



Case Report

# Holospinal epidural abscess in elderly patient: A case presentation and review

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## ABSTRACT

**Background:** Holospinal epidural abscess (HEA) is a rare pathological entity with significant morbidity and mortality rates. Here, we present a 74-year-old male with HEA treated with focal skip laminectomies and catheter irrigation.

**Case Description:** A 74-year-old male presented with fever, neck/back pain, and slight weakness in his legs bilaterally (4/5). The patient underwent a magnetic resonance imaging (MRI) of the entire spine showing an epidural collection extending from C5-C6 to the L4-L5 levels. Laboratory studies revealed a leukocytosis and an elevated C-reactive protein level. Blood cultures were positive for methicillin-sensitive *Staphylococcus aureus*. The patient underwent skip laminectomies at C6 and C7; T2, T3, T5, T6, T8, T9, T10, and T12; and L3, L4, and L5 with catheter irrigation between these levels; this minimized the risk of postoperative kyphosis and instability. His postoperative course was uneventful. Other surgical approaches to HEA described in literature include laminectomy, focal laminectomies, and skip laminectomies.

**Conclusion:** In this case of a holospinal HEA, skip laminectomies and catheter irrigation avoided neurological deterioration and delayed spinal instability in a 74-year-old male.

**Keywords:** Abscess, Epidural, Holospinal, Laminectomy, Surgery

## INTRODUCTION

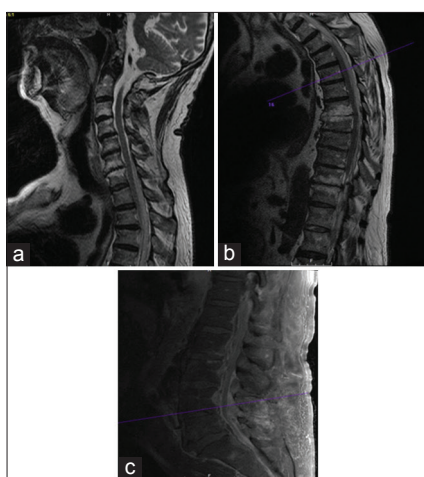
Epidural abscess (EDA) is a life-threatening condition that can rapidly lead to permanent neurological deficits and even death due to sepsis if the diagnosis and treatment are delayed.<sup>[2,6]</sup> The pathogenesis is attributed to direct contamination (iatrogenic/adjacent spinal structures [30% of patients] or hematogenous spread); in one-third of patients, the source remains unknown.<sup>[6,9]</sup> Three main predisposing factors to EDA include immunosuppression, trauma, prior spine surgery, and epidural injections.<sup>[6,8]</sup> The most common locations for EDA include the lumbar or thoracic spine, only rarely are EDA holospinal in location.<sup>[1-9]</sup>

The clinical triad for EDA includes fever, back pain, and neurologic decline; however, in some patients, symptoms and signs may be nonspecific (e.g., malaise and fever).<sup>[2,6]</sup> The absence of inflammatory markers and leukocytosis does not preclude the presence of EDA.<sup>[9]</sup> Magnetic resonance imaging (MRI) yields the greatest diagnostic accuracy.<sup>[4]</sup> EDA is primarily bacterial

infections; *Staphylococcus aureus* is the most frequently isolated pathogen.<sup>[2,3]</sup> Blood cultures are crucial for prompt identification of the causative agent that then directs appropriate antimicrobial treatment.<sup>[3]</sup> However, if neurological deterioration occurs, surgical drainage may be warranted.<sup>[2]</sup> Here, we present a rare case of a holospinal epidural abscess (HEA) in a 74-year-old patient who required spinal surgery consisting of multilevel skip laminectomies with epidural irrigation.

## CASE DESCRIPTION

A 74-year-old male complained of neck and back pain for 10 days duration. He had previously been diagnosed



**Figure 1:** Mid-sagittal T2-weighted MRI images of the cervical (a), thoracic (b), and lumbar (c) spine with contrast showing an epidural collection extending from C5/C6 to L4/L5 vertebrae with mass effect on spinal cord at levels of the C6 and T4 vertebrae.

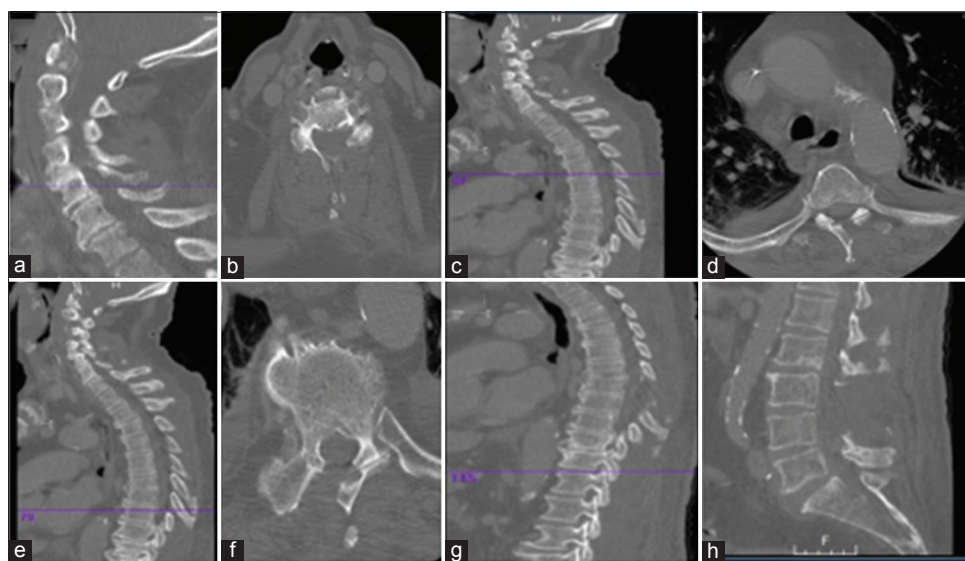
with lumbar spinal stenosis (L3/4 and L4/5) and had recently been placed on methylprednisolone. In the emergency department, he was febrile to 37.7°C, and he exhibited intermittent confusion, mild weakness in both lower extremities (4/5), and diminished deep tendon reflexes bilaterally. Laboratory studies showed a marked leukocytosis (33,000/mm<sup>3</sup>) with 92% neutrophils and a markedly elevated C-reactive protein (CRP) (166 mg/L) level.

## Diagnostic MR and laboratory studies

The patient underwent an MRI of the entire spine with and without contrast; it showed an epidural collection consistent with an epidural abscess extending from C5/C6 all the way to L4/L5 level, accompanied by maximal cord compression at C6 and T4 [Figures 1a-c]. When blood cultures were positive for methicillin-sensitive *S. aureus*, the patient was started on oxacillin.

## Lumbar surgery

With the diagnosis of a holospinal spinal EDA, the patient underwent multiple skip laminectomies (e.g., at the C6, C7, T2, T3, T5, T6, T8, T9, T10, and T12 levels); complete laminectomies were performed at L3, L4, and L5 [Figures 2a-h]. Cultures were obtained intraoperatively. A small-bore catheter was then used to irrigate the epidural space between the laminectomies to complete EDA evacuation. Four drains were left in place. The estimated blood loss was 800 cc. The postoperative MRI scans showed complete resolution of the holospinal HEA [Figures 3a and b]. His postoperative course was uneventful, and 18 months later, he had fully recovered.

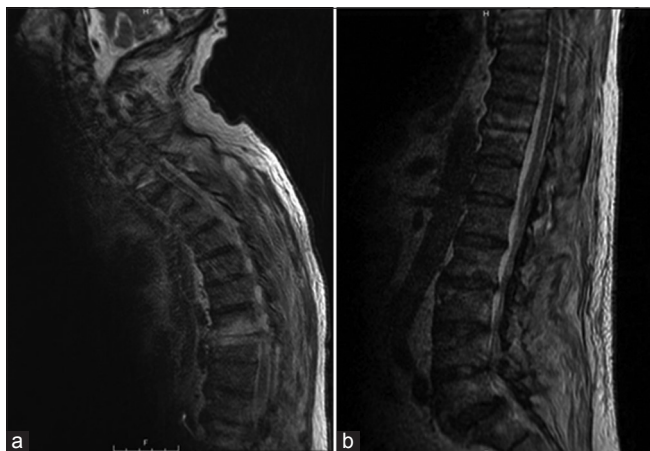


**Figure 2:** Computer tomography scans showing the left ipsi-/contra-lateral laminectomy at C5-6 level (a,b), left T5 ipsi/contra laminectomy (c,d), right T8 ipsi/contra laminectomy (e,f), left T11 ipsi-contra laminectomy (g), L4,L5 laminectomies (h).

## DISCUSSION

### Diagnosis of HEA

In literature, there are few reports of HEAs [Table 1]. MRI is the method of choice for establishing the diagnosis and can also be used to differentiate intraspinal from extraspinal



**Figure 3:** Postoperative mid-sagittal T2-weighted magnetic resonance imaging images of the cervicothoracic junction (a) and lumbar (b) spine with contrast showing complete resolution of the epidural collection.

sites of infection (e.g., paraspinal, retrosigmoid, and psoas areas).<sup>[2,6-8]</sup> Blood cultures are positive in two-thirds of the cases and must be obtained as soon as possible for the identification of the causative agent.<sup>[2,3]</sup> Early treatment of HEAs is essential to prevent irreversible disability.<sup>[2,8]</sup>

### Surgery of HEA

Surgical management of HEAs is critical to avoid neurological deterioration.<sup>[2,8,9]</sup> Notably, neurological impairment may even appear without mechanical cord compression; this is attributed to arteritis, venous thrombosis, and septic thrombophlebitis.<sup>[9]</sup> The use of conservative treatment may be successful in selected HEA cases; this requires continued intravenous antibiotic therapy with repeated blood cultures documenting resolution, declining CRP values, and careful monitoring of neurological function (e.g., negligible neurological deficits without progression). Conservative treatment may also be the only option in those with major prohibitive comorbidities.<sup>[9]</sup>

### Surgical approaches

Multiple surgical alternatives for treating HEAs include (1) multilevel laminectomy (e.g., of the entire vertebral column), (2) focal laminectomies (e.g., at levels of maximal cord compromise), and (3) skip laminectomies using epidural

**Table 1:** Recent reported cases of HEAs in literature that were treated surgically.

Authors	Year	Patients	Type of surgery	Outcomes
Abd-El-Barr <i>et al.</i> <sup>[1]</sup>	2015	2	Apical laminectomies	At 1-year follow-up restoration of muscle strength and resolution of the abscess in both patients.
Bridges <i>et al.</i> <sup>[2]</sup>	2017	8	1 panspinal laminectomy 4 focal laminectomies 3 skip laminectomies	3/4 patients with focal laminectomies required additional operations No difference in outcome between patients who underwent skip versus panspinal laminectomies 2/6 patients with cervical laminectomies had fusions at the time of decompression. Of the remaining four patients, two developed postoperative kyphosis warranting surgical correction.
Gorchynski <i>et al.</i> <sup>[3]</sup>	2009	1	Panspinal laminectomy	Upon discharge 2 weeks after initial ED visit slight (4/5) left lower extremity motor weakness with continued right lower extremity weakness (3/5 proximally, 2/5 distally) At 3 months postdischarge normal upper and left lower extremity motor strength with no sensory deficits, with the right lower extremity motor strength of 3/5 6 months and 1 year after discharge, the patient continued to have right lower extremity 3/5 weakness as his only remaining neurological deficit.
Kopley <i>et al.</i> <sup>[4]</sup>	2015	1	L2 and L3 bilateral partial hemilaminotomy	N/A*

(Contd...)

**Table 1:** (Continued)

Authors	Year	Patients	Type of surgery	Outcomes
Lau <i>et al.</i> <sup>[5]</sup>	2014	2	1 <sup>st</sup> patient: Transoral odontoidectomy, removal of the anterior arch of C1, and partial corpectomy of C2 2 <sup>nd</sup> patient: L2–L3 laminectomy	1 <sup>st</sup> patient: 6 days postoperative laminectomy of C3–C6 and C1–C2 posterior cervical fusion At 13-month follow-up, significant restoration of upper extremity strength (4/5). 2 <sup>nd</sup> patient: 2 days postoperative additional segmental laminectomies at C3–C6 and T6–T9 for further decompression and abscess drainage In postoperative, MRI decrease of the epidural abscess. At 1-month follow-up, lower extremities had 3/5 motor strength.
Oh <i>et al.</i> <sup>[6]</sup>	2016	1	Skip laminectomies at C3-7, T11, and L2-4	By postoperative day 10 neurologically intact.
Shiu <i>et al.</i> <sup>[7]</sup>	2014	1	Vertebroplasty of L4, laminectomy of T6 and T8	Restoration of muscle strength to 2 of 5 after follow-up for 53 days, but failure to wean from ventilator.
Siasios <i>et al.</i> <sup>[8]</sup>	2019	1	Skip laminectomies at T2-3, T9-10, and L3-5	Interval MRI showed resolution of the epidural abscesses, with some residual at L4-S1 as well as discitis/osteomyelitis at L4-5 and L5-S1, and minimal fluid and edema at the thoracic spine.
Smith <i>et al.</i> <sup>[9]</sup>	2014	2	1 <sup>st</sup> patient: Skip laminectomies at C6–7, T7–8, and L-1 2 <sup>nd</sup> patient: Laminectomy of L3	1 <sup>st</sup> patient: 3.5 weeks postoperative unchanged motor strength but improved tone present in his ankle and hips, with a sensory level at T-3 At the 1- and 3-month follow-up, MRI studies complete resolution of the epidural abscess. Rehabilitation did not improve neurological examination. 2 <sup>nd</sup> patient: 6 days postoperative emergency C1–2 laminectomy 3 weeks after admission greatly improved upper extremity strength (5/5) bilaterally, but lower extremity strength unchanged (1/5 bilaterally).

\*N/A: Not available. HEA: Holo-spinal epidural abscess

irrigation/aspiration (e.g., fewer laminectomies/reduced instability).<sup>[1-3,5-9]</sup> In most cases, instrumentation is not used. Bridges *et al.* noted comparable neurological outcomes for skip laminectomies versus panspinal laminectomies with HEA. The superiority of skip laminectomies involving the cervical, thoracic, and lumbar spine versus focal laminectomies was also supported by other studies.<sup>[5,9]</sup> Alternatively, those undergoing restricted laminectomies were more likely to require reoperations at additional levels for proper abscess evacuation with/without fusion.<sup>[2,5]</sup>

### Skip laminectomies

A modification of skip laminectomies for liquid pus evacuation was described by Abd-El-Barr *et al.*; this involved three

separate midline incisions at the midcervical, midthoracic, and midlumbar levels.<sup>[1]</sup> A pediatric feeding tube was inserted into the epidural space caudad and cephalad, followed by abscess irrigation. For ventrally located C1-C2 EDA, Lau *et al.* described performing a transoral odontoidectomy, with the removal of the anterior arch of C1 and partial corpectomy of C2.<sup>[5]</sup> In our patient's preoperative MRI, the abscess was dorsally located (e.g., with peripheral enhancement suggestive of liquid state), and therefore, a purely dorsal decompressive approach was sufficient for EDA removal.

### CONCLUSION

Complete evacuation of dorsally located and liquefied HEAs is feasible even in elderly patients with significant

comorbidities utilizing skip laminectomies and intervening catheter irrigation for aspiration of epidural pus. Such skip procedures significantly reduce the risk of postoperative kyphosis.

#### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

#### REFERENCES

1. Abd-El-Barr MM, Bi WL, Bahluyen B, Rodriguez ST, Groff MW, Chi JH, *et al.* Extensive spinal epidural abscess treated with “apical laminectomies” and irrigation of the epidural space: Report of 2 cases. *J Neurosurg Spine* 2015;22:318-23.
2. Bridges KJ, Than KD. Holospinal epidural abscesses institutional experience. *J Clin Neurosci* 2018;48:18-27.

3. Gorchynski J, Hwang J, McLaughlin T. A methicillin-resistant *Staphylococcus aureus*-positive holospinal epidural abscess. *Am J Emerg Med* 2009;27:514.e7-9.
4. Koplay M, Sivri M, Emiroglu MK, Guler İ, Karabagli H, Paksoy Y, *et al.* Holospinal epidural abscess in a child patient: Magnetic resonance imaging findings. *Spine J* 2015;15:e1-2.
5. Lau D, Maa J, Mummaneni PV, Chou D. Holospinal epidural abscess. *J Clin Neurosci* 2014;21:517-20.
6. Oh GS, Abou-Al-Shaar H, Arnone GD, Barks AL, Hage ZA, Neckrysh S, *et al.* Spinal epidural abscess in a patient with piriformis pyomyositis. *Surg Neurol Int* 2016;7:S911-13.
7. Shiu SI, Lee BJ, Chen HC, Lin YH, Wang CY. Holospinal epidural abscess complicated with bilateral psoas muscle abscess. *Spine J* 2014;14:1072-3.
8. Siasios ID, Szewczyk B, Zakeri A, Kowalski JM, Dimopoulos VG. Holospinal epidural abscess combined with multifocal extraspinal abscesses in rheumatoid arthritis. *J Neurosurg Sci* 2019;63:348-50.
9. Smith GA, Kochar AS, Manjila S, Onwuzulike K, Geertman RT, Anderson JS, *et al.* Holospinal epidural abscess of the spinal axis: Two illustrative cases with review of treatment strategies and surgical techniques. *Neurosurg Focus* 2014;37:E11.

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