 cases per 10,000 hospital admissions (1).

Historically, there is evidence of spinal infection in human skeletons dating back to the Iron Age (2). The early 1900s marked the beginning of invasive spinal surgery. In 1911, Russell Hibbs, a pioneer in spinal fusion surgery, performed a surgical intervention for patient with spinal tuberculosis, in an attempt to prevent disease progression (3).

Tuberculosis used to represent the most frequent cause of spinal infection, but in recent decades, the majority of spinal infections are pyogenic in origin (4). Staphylococcus aureus is involved in the etiology of half of patients with epidural abscess. Other pathogens like enterobacteriaceae, Pseudomonas aeruginosa, streptococcal and brucella species can be also a cause of the disease. Mycobacterium tuberculosis affects especially immunocompromised hosts. The organisms are usually introduced by hematogenous seeding, but direct extension from vertebral osteomyelitis or discitis, or post-spinal surgical procedure is also possible.

The classic triad of a spinal epidural abscess is back pain, fever, and neurologic deficits, but this presentation is in less than 10% of the patients. Epidural abscesses affects mainly the lumbar spine (60 %), followed by thoracic (30 %) and cervical (10 %) and usually involves 3 to 5 spinal cord segments. If the disease progresses with abscess expansion within the confined spinal canal, patients will develop neurologic deficits due to spinal cord or cauda equina compression: sensory changes, motor weakness and bowel or bladder dysfunction.

Several clinical routine markers are used for diagnosis and evaluation of treatment response. Diagnosis of spinal epidural abscess is by gadolinium enhanced-magnetic resonance imaging (MRI). Additional laboratory tests are necessary to evaluate an inflammatory syndrome and to exclude other differential diagnostics. MRI is mandatory for a patient with risk factors (intravenous drug use, diabetes mellitus, alcohol abuse, HIV infection, recent surgery/procedure), fever, recent infection or dental procedure and unexplained back pain (5).

Due to the risk of neurologic compromise from purulent expansion, timely treatment of suspected SEA is key. The treatment focuses on the elimination of suppurate mass and eradication of the organism (6)

There are few studies about the rehabilitation of patients with spinal infections. Most studies on spinal epidural abscess are focusing on acute management, treatment and less on the rehabilitation of the patients with myelopathy. A complete

rehabilitation programme during and after hospitalization provide an optimal management and can prevent further disability. Studies present a high mortality rate and less than 50% of surviving patients show full recovery. The goal of the rehabilitation programme it is to ensure an independent life for the patient by providing early mobilization, correct posture, improvement in neurologic deficits related to spinal epidural abscess (7).

During rehabilitation process, a proper diet is necessary to sustain the appropriate physiological mechanisms. All macronutrient components should be provided with a special attention on protein intake because of the increased metabolic requirements (8).

Case presentation

We present a case of a 46-year-old male from a rural area, with right laterality, having no contact with pets and no history of any chronic medical illnesses. The patient presented himself to our department with complaints of persistent low back pain of moderate intensity (6 out of 10 on the numeric pain rating scale), radiating asymmetrically on the posterior side of lower limbs with a higher intensity at the level of left inferior limb. The patient noticed an increasing amount of pain when walking and during the evenings, while slightly reducing the intensity with minor antialgic drug administration. Additionally, the patient reported the presence of a spontaneously drained pilonidal cyst in the sacrococcygeal area, approximately two weeks prior to the onset of symptoms. There was no history of trauma, altered sensorium or loss of consciousness. He also claimed no history for tobacco, alcohol or drugs consumption.

The symptoms suddenly appeared approximately two weeks prior to the hospital admission, having fever (39-degree Celsius) associated with chills and dysuria. Due to these symptoms, the patient presented himself at the emergency care unit where the biological tests revealed a mild inflammatory syndrome along with leukocyturia and a negative flu test. There were no abnormalities in the chest radiography results. An interdisciplinary medical consult has been made by the infectious disease specialist, which concluded with a recommendation for admission to the hospital due to the unknown etiology of the febrile syndrome. However, the patient refused the admission and therefore, he was prescribed oral administration of antibiotherapy with Cefixime 400 mg daily, for ten days.

Despite of the treatment, the patient's back pain intensified and after 48 hours, he presented himself for the second time to the emergency care unit having 37.6-degree Celsius temperature. Biological tests revealed the persistence of the inflammatory syndrome and the absence of leukocyturia. The abdominal ultrasound did not reveal the source of infection while the lumbar spine radiography showed a 4 mm L5 anterolisthesis. The neurological examination did not emphasize any abnormalities at that moment. However, the recommendations consisted of lumbosacral spine MRI and anti-inflammatory drug use.

The patient presented himself to the neurology department with the results of previously recommended lumbosacral MRI. The MRI scans show an epidural abscess extending from L1 through L5 both ventrally and posteriorly, hyperintense on T2 sequences and with intermediate signal on T1 sequences (Figure 1a, Figure 1b). The clinical examination revealed a grade II obesity with 36.36 kg/cm^2 body mass index (BMI), lumbar paraspinal muscle contraction, the disappearance of lumbar lordosis, antalgic gait pattern, positive Neri's sign, diminished right and abolished left Achilles reflex. The rest of the exam was unremarkable. At the time of admission, the patient was in his sixth day of antibiotic treatment. The patient had no signs of pilonidal cyst at that time.

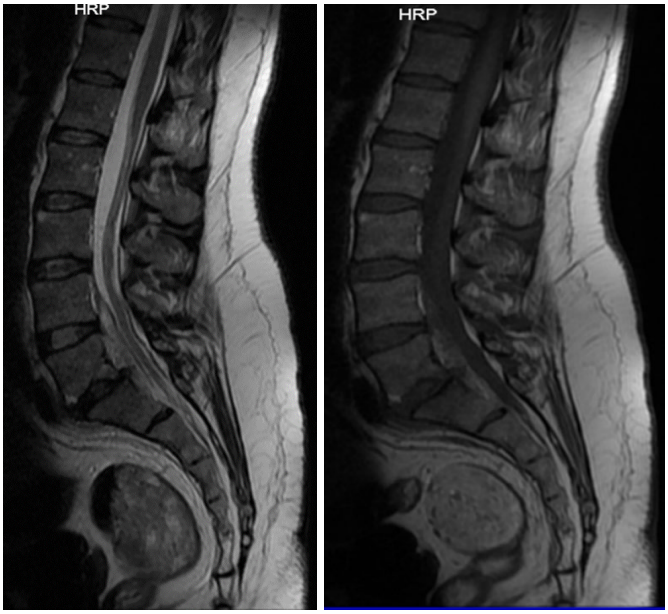

Figure 1a: Sagital T2-MRI of the lumbosacral spine
Figure 1b: Sagital T1-MRI of the lumbosacral spine

Complete blood work was done. Notable laboratory values included mild inflammatory syndrome (erythrocyte sedimentation rate=64 mm/h and the C-reactive protein=8.2 mg/ dL), and slightly increased creatine kinase and serum transaminases values.

In order to identify the infectious source and to exclude any risk factors for immunodeficiency, we had a multidisciplinary approach. Thus, we excluded HIV infection, syphilis, diabetes, kidney, liver and autoimmune diseases. The cardiologic evaluation, including echocardiography, did not reveal any pathological changes. The abdominal ultrasound showed hepatic steatosis.

At the infectious disease specialist's instructions, we ceased the antibiotic treatment after ten days and performed two blood culture sets that were negative. In addition, we performed urinary culture tests and the results came in as negative even after ceasing the antibiotic treatment. A throat culture excluded streptococcal pharyngitis.

For a better anatomical description, a gadolinium-enhanced lumbosacral MRI was performed. The images confirmed the diagnosis, revealing the presence of a region witg high T2 signal and low T1 signal surrounded by a rim of enhancement, which strongly suggest the presence of an abscess (Figure 2a, Figure 2b).

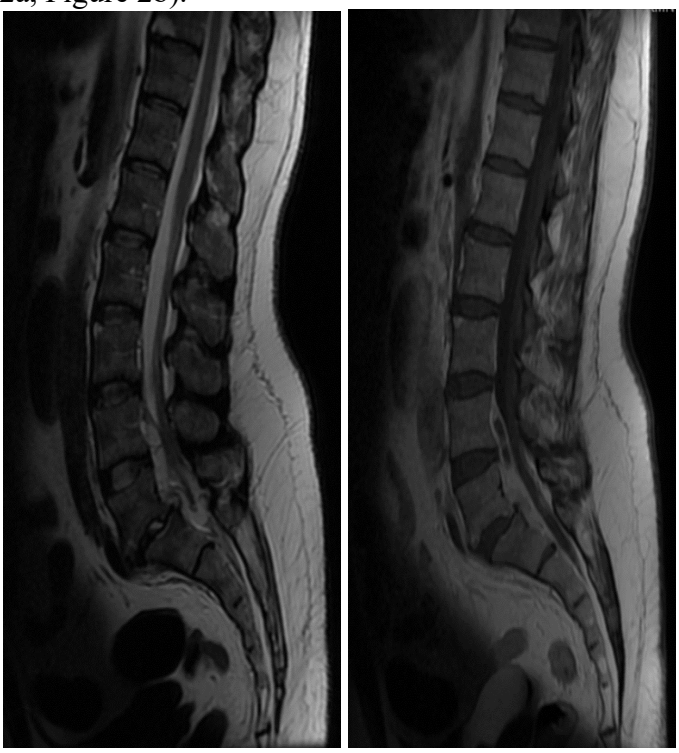

Figure 2a: Sagital T2-MRI of the lumbosacral spine
Figure 2b: Sagital T1-MRI of the lumbosacral spine with contrast-enhancement

During hospitalization, the patient suffered from increased back pain with an intensity that reached 9 out of 10 on numeric pain rating scale, only partially diminished after antialgic drug administration such as opioids (Tramadol 100mg). In addition, he developed rapid clinical deterioration with paresthesia and weakness along the distribution of the left sciatic nerve, indicating sciatic nerve palsy.

He underwent emergent surgery with decompression of the dural sac by L5 laminectomy, abscess evacuation, L5-S1 discectomy and posterior L5-S1 synthesis. Cultures were obtained but there was no etiologic agent found. However, empiric post-surgical antibiotherapy was initiated with Vancomycin 1g x 2/day for six weeks, Ciprofloxacin 400 mg x 2/day and Metronidazole 250 mg x 3/day for two weeks.

The patient's postoperative course was uneventful, with clinical and biological progressive improvement. Lumbosacral MRI showed a significant decrease in size of the lesion with no other post-surgery complications (Figure 3a and Figure 3b). Alongside antibiotherapy, pain management and thromboprophylaxy, he completed the rehabilitation program. Isometric, passive, active-assisted, active exercises were progressively performed to improve the functional capacity of muscles. A lumbar corset was used during mobilization to provide additional low back support and preventing muscles from rapidly fatiguing during recovery. The patient relied on a walker for the first 7 days after surgery, then he walked with a cane. Mobilization was repeated up to 3 to 4 times on a daily basis associated with balance and strengthening exercises. Assistive equipment was withdrawn after the successful independent mobilization of the patient.

Eventually, 6 weeks post-surgery, the patient could walk independently but still having slight difficulty descending the stairs, with no need for pain medication and the inflammatory markers were in the normal ranges. The modified Barthel score for activities of daily living and mobility improved significantly (from 45 points to 95 points).

He was discharged with a basic home exercise program, having no need for any medication, supervision or assistance, being able to perform independently his daily routine.


Figure 3a: Sagital T1-MRI of the lumbosacral spine with contrast enhancement
Figure 3b: Sagital T1-MRI of the lumbosacral spine

Discution

The incidence of spinal epidural abscess has been increasing in the past several decades. The rising incidence is likely multifactorial. The human immunodeficiency virus epidemic, invasive medical procedures and rising intravenous drug abuse are probable contributory factors. Other risk factors are diabetes, alcoholism, renal/liver/cardiac disease. Back pain and fever are cardinal symptoms. Back pain is the most common complaint and can be elicited by percussion over the spinous processes overlaying spinal epidural abscess or through straight leg raise (5).

Prompt diagnosis confirmed by gadolinium-enhanced magnetic resonance imaging (MRI) with appropriate treatment is very important in SEA. Despite advances in imaging, SEA remains difficult to diagnose because of its nonspecific presentation. In the emergency department, around 75% of SEA cases are misdiagnosed with resulting diagnostic delay and complications (9).

There are several markers routinely used in clinical practice that are very important for diagnosis and further evaluation of treatment response. Laboratory evaluation should include inflammatory markers, complete blood count, urinary and blood cultures. Erythrocyte sedimentation rate (ESR) is often elevated in these patients and is a sensitive marker of infection (85% to 94% sensitivity) but with low specificity. ESR is also used, as a marker of therapeutic response and prognosis, but normal values does not rule out the diagnosis of spinal epidural abscess (10). With a higher specificity in diagnosis is the C-reactive protein (CRP). This inflammatory marker is considered to be the best monitor of treatment response because after adequate treatment it returns to normal faster than ESR. Procalcitonin (PCT) can be elevated in patients with epidural abscess due to a pro-inflammatory stimulus, especially of bacterial origin, but its sensitivity is lower than CRP. The white blood cells (WB) count has the lowest sensitivity and specificity and is the least useful of all inflammatory markers (11).

Once a spinal infection is suspected, it is recommended to obtain blood and urine cultures before starting an empiric antibiotic therapy. Up to 59% of positive blood cultures identify the causative microorganism in patients with monomicrobial pyogenic spinal infections. Lumbar puncture is relatively contraindicated. Cerebrospinal fluid evaluation may show pleocytosis and elevated proteins (12).

Gadolinium-enhanced MRI is considered the gold standard for detecting an epidural abscess because can provide good anatomical information about surrounding soft tissues and epidural space. The sensitivity and specificity is approximately 90%. Diffusion-weighted sequences are useful for diagnosis. There are no pathognomonic findings on MRI, therefore a variety of *additional*, nonspecific tests are mandatory. Other imaging techniques like plain radiograph and CT does not provide direct visualization of the collection, however they can be useful in visualizing the bone structure (13).

After establishing the diagnosis, the treatment will be decided individually. For the past century, systemic antibiotic therapy associated with surgical decompression was considered the treatment of choice, but in the literature, there are numerous reported cases of successful non-operative treatment. Empirical antibiotic treatment should cover both Gram-positives and Gram-negatives, and then the definitive therapy will be based on culture results (14).

In addition to conflicting reports in the literature, it is difficult to determine the efficacy of non-surgical management. Furthermore, it is difficult to evaluate the best treatment option because of the paucity of studies investigating the risk of failure of non-operative management (15).

The largest American series of bacterial spinal epidural abscess was published in Medicine (Baltimore) in 1992, providing a review of clinical features and management. The study shows the outcome is definitely predicted by preoperative status (16). There is a consensus that early surgical decompression will prevent the progression of neurologic impairment and combined with systemic antibiotics is still considered the gold standard (11).

Few studies explore rehabilitation techniques for patients with spinal epidural abscess and paralysis, particularly predictors of recovery and eventual outcomes. Basic rehabilitation approaches during early stages will provide significant contributions to the improvement of patient sensory and motor skills, balance and proprioception. Continuing the rehabilitation period after hospitalization, including different techniques performed in the home environment, increase the independence of patients in daily living activities and minimize the assistance of other people. A detailed physical examination, including complete neurological evaluation, cardiopulmonary and psychological status is necessary before initializing an optimal rehabilitation program. Associated diseases, age and the anatomical level of the lesion is important to estimate the possible outcome (7). Prolonged immobilization, seen especially in patients with SEA and neurologic deficits and those who went under surgical treatment, leads often to complications and delayed recovery. In those cases, it is necessary to implement early preventive measures and the rehabilitation programs should be conducted carefully (17). Generally, the studies show a better outcome for patients surgically decompressed within 48 hours of presentation (18).

Before addressing rehabilitation procedures, pain management, antibiotic treatment and surgery, when is necessary, are a priority. A correct amount of resting time is beneficial both for pain management and for maintenance of stability. A successful rehabilitation program should assist patients to return their daily living activities by providing early mobilization with pain reduction, strengthening of weak muscles or prevention of muscle weakening, stabilization, correct posture and trunk mobilization (19).

A good nutrition is essential during the rehabilitation process. All macronutrient components should be provided, especially a proper intake of proteins since metabolic requirements are increased during both disease and the rehabilitation period. An inadequate amount of protein will lead to negative nitrogen balance and then to wasting or destruction of tissue that will make the recovery process much more difficult. In addition, monitoring daily caloric intake is an important factor, especially in patients with paraplegia or tetraplegia. The perfect balance between caloric intake and consumption will decrease the risk of obesity, dyslipidemia, insulin resistance, postprandial hyperlipidemia and inflammation (20).

Pylonidal cyst is a common inflammation disease located usually in the sacrococcygeal area and affects mostly working males between the age of 15 and 30. It has a benign evolution, rarely causing complications and exceptionally leads to spinal infections. We consider that in the given clinical context the spinal epidural abscess was secondary to the pilonidal cyst, due to contiguous spread. We found only two reported cases of epidural abscesses linked to pilonidal disease.

Conclusion

Spinal epidural abscess is a life threatening disease with high mortality rate. Proper management and treatment leads to early rehabilitation and better outcome.

Pilonidal cyst is an exceptionally rare cause for epidural abscess, especially in immunocompetent patients.

The rehabilitation program requires a multidisciplinary approach. We should not neglect the long-term follow up of the patients with infection-related spinal cord diseases. More studies are required reporting longer-term outcomes, bringing us closer to a conclusive guideline.

Informed consent

An informed consent was obtained from the patient participating in the study.

Declaration of conflict of interests

The authors declare no conflict of interest.

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