

E-ISSN: 2395-1958  
P-ISSN: 2706-6630  
IJOS 2020; 6(3): 23-25  
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[www.orthopaper.com](http://www.orthopaper.com)  
Received: 16-05-2020  
Accepted: 18-06-2020

**C Calderon**  
Neurosurgical Resident,  
Department of Clinical Surgical  
Sciences, The University of The  
West Indies, St Augustine,  
Jamaica

**A Haralsingh**  
House Officer, Department of  
Surgery, Eric Williams Medical  
Sciences Complex, Tobago

**D Ramnarine**  
Lecturer, Department of Clinical  
Surgical Sciences, The University  
of The West Indies, St.  
Augustine, Jamaica

**Corresponding Author:**  
**C Calderon**  
Neurosurgical Resident,  
Department of Clinical Surgical  
Sciences, The University of the  
West Indies, St Augustine,  
Jamaica

## Holospinal epidural abscess: An unexpected find

C Calderon, A Haralsingh and D Ramnarine

DOI: <https://doi.org/10.22271/ortho.2020.v6.i3a.2171>

### Abstract

**Introduction:** Spinal epidural abscesses present infrequently in surgical practice resulting in neurological morbidity, and mortality. A rare find is the presence of an abscess involving the entire cervical, thoracic and lumbosacral regions of the spine, with limited reported cases in literature. When this is encountered urgent neurosurgical intervention is required to improve patient prognosis.

**Case Description:** A 58-year-old, poorly controlled type II diabetic male, presented with a 3-week history of lower back pain and progressive limitation in ambulation. Further deterioration was observed in-hospital, with a sudden decline in power of the lower limbs from a Medical Research Council (MRC) grade 5 to 2. This prompted urgent magnetic resonance imaging of the whole spine, which depicted an epidural abscess extending from the cervical vertebrae - C3, to the sacrum - S1, with resulting compression of the spinal cord. An emergency multi-level laminectomy was performed with drainage of the epidural space. There was resolution of his sensory deficits and objective improvement in power of the lower limbs post-operation. Culture reports showed the culprit organism to be *Escherichia coli*.

**Conclusion:** Severe back pain in the diabetic patient requires careful assessment and monitoring. Emergency surgical decompression within 72 hours of neurological symptoms improves prognostic outcomes in patients with spinal epidural abscesses. We contend that performing a multi-level laminectomy procedure is the best option for an extensive posterior spinal epidural abscesses without bony involvement. Other methods such as image-guided percutaneous drainage, catheter procedures and intermediate level fenestration procedures, while less invasive, may be more likely to fail.

**Keywords:** Holospinal, spinal epidural abscess, segmental laminectomy, *escherichia coli*

### Introduction

A spinal epidural abscess (SEA) is a rare but serious condition which is often misdiagnosed in its early stages. It accounts for 0.2 – 2 per 10 000 hospital admissions, and most often presents with non-specific symptoms such as back pain and tenderness over affected spinal segments. Predisposing factors include diabetes mellitus, alcoholism, prior surgical intervention, intravenous drug abuse, and any immunocompromised state.

Manifestation of a SEA will typically occur due to skin or soft tissue infection which has spread haematogenously to the epidural cavity <sup>[1]</sup>. Gadolinium-enhanced magnetic resonance imaging (MRI) is essential in attaining the diagnosis. Neurosurgical decompression remains the mainstay of treatment, although medical management is an option in select patients <sup>[2]</sup>.

Very rarely, an epidural abscess may extend across the cervical, thoracic, lumbar and sacral vertebral segments. These pan-spinal or holo-spinal epidural abscesses consist of a limited number of reported cases in the literature.

### Case Report

A 58-year-old male presented with a 3-week history of severe lower back pain and a 1-day history of fever. This was associated with progressively limited ambulation secondary to the rising intensity of his lower back pain. Comorbidities entailed poorly controlled diabetes mellitus of six (6) years duration.

On admission, he was tachycardic and febrile. The initial neurological examination was unremarkable with normal tone, power and reflexes. Blood investigations revealed a leukocytosis ( $24.4 \times 10^3/\mu\text{L}$ ) with left shift (82.8%), and an elevated C-reactive protein (81.9 mg/L). Additionally, his random blood glucose measurement was 414 mg/dL.

Empirical broad-spectrum antibiotic therapy was initiated and a computed tomography-aortogram was ordered to exclude aortic dissection. It revealed an incidental finding of paraspinous muscle emphysema extending into the spinal canal (Figure 1).

New complaints of both upper and lower limb weakness, with accompanying paresthesia distally, prompted an urgent MRI for further evaluation. MRI whole spine depicted an epidural abscess extending from the C3 vertebral level to the S1 vertebral level with compression of the spinal cord (Figures 2 and 3).

Emergency neurosurgical intervention was undertaken. Separate laminectomies were performed in the lower cervical, upper and lower thoracic, and lumbar regions with drainage of the affected space. Purulent and necrotic material was also noted in the lumbar para-spinal muscle on the left. *Escherichia coli* was isolated from the pus cultures with sensitivity to ciprofloxacin. He received high dose intravenous antibiotic therapy for approximately 6 weeks. Within the post-operative period, there was resolution of sensory deficits and objective improvement in power of the lower limbs.

### Discussion

A SEA is an uncommon clinical diagnosis, representing 0.2 – 2 cases per 10,000 annual hospital admissions [1-5]. A slight but progressive increase has been noted over the decades mainly due to an aging population and an increase number of spinal surgical interventions being performed [3-6]. As a result, establishing the underlying pathology requires not only the application of the appropriate imaging techniques, but exceptional clinical acumen. As seen within this case report, although some of the classical findings of gradually worsening back pain and fever were present, other common disease aetiologies were considered initially. Furthermore, in the absence of neurological deficits, it may prove arduous attaining the correct differential [7].

The common risk factors include a history of trauma, surgical intervention and intravenous drug use. More so, what cannot be understated is the presence of an immune-compromising disease state, diabetes mellitus, as seen with this case [7, 8]. The reported patient's source of infection was attributed to an abscess collection present in the para-spinal muscles. The culprit gas-producing organism, *Escherichia coli*, facilitated the contiguous spread of bacteria into the spinal epidural space. This aggressive pathogen, in a poorly controlled diabetic patient, may lead to an insidious disease course, with an associated high morbidity and mortality [9].

Contrast-enhanced MRI is a pivotal diagnostic tool, with an approximate 90% sensitivity and specificity [8, 10, 11]. In a resource poor setting, this may not be readily available, and alternative options may be entertained, such as CT with myelography [3]. Imaging scans identify the extent of the vertebral region involved, site of abscess collection and most importantly, aids with surgical planning [11]. Although the thoracic and lumbar vertebrae are implicated in most cases, an MRI of whole spine is recommended, especially with high risk patients, as illustrated in this case [5, 8, 12].

Extensive multi-regional SEA is a rare find. Involvement of the cervical, thoracic, lumbar and sacral (CTLS) regions is referred to as a pan- or holo-spinal epidural abscess and have been reported a limited number of times in the literature. Among reported cases of this phenomena, none have reported *Escherichia coli* as being the causative organism [2, 13-15].

These abscesses are traditionally thought of as a surgical

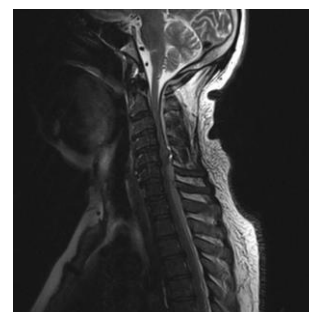
emergency. Extensive spinal epidural abscesses are notoriously associated with neurological deficit, which may at times lead to deterioration in the form of quadriplegia [13, 20]. Any form of delay in attaining a diagnosis or administering appropriate management may result in irreversible damage. There is controversy on the role of conservative management. The failure rate of non-surgical management of spinal epidural abscesses is high, about 41% [21]. In the presence of neurological deficit and a case of multi-regional disease, especially when cervical and thoracic lesions are implicated-the result is unforgiving morbidity and we believe surgical management is ideal [13, 16].

Appropriate management is grounded on the use of a long course of parenteral antibiotics and prompt surgical decompression of purulent material – the latter relieving the mechanical assault being placed on the spinal cord [2, 13, 17]. Both minimally invasive and open approaches have been described in the literature. Less invasive techniques include the use of CT guided percutaneous drainage, and the use of microsurgical tubular retractor systems [4, 18, 19]. Open access to the spinal abscess collection may be attained via a laminectomy, laminotomy or inter-laminar approach. An extensive contiguous laminectomy threatens the risk of spinal instability [4, 13]. Hence, in this case, non-contiguous multilevel laminectomies were performed over 2-3 vertebrae per segment to deter this occurrence. Multi-level laminectomies seem to be the procedure of choice for holo-spinal epidural abscesses, achieving satisfactory results in the most patients [2].

### Appendix



**Fig 1:** Sagittal view of a CT Aortogram showing para-spinal muscle emphysema and an air pocket in the spinal canal at the thoracolumbar level



**Fig 2:** Sagittal view of an MRI (T2-weighted image) of the cervical spine showing the spinal epidural abscess posterior to the spinal cord, commencing at the C3 vertebral level



**Fig 3:** Sagittal view of an MRI (T2-weighted image) of the thoraco-lumbo-sacral spine showing the spinal epidural abscess posterior to the spinal cord, extending down to the S1 vertebral level

### Conclusion

We report the rare case of a holo-spinal epidural abscess in a middle-aged diabetic male, who required emergency neurosurgical decompression at multiple levels. Among a handful of case reports of holo-spinal epidural abscesses, *Escherichia coli* has never been formerly reported as the causative organism. It is important for clinicians to have a high clinical index of suspicion when assessing diabetic patients with lower back pain. Once diagnosed, prompt neurosurgical decompression and long-term parenteral antibiotics are essential to recovery.

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