



Spinal Cervical Epidural Abscess Leading to Quadriplegia

Karthik S.R^{1*}, Mamidi Rohini Reddy², Gaurav Venkat Cuddapah³, Baddam Akshitha Reddy⁴, Mudraboina Sree Vigna⁵, Hari Kishan J⁶

^{1*,2,4}Final Year Resident, ^{3,5}House Surgeon, ⁶Associate Professor and Consultant,

^{1*,2,3,4}Department of Internal Medicine,

^{1*,2,3,4,5,6}Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, IND

***Corresponding Author:**

Karthik S.R

Department of Internal Medicine, Final Year Resident, Kamineni Academy of Medical Sciences and Research Centre, Hyderabad, IND

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

SEA (Spinal cervical epidural abscess) is a rare disorder linked to considerable mortality & morbidity, early recognition of which remains elusive. Three unique case series of quadriplegia affected due to cervical SEA that occurs at the same level were reported by us, reminding clinicians of the risks of diagnosing late & the significance of treating early. Case 1 (53 years) was diagnosed with C4-5 infective spondylitis and intervening discitis with pre paravertebral and epidural abscess causing severe cord compression. Case 2 (14 years) was diagnosed with C3-4 paraspinal and epidural abscess. While case 3 (57 years) was diagnosed with spinal epidural abscess, cord compression at C3, C4 with displacement to the left, and myelitis at C1 to C4 level and the patient presented with a history of diabetic complications viz. diabetic foot ulcer (DFU) requiring amputation. Case 1 was treated with anterior cervical C4-5 microdiscectomy and an evacuation of prevertebral abscess followed by C4, C5, C6 lateral fixation under GA, postoperative antibiotics, analgesics, steroids and other supportive treatment. The patient improved symptomatically and was discharged. Case 2 was treated with C3 hemilaminectomy excision of paraspinal epidural abscess and granulation tissue under GA. Squash was suggestive of tuberculosis etiology. Post-operatively patient was put on antibiotics, analgesics, antituberculosis drugs, other supportive measures and discharged. Whereas in case 3, the infective source of the epidural abscess was traced to neglected chronic foot ulcers with rapid progression to quadriplegia. The patient condition was not conducive for surgical intervention due to the thin sheet of pus collection and associated severe myelitis. The patient was started on IV antibiotics and was discharged with antibiotics, analgesics with further management at the neurorehabilitation centre. These case series delineated common presentations like tuberculosis localized to the spine with bone involvement, where decompression surgery relieved the compression. Importance of DFU leading to a cervical epidural abscess, and how timely intervention in the form of foot disarticulation could have saved the patient from the prolonged hospital stay and possibly irreversible neurological deficit. Very common benign neck pain in a chronic diabetic should not be taken casually and pursued with repeat MRI scans

Keywords: Epidural abscess, quadriplegia, neck pain, MRI, decompression surgery

Introduction

SEA (Spinal cervical epidural abscess) is a rare disorder that accounts for nearly 2 – 25 admissions per 100 000 hospital admissions [1]. *Staphylococcus*

aureus is the commonest to cause the infection, but it can also be caused by a variety of other fungi or bacteria. Renal & liver failure, alcohol and drug

abuse, diabetes mellitus & invasive operations are all risk factors linked to the spinal cervical epidural abscess [2]. Many risk factors are associated with SEA, including diabetes mellitus, drug & alcohol abuse, liver & renal failure, and invasive procedures.3-6 Although cervical SEA does occur, the infection process usually occurs in lumbar or thoracic areas [3-7]. The abscesses frequency in the cervical region has been estimated to be around 14 percent of all spinal cervical epidural abscesses [8].

The exact SEA pathophysiology is unclear; however, the most important theory is that it is spread from remote regions via lymphatic or hematogenous routes. Anatomically, Since the tiny region around the thecal sac inhibits any adjacent disease condition progression, such as an abscess, the formation of an infectious collect within the spinal canal raises an emergency to the clinician [9]. Nervous structures, as well as the cord itself, are compressed at the condition's highpoint, causing neurological sequelae. Long delays in diagnosing are frequently caused by the vagueness of symptoms, which makes clinicians' jobs even more difficult [10].

Previous research examined the clinical manifestations, pathogenesis, and surgical treatment of destructive spondyloarthropathy (DSA).1-5 But, to our knowledge, quadriplegia caused by SEA at the same level has not been characterized well in the literature. Three unique quadriplegia cases caused by SEA that occurred at the same level were reported by us, helping clinicians remember the risk of late diagnosis & the significance of treating it early.

Case Report 1

A 50-year-old Singareni agriculture worker was brought with severe neck pain complaint with fever, chills & rigours at night for the past 1 month. He had a history of dysphagia for 10 days followed by severe neck pain, aggravated with lying down, minimally relieved with sitting upright and also had restricted neck movements, minimal radiation of pain to right upper left shoulder, with mild weakness in both upper left hands, tingling and numbness in hand. On examination, he complained of difficulty in swallowing, cough present on trying to swallow and nasal regurgitation. He had a cough with sputum for 10 days, evening rise of temperature, loss of weight. There was no history of trauma, radiating pain/bowel, bladder disturbances, ataxia, giddiness and no

respiratory difficulty. The subject had a hypertension history for 5 years and was on irregular treatment. On examination, vital parameters were found to be normal, normal movement of all limbs, power 5/5 in all limbs, ambulant, no grip weakness, mild decrease sensation by 5 to 10 % in the right arm: no sensory deficits, bilateral plantar mute and neck pain.

The patient presented with the above complaints underwent an MRI scan. His MRI C spine showed infective spondylitis involving C4-5 and intervening disitis with pre, paravertebral and epidural abscess causing severe cord compression. X-ray C- spine showed kyphosis and posterior listhesis of C5-C6. He was started on anti-Koch's treatment and was planned for surgery in two steps. He underwent anterior cervical C4-5 microdiscectomy, debridement and evacuation of the prevertebral abscess under general anaesthesia. Post-operatively he was treated with antibiotics, analgesics, steroids, and other supportive measures. He underwent surgery again after 3 days for C4, C5, C6 lateral mass fixation with bilateral pedicle screws and rods by posterior approach under general anaesthesia. Operative findings showed that 10-20 ml of greyish white coloured pus came after incising prevertebral fascia.

After surgery, the patient was improved symptomatically with decreased difficulty in neck pain and swallowing. Postoperative chest X-Ray of the cervical spine showed implants in situ. On discharge, the patient was comfortable with no radicular pain, no deficit, power 5/5 in all limbs, ambulant, voiding normally, vitals stable, afebrile, wound healthy.

Case Report 2

A 14-year-old female came up with a chief complaint of neck pain for the past 3 months. The patient was asymptomatic 3 months back; then, she experienced pain in the neck which gradually aggravated with daily activities and relieved with rest. Her pain was dragging type, radiating to the left shoulder. She did not have a history of radiating pain to the right shoulder, trauma, early morning stiffness, fever, loss of weight, cough with sputum, difficulty in combing hair, mixing food, buttoning and unbuttoning, no grip weakness, with no difficulty in climbing steps, bowel and bladder disturbances. On examination, the vital parameters of the patient were normal, full

functioning of the motor system, normal tone, power 5/5 & normal movement of all limbs.

After admission, the patient's MRI cervical spine showed heterogeneously intensely enhancing lesion C3 to C4 vertebral bodies, destroying posterior neural elements, soft tissue and lateral epidural collection marked compression over the cord. Patient attenders were explained about the condition of the patient, requirement for surgery and complications involved in the procedure. C3 hemilaminectomy excision of paraspinal epidural abscess and granulation tissue under general anaesthesia treatment was given, and squash was suggestive of tuberculous etiology. Operative findings revealed that around 15 ml of pus was evacuated, granulation tissue extending from paraspinal muscle, eroding C3 laminae into epidural tissue and lower extent up to C4 lower border. Granulation tissue was encasing the right vertebral artery, and the dura was intact.

Post-operatively patient was treated with antibiotics, analgesics, antituberculous drugs and other supportive measures. Antituberculous drugs were started on the day after surgery. Her liver function tests were within normal limits, and the postoperative period was uneventful. The dressing was done, sutures in situ, and the wound was healthy. The culture and sensitivity test for pus did not reveal any growth. During discharge, the subject was comfortable; the vital parameters of the patient were normal, full functioning of the motor system, normal tone, power 5/5 & normal movement of all limbs.

Case Report 3

A 57-yr-old female patient came with the chief complaints of neck pain for the past 3 days, left lower limb showed swelling from the past 30 days and had a fever for 5 days. The patient was admitted to a local hospital from April 17, 2020, to May 6, 2020, for acute gastroenteritis and cellulitis was evaluated and treated. The subject had a neck pain history for 3 days, which was sudden in onset progressive, unable to move the neck from side to side, pain radiating to both shoulder and back, left lower limb swelling associated with an ulcer with pus discharge, foul-smelling of left foot, the patient had a history of fever with chills and rigour for past 2 days associated with body pains. The patient had a DM (diabetes mellitus) history for the past 30 years & was under Novamix 30/70 insulin medication. There was no history of

tuberculosis, asthma, epilepsy. No pallor, icterus, cyanosis, clubbing, lymphadenopathy, oedema of the left limb was seen. (Vital parameters: Body temp: 101°F, PR: 108/min, RR: 18 breaths/min, BP: 130/80 mm Hg, GRBS-268 mg/dl, SpO₂- 960/0 on room air. On examination, the patient was conscious, coherent, co-operative, CVS- 5152+, RS-BAE+, P/A- Soft non-tender, CNS-higher mental functions normal, GCS-E4V5M6, bulk normal, tone normal, power-upper limb-shoulders elbow, wrist-5/5 on both left side & right side, handgrip 100% on both left side & right side lower limb power hip and knee -4/5 on both left side & right side, reflexes biceps, triceps, supinator 2+ on both right and left sides, Neck tenderness, Spine tenderness was present, unable to flex the neck. It was found that left lower limb edema, Tenderness, and multiple ulcers on the ankle (medial) were found on local examination.

Baseline investigations revealed normocytic normochromic anaemia, neutrophilic leukocytosis, poorly controlled sugars (HbA_{1c} 10.4%). Wound swab C/S, blood and urine C/S were sent, and the patient started on empirical antibiotic therapy. Regular blood glucose monitoring was done, and the patient was put on a fixed insulin dose regimen. Blood culture revealed *Staphylococcus aureus* growth and was sensitive to inj. Clindamycin and inj. Meropenem and antibiotics were changed; accordingly, pus culture showed growth of *Streptococcus agalactiae*. On examination, there were 2-3 ulcers on the left foot with deep-seated pus pockets for which general surgery opinion was sought and advised for pus drainage, debridement and daily dressings were done, the patient underwent great toe disarticulation. I/V/O patient C/O neck pain, MRI whole spine was done, which showed old degenerative changes and neurosurgery opinion was sought, and their advice for conservative management with muscle relaxants, NSAIDs and neck physiotherapy was followed. In due course of time, the patient started complaining of sudden onset weakness of the right upper limb for which MRI was repeated, which showed spinal epidural abscess extending from the base of the skull to D7, myelitis seen at the level of C4 to C5, B/L paraspinal and B/L shoulder girdle pyomyositis. The patient was immediately shifted to ICU, a central line was secured, and the patient was put on an antibiotic regimen (meropenem, linezolid, clindamycin)

according to the c/s. Daily TLC was monitored, which showed a decreasing trend, and no fever spikes were recorded. After 4 days of the antibiotic course, an ultra-scan of the B/L shoulder was done, which showed improvement of pyomyositis. In view of the improving condition, the patient was shifted to the ward for further management. Repeat MRI spine was done, which showed cord compression at the C3-C4 level, deteriorating myelitis and significant B/L paraspinal myositis. The patient started complaining of the complete weakness of the left upper limb and B/L lower limbs a day after. In view of the MRI spine report and symptoms of the patient, a neurosurgery opinion was sought and advised for conservation management with no surgical intervention for the abscess. In view of the left foot ulcer and Charcot's joint, orthopaedic opinion was sought and advised for left below-knee amputation but was not taken up due to the patient's condition. Patient attenders were counselled about the condition of the patient, the poor prognosis associated with it and the need for intubation and ventilatory support in case of respiratory failure. However, attenders were not willing for aggressive management and wanted only supportive care for the patient. Neurology and neurosurgery opinion was sought for the scope of neurorehabilitation, and a plan for the same was put in place. A repeat MRI spine was done to look for the status of the abscess and myelitis. The patient was discharged with a treatment regimen and advised for further management at a neurorehabilitation centre.

Discussion

The occurrence of SEA in the cervical area is of particular concern. *S. aureus*-induced spinal epidural abscess, which is a rare but well-documented condition. Chronic alcohol abuse, immunodeficient conditions, diabetes mellitus, old age, and chronic renal failure are all known potential risks [11-13] Infection is the 2nd major death cause among hemodialysis subjects, following cardiovascular disorders. The commonest route of infection is vascular access [14].

Case series involving SEA of the cervical area have shown numerous significant trends regarding demographic aspects, involvement of spinal level, treatment approaches, and repercussions in the literature. The classic diagnostic triad of fever, spinal pain & neurological abnormalities are clinical

symptoms of SEA patients. Fever is a common indication in literature (31.25%); however, it is not commonest on presentation. Neurological indications spanned from sphincter incontinence to localized paresthesias & back pain, monoparesis, myalgias, ascending paraparesis, quadriparesis & paraplegia [2,4,6,9].

S. aureus was the most common pathogen found in our study, and this finding is in concurrence with similar to previous reports published by various research investigators [3,4,6,7,15-19] However, *Streptococcus* and *Pseudomonas* are the other prevailing pathogens of causing SEA in a considerable percentage of subjects [7,10]

Generally, subjects are treated using both surgical & medical methods. At the time of presentation, most subjects in the literature were given broad-spectrum IV antibiotics. Antibiotic medication was also given post-operatively for periods ranging from 2 to 3 months [2,5]. In several investigations, subjects were not given antibiotics until after surgical evacuation & identification of the causative organism, especially if the subject was not septic at the time of presentation. For e.g., in a study reported by Ghobrial et al., any subject who presented with CSEA went through surgery immediately, regardless of whether or not they had neurological complications [20]. Patients who just received medical treatment, on the other hand, were much more prone to have markedly improved motor scores during presentation time [9]. Likewise, with regards to therapy options available to our research case subjects, we discovered that surgery combined with systemic antibiotics was the best treatment option for 2 subjects. Commonly, Subjects who did not have involvement of cord or/and focal neurological deficits, as well as those who had the infection resolved at follow-up, were considered eligible candidates for antibiotic treatment alone [21].

The neurological impairment risks owing to nerve compression or spinal cord ischemia increases with delayed diagnosis [22]. In a case series study reported by Ghobrial et al., about 50% of cases exhibited neurological progress after surgery & only rare proof of deteriorating motor scores [20]. In another case series study reported, Shousha et al. delineated that 58.3% of cases demonstrated significant neurological progress following treatment with what needs to be

mentioned here, and the other 41.7% remained without improvement [7]. While Siddiq et al. recommended that post-treatment therapies like intensive rehabilitation & physical therapy may help with motor function improvement [23]. Overall, the decision on a plan for surgery would be the sole discretion of the spine surgeon and is typically commenced along with approvals from colleagues in other disciplines viz. infectious disease services, general medicine, orthopaedic, anaesthesia etc.

Conclusion

These case series delineated common presentations like tuberculosis localized to the spine with bone involvement, where decompression surgery relieved the compression. Importance of DFU leading to a cervical epidural abscess, and how timely intervention in the form of foot disarticulation could have saved the patient from the prolonged hospital stay and possibly irreversible neurological deficit. Very common benign neck pain in a chronic diabetic should not be taken casually and pursued with repeat MRI scans.

References

- Gellin BG, Weingarten K, Gamache FW Jr, Hartman B.J. Epidural abscess. In: Scheld WM, Whitley RJ, Durack DT (eds) Infections of the Central Nervous System, 2nd edn. Lippincott-Raven Publishers: Philadelphia, PA, USA, 1997, p 507.
- Pina MA, Modrego PJ, Uroz JJ, Cobeta JC, Lerin FJ, Baiges JJ. Brucellar spinal epidural abscess of cervical location: report of four cases. Eur Neurol 2001; 45: 249–253.
- Faruqui S, Palacios E, Friedlander P, Melgar M, Alvernia J, Parry PV. Nontraumatic retropharyngeal abscess complicated by cervical osteomyelitis and epidural abscess in post-Katrina New Orleans: four cases. J Ear Nose Throat 2009; 88: E14.
- Gezici A, Ergün R. Cervical epidural abscess in haemodialysis patients by catheter related infection: report of two cases. J Korean Med Sci 2010; 25: 176–179.
- Kricun R, Shoemaker E, Chovanes G, Stephens HW. Epidural abscess of the cervical spine: MR findings in five cases. American Journal of Roentgenology 1992; 158: 1145–1149.
- Liou LM, Shih PY. Epidural abscess of the cervical spine with atypical manifestations: a report of two cases. Neurologist 2007; 13: 215–218.
- Shousha M, Boehm H. Surgical treatment of cervical spondylodiscitis: a review of 30 consecutive patients. Spine 2012; 37: 30–36.
- Giuffrida S, Chiamonte I, Saponara R, Greco S, Giammona G, Nicoletti G, Le Pira F. Cervical epidural abscess: serial MRI study. Journal of neurosurgical sciences. 1997;41(2):219-23.
- Alton TB, Patel AR, Bransford RJ, Bellabarba C, Lee MJ, Chapman JR. Is there a difference in neurologic outcome in medical versus early operative management of cervical epidural abscesses? Spine J 2015; 15: 10–17.
- Walters H, Measley R. Two cases of *Pseudomonas aeruginosa* epidural abscesses and cervical osteomyelitis after dental extractions. Spine 2008; 33: 293–296.
- Darouiche RO, Hamill RJ, Greenberg SB, Weathers SW, Musher DM. Bacterial spinal epidural abscess. Review of 43 cases and literature survey. Medicine (Baltimore). 1992; 71:369–85.
- Tang HJ, Lin HJ, Liu YC, Li CM. Spinal epidural abscess--experience with 46 patients and evaluation of prognostic factors. J Infect. 2002; 45:76–81.
- Cahill DW, Love LC, Rehtine GR. Pyogenic osteomyelitis of the spine in the elderly. J Neurosurg. 1991; 74:878–86.
- Butterly DW, Schwab SJ. Dialysis access infections. Curr Opin Nephrol Hypertens. 2000; 9:631–5.
- Piccolo R, Passanisi M, Chiamonte I, Tropea R, Mancuso P. Cervical spinal epidural abscesses. A report on five cases. J Neurosurg Sci 1999; 43: 63.
- Muffoletto A, Nader R, Westmark R, Nauta HJ, Garges KJ, Hadjipavlou AG. Hematogenous pyogenic facet joint infection

- of the subaxial cervical spine: a report of two cases and review of the literature. *J Neurosurg* 2001; 95: 135–138.
17. Pöpping DM, Zahn PK, Van Aken HK, Dasch B, Boche R, Pogatzki-Zahn EM. Effectiveness and safety of postoperative pain management: a survey of 18 925 consecutive patients between 1998 and 2006 (2nd revision): a database analysis of prospectively raised data. *Br J Anesth* 2008; 101: 832–840.
 18. Sendi P, Bregenzer T, Zimmerli W. Spinal epidural abscess in clinical practice. *Q J Med* 2008; 101: 1–12.
 19. Nussbaum E, Rigamonti D, Standiford H, Numaguchi Y, Wolf AL, Robinson WL. Spinal epidural abscess: a report of 40 cases and review. *Surg Neurol* 1992; 38: 225.
 20. Ghobrial GM, Viereck MJ, Margiotta PJ, Beygi S, Maulucci CM, Heller JE et al. Surgical management in 40 consecutive patients with cervical spinal epidural abscesses: shifting toward circumferential treatment. *Spine (Phila Pa 1976)* 2015; 40: E949–E953.
 21. Shweikeh F, Hussain M, Sangtani A, Issa H, Bashir A, Johnson JP, Markarian GZ. Cervical spine epidural abscess: a single center analytical comparison to the literature. *Spinal cord series and cases*. 2017;3(1):1-5.
 22. Muzii VF, Mariottini A, Zalaffi A, Carangelo BR, Palma L. Cervical spine epidural abscess: experience with microsurgical treatment in eight cases. *J Neurosurg Spine* 2006; 5: 392–397.
 23. Siddiq F, Chowfin A, Tight R, Sahnoun AE, Smego RA Jr. Medical vs surgical management of spinal epidural abscess. *Arch Intern Med* 2004; 164: 2409–2412.