

# Cervical Intradural Abscess Masquerading as an Epidural Collection

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## Abstract

Intradural spinal cord abscesses especially in the cervical spine are a rare occurrence. We report a rare presentation of an intradural extramedullary abscess at the atlantoaxial level, initially misdiagnosed as an epidural collection. The patient presented with worsening quadriparesis preceded by a 2-week history of upper respiratory tract infection and neck pain. Magnetic resonance imaging showed evidence of an epidural abscess on the left side abutting the cervicomedullary junction. We performed occipitocervical fixation and surgical decompression. Absence of a suspected epidural abscess led us to consider a durotomy, and an intradural abscess was recognized and drained. Presence of an intradural abscess, though extremely rare, must always be considered in suspected spinal epidural collections as radiological and clinical findings are indistinguishable between the two conditions.

## Keywords

- ▶ intradural spinal cord abscess
- ▶ epidural spinal cord abscess
- ▶ meningitis
- ▶ spinal cord compression

Spinal subdural abscess (SSA) is a rare entity with unknown incidence.<sup>1,2</sup> Most of them occur in the thoracic and lumbar spine, and they are much rarer in the cervical spine.<sup>1</sup> To date, around nine cases of cervical spine subdural collections have been reported.<sup>1–3</sup> Subdural collections comprise both intramedullary and extramedullary abscesses. Intradural extramedullary spinal cord abscesses are rare entities and even much rarer in the cervical spine. We hereby report a rare presentation of an intradural extramedullary abscess at the atlantoaxial level.

These abscesses are associated with a high morbidity and mortality, and thus early diagnosis and emergent treatment are vital to prevent progression of neurological deficits and death. Cervical spine intradural abscesses also pose a further diagnostic challenge as their location makes them radiologically indistinguishable from the more common epidural collections.<sup>3,4</sup> In our case, the intradural extramedullary abscess was initially misdiagnosed as an epidural collection, which turned out to be intradural upon exploration.

## Case Report

### History and Examination

A 71-year-old man presented at our institution's emergency department with worsening quadriparesis. Prior to this presentation, he had a 2-week history of upper respiratory tract infection as well as neck pain, which were both treated symptomatically. One week before admission, he began experiencing progressive weakness in all four limbs. On presentation there was notable loss of bladder and bowel control. Upon examination the left side had grade 0 power, and the right side was slightly stronger with grade 2 power in both upper and lower limbs. All reflexes were absent and anal tone was noted to be lax. Plantar response was upgoing on the left side. There was marked upper cervical and occipital tenderness.

### Investigations

Blood investigations showed a total white count of 16,500/mm<sup>3</sup>, C-reactive protein of 73, and erythrocyte sedimentation

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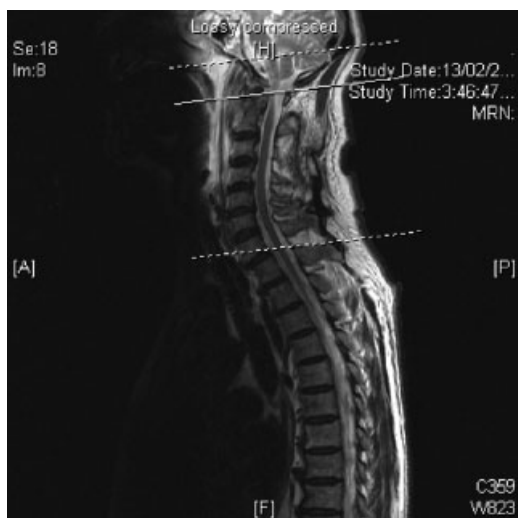
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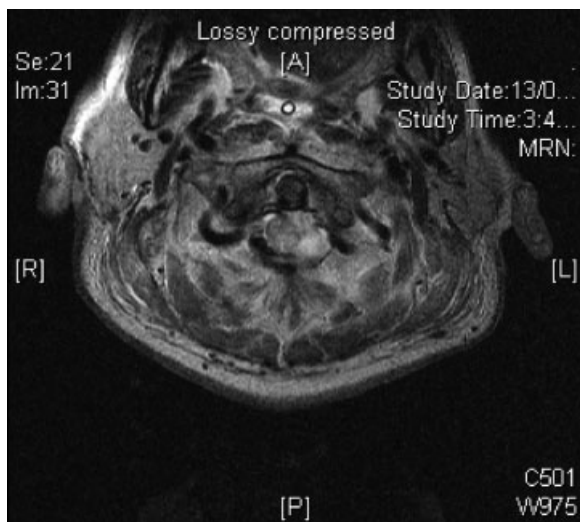


**Fig. 1** Sagittal sections of magnetic resonance imaging (T2-weighted) showing extension of the abscess from C0–C3.

rate was 100 mm/h. Cerebrospinal fluid analysis showed low glucose and high protein levels but failed to grow any organism. Imaging included plain radiographs, cervical spine computerized tomography (CT), brain and cervical spine magnetic resonance imaging (MRI). CT scans were suggestive of erosive lesions in the left-sided C1–C2 and C2–C3 facetal joints. Predentate space was widened indicating an atlantoaxial subluxation. MRI showed evidence of an epidural abscess on the left side abutting the cervicomedullary junction as well as osteomyelitis and myositis of the structures around the atlantoaxial joint (►Figs. 1–5). There were also radiological features suggestive of meningitis and pyogenic ventriculitis with no hydrocephalus or brain abscesses.

### Management

In view of the radiological findings and clinical deterioration, the decision was made for surgical intervention. The patient subsequently underwent an occipitocervical fixation from



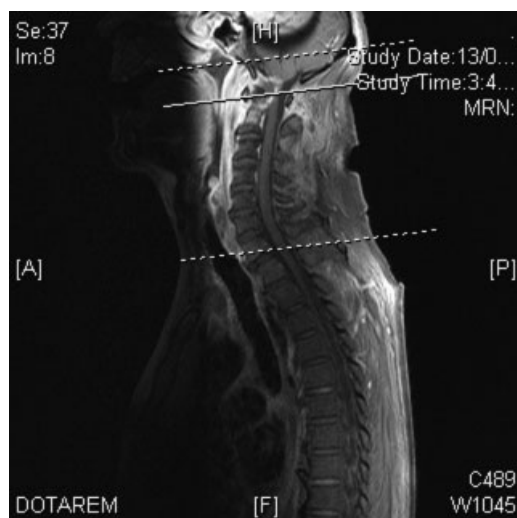
**Fig. 2** Axial section of magnetic resonance imaging (T2-weighted) at C1–C2 level showing a left-sided hyperintense cervical cord collection.



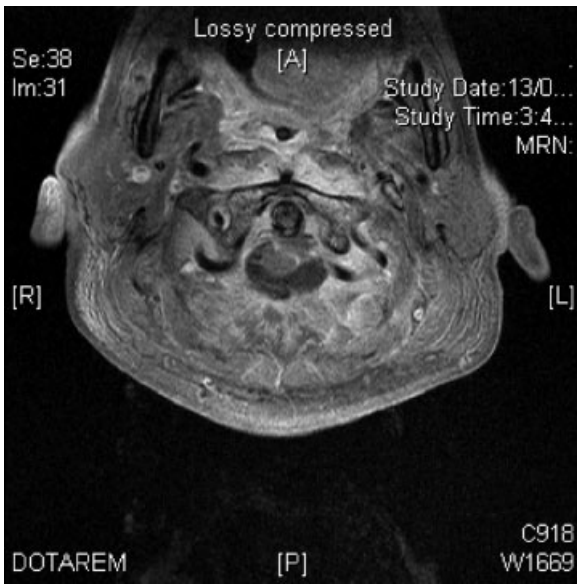
**Fig. 3** Sagittal sections of the magnetic resonance imaging (T1-weighted) showing extension of the abscess from C0–C3.

C0–C5 levels (►Fig. 6). After instrumentation, the posterior arch of C1 was drilled and removed while protecting the extradural portion of the vertebral artery. The epidural space did not have an abscess, but there were congested epidural veins. At this stage, an intradural abscess was suspected, and the dura was opened on the left side with stay sutures; the left C1 nerve root was cut to get a window to decompress the abscess cavity (►Fig. 7). Care was taken to identify and retract the intramural portion of vertebral artery and the spinal part of the accessory nerve. The abscess cavity was opened longitudinally, and semisolid purulent content was drained. Dissection was limited on the anterior aspect due to proximity of the anterior spinal artery. Durotomy was closed with Ethilon 5–0 (Johnson & Johnson, Somerville, NJ) and sealed with tissue glue.

Histopathology from intraoperative samples showed granulation tissue consistent with an abscess. Cultures grew methicillin-susceptible *Staphylococcus aureus*, which was



**Fig. 4** Sagittal sections of the magnetic resonance imaging (contrast enhanced) showing extension of the abscess from C0–C3.



**Fig. 5** Contrast-enhanced axial images showing ring enhancement of the collection.

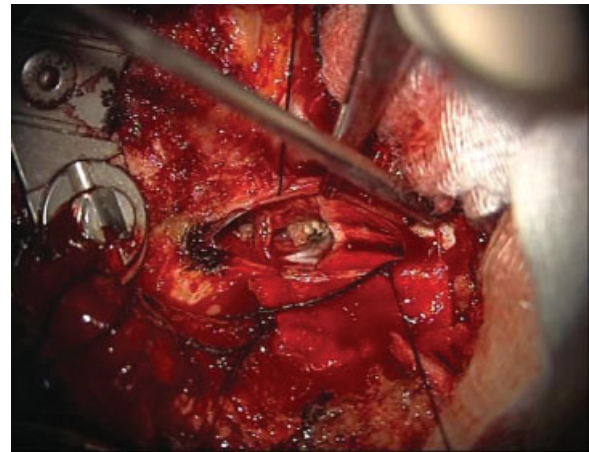
treated with an extended course of intravenous cloxacillin. The patient subsequently recovered urinary bladder and bowel function, and on the latest follow-up was noted to have grade 5 power on the left side of the body. The right upper and lower limbs still had some residual deficits.

## Discussion

Spinal cord dural anatomy and blood flow patterns unlike those of the brain are not conducive to intradural infections. Absence of dural sinuses, width of the epidural space, and centripetal direction of blood flow in the spinal vasculature all contribute toward the low incidence of these abscesses within the spinal dura.<sup>5</sup> To date, only 65 cases of SSA have been



**Fig. 6** Postoperative radiographs showing C0–C5 instrumentation.



**Fig. 7** Durotomy revealing the intradural abscess.

reported since Sittig's first described case in 1927.<sup>2,6</sup> Only nine of these cases were primary cervical spine collections with no thoracic or lumbar involvement (►Table 1).<sup>1–4,7–11</sup>

Hematogenous spread from the respiratory tract is the most common etiology followed by contiguous spread from adjacent infections.<sup>1</sup> Congenital dermal sinus or other congenital conditions with open dural defects may also result in intradural collections. Recent reports have pointed toward iatrogenic causes, such as lumbar puncture, injection of a local anesthetic agent, and discography.<sup>12</sup> Intravenous drug abuse also appears to be a major risk factor, especially in the cervical spine where 3 of 10 patients were drug abusers (►Table 1). The proposed etiology in our patient was a possible community-acquired respiratory tract infection complicated by meningitis causing bacteria seeding beyond the dura resulting in an intradural collection. Culture growth of *S. aureus* from the surgery specimen was not unexpected as *S. aureus* is the most commonly involved pathogen.<sup>1–4</sup>

Clinically and radiologically it is difficult to distinguish epidural and intradural abscesses.<sup>3,4,13</sup> Like their more common epidural counterpart, suspicion of SSA should be aroused when a febrile patient with back or neck pain reports a recent history of infection. Physical examination usually shows evolving neurological manifestations including sensory and motor deficits. Levy et al described a characteristic triad of fever, neck or back pain, and signs of cord compression, which was present in 18 of their 47 reviewed cases of intradural spine collections.<sup>3</sup> This triad was also manifested by our patient upon presentation.

Typical MRI findings of an intradural spinal abscess have been well described.<sup>4,13</sup> In T1-weighted images, the intradural lesion is usually isointense with the cord. On T2-weighted images, the contents appear hyperintense and well demarcated from the other intradural contents. On gadolinium enhancement, a typical ring-enhancing lesion is seen in the setting of an abscess.<sup>4,13</sup> However, an epidural abscess may also have some of these characteristic features and therefore diagnosis purely on imaging can be misleading. In our case, it was only after an intraoperative durotomy that the true location of the abscess was revealed.

Prognosis is highly dependent on early diagnosis and prompt intervention. Surgical drainage, together with systemic

**Table 1** Clinical summary of the nine reported cases of cervical intradural abscess

Author and year	Age (y), sex	Etiology	Investigation	Organism	Level	Treatment	Outcome
Akiyama et al, 2009 <sup>7</sup>	48, M	?	MRI	<i>S. aureus</i>	C4–6	Laminectomy, irrigation & drainage	++?
Levy et al, 1994 <sup>3</sup>	38, F	IVDA	MRI	<i>S. aureus</i>	C2–4	Laminectomy, irrigation & drainage	+++
	47, M	IVDA, retropharyngeal abscess	Myelogram/MRI	<i>S. aureus</i>	C4–7	Laminectomy, irrigation & drainage	Died
Bartels et al, 1992 <sup>1</sup>	55, M	?	CT	<i>E. coli</i>	C6–7	Laminectomy and irrigation	++
Scully et al, 1984 <sup>11</sup>	65, M	IVDA	Myelogram	?	C2–6	Laminectomy and irrigation	++
Heindel et al, 1974 <sup>9</sup>	31, F	Pregnancy, furuncle	Myelogram	<i>Staphylococcus</i>	C2–6	Laminectomy, irrigation & drainage	++
Hirson, 1965 <sup>8</sup>	66, F	Necrotic C spine	None	?	C5–6	Laminectomy	Died
	13, F	C spine trauma	None	<i>Staphylococcus</i>	C3–5	Laminectomy	+++
Negrin and Clark, 1952 <sup>10</sup>	66, F	Furuncles	LP	<i>S. aureus</i>	C3–6	Laminectomy, irrigation & drainage	Died

Abbreviations: C, cervical; *E. coli*, *Escherichia coli*; IVDA, intravenous drug abuse; LP, lumbar puncture; *S. aureus*, *Staphylococcus aureus*; ?, data not available; +, mild recovery; ++, moderate recovery; +++, full recovery.

antibiotics, is the treatment of choice.<sup>1–3</sup> Without intervention, patients can develop significant neurological deficit below the lesion, and surgery performed after this stage may not reverse the deficits. Surgical decompression and washout were performed among all the cervical intradural abscess cases reported to date, with a majority showing good recovery (► **Table 1**). Our patient presented with progressive quadriplegia including loss of bladder and bowel control. Postsurgery he improved considerably, and the only deficit that remained was a mild right-sided hemiparesis. He is able to walk independently with the help of a walking stick within 6 months after surgery.

## Conclusion

Cervical intradural abscess is an extremely rare but a well-described entity that requires prompt surgical intervention. It can be clinically and radiologically indistinguishable from the more commonly occurring epidural collection. Thus if an exploration of a suspected epidural abscess with progressive neurological deficits is performed, one must always be aware of the possibility of an intradural or a combination abscess and therefore keep a low threshold for performing a durotomy to look for a subdural collection that maybe mimicking the epidural abscess.

### Disclosures

Muhammed Yaser Hasan, None  
 K. Karupiah Kumar, None  
 Sein Lwin, None  
 Leok-Lim Lau, None  
 Naresh Kumar, None

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