Spontaneous Cervical Epidural Abscess Caused by Serratia Marcescens

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ABSTRACT

Serratia marcescens infections are very rare and usually occur in the form of nosocomial and opportunistic infections. The subjects usually have severe medical comorbidities such as immunosuppression, diabetes mellitus, and renal failure. Spontaneous *Serratia marcescens* infection is very rare. In this case, we demonstrate that it can be seen in the spontaneous cervical epidural abscess. A 54-year female patient presented with a complaint of weakness in the left arm. Cervical magnetic resonance imaging revealed a spinal epidural abscess at the C5-6 level. Surgery was planned for this lesion. The abscess that created a cervical mass effect was totally removed and treatment with oral antibiotics was continued due to *S. marcescens* growth in the culture. This is the first case where *S. marcescens* has caused the development of a cervical epidural abscess in a patient without any medical comorbidity.

Key Words: *Serratia marcescens, Spinal epidural abscess, Vertebral osteomyelitis, Cervical discitis.*

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INTRODUCTION

Serratia marcescens is a facultatively anaerobic, motile, and gram-negative bacillus. It is a member of the *Enterobacteriae* family and has been reported to cause respiratory, urinary and wound site infections and septicemia.[1,2] It is also a common cause of opportunistic and nosocomial infections and can cause infections in subjects with immunosuppression, drug addiction, or severe medical comorbidities.[3] It can grow in antiseptic solutions and is of hospital origin and can cause outbreaks. It can very rarely cause cervical spinal osteomyelitis, discitis or epidural abscess and all reported patients have had predisposing risk factors.[4] Our case developed an epidural abscess caused by *S. marcescens* that produced a mass effect in the cervical spine. There was no associated comorbidity in this case, which makes it an unusual case.

CASE REPORT

A 54-year female presented to our clinic with neck pain and left arm weakness that had gradually increased in the last week. The muscle strength in all movements of the left arm was 3/5 on examination.

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The history revealed no surgery, drug addiction or known disease. Blood sugar was 102 mg/dL. Liver, electrolytes, and renal function tests were in the normal range and anti-human immunodeficiency virus (HIV) was negative in the preoperative tests. Among the preoperative infection parameters, the white blood cell count was 9.67×10^9 /L, neutrophil count 6.66×10^9 cells/L, C-reactive protein (CRP) 42.68 mg/L (Normal Range: 0-5 mg/L) and erythrocyte sedimentation value was 31 mm/1st h. Cervical magnetic resonance imaging revealed a spinal mass at the cervical C5-6 level compressing the spinal cord on the left (Figure 1a and b).

Corpectomy and mass excision with an anterior approach was planned. Discitis was observed at the C5-6 level and discectomy was performed at the C4-5, C5-6, and C6-7 levels while corpectomy was performed for C5 and C6. The mass surrounding the spinal cord, which was adherent to the posterior longitudinal ligament, was totally excised. A corpectomy cage was inserted at the C5-C6 level, and the system was fixed with an anterior plate screw (Figure 2a and b).

The loss of strength in the left arm improved postoperatively. Pathology reports revealed the process to be infectious and there was *S. marcescens* growth on culture identified with *S. marcescens* fully automated VITEK II Compact (Biomeriux, France) system and antibiotic susceptibility test was studied. The microorganism was sensitive to ceftriaxone, cefepime, ciprofloxacin, trimethoprim / sulfamethoxazole, aminoglycoside and carbapenem group in the antibiotic sensitivity test. The patient was started treatment with daily oral 1200 mg ciprofloxacin and 3200/640 mg trimethoprim/sulfamethoxazole for 1 week.

Table I: Cases of *S. marcescens* in the cervical spine between 1976 and 2020.

Reference no.	Age, years (Gender)	Spinal level	Predisposing factors	Treatment
7	53 (female)	C3-4	i.v. substance abuse	Surgery
7	42 (female)	C4-5	i.v. substance abuse	Surgery
8	56 (female)	C4-6	After cervical spine surgery	Surgery
4	51 (female)	C1-6	i.v. substance abuse in the past	i.v meropenem followed by oral ciprofloxacin
Present case	54 (female	C5-6	No factor defined	Surgery followed by oral ciprofloxacin and trimethoprim/sulfamethoxazole

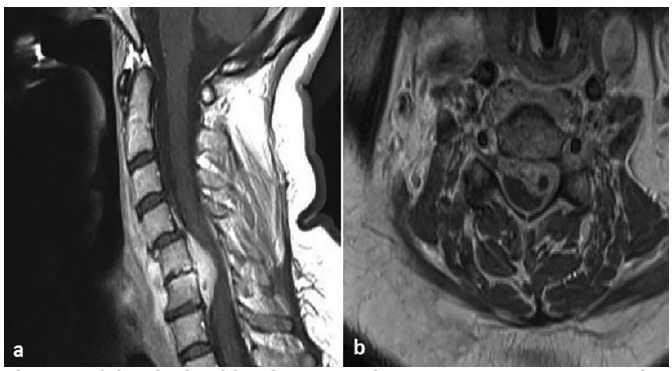

Figure 1: (a) Spinal epidural mass at the C5-6 space on preoperative sagittal magnetic resonance imaging. (b) Image of spinal epidural mass at the C6 level on axial section.

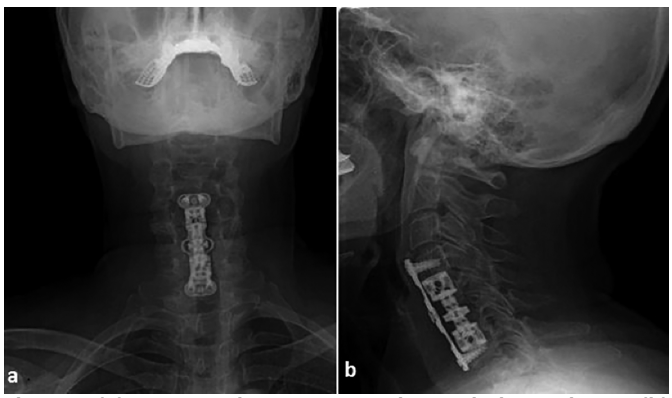

Figure 2: (a) Postoperative anteroposterior cervical X-ray image. (b) Postoperative lateral cervical X-ray image.

The treatment was continued for another 6 weeks with daily 1500 mg ciprofloxacin. The CRP value was 12.13 mg/dL on 10th postoperative day and 0.5 mg/dL at the 1st month with a sedimentation value of 14 mm/1st h. No clinical or radiological recurrence was seen during 3 years of follow-up.

DISCUSSION

Spinal epidural abscess (SEA) is often seen in adults in the fifth and sixth decades of life. Predisposing risk factors include parenteral drug addiction, diabetes mellitus, alcoholism, cancer, HIV infection causing immunosuppression, and other conditions such as paravertebral infections, spinal surgery or trauma.[5] The location is posterior in 80% of SEAs and anterior in 20%. Anterior abscesses are usually associated with osteomyelitis and discitis and are often seen in the thoracic and lumbar region with only 20% in the cervical region. SEA patients were clinically present with symptoms of back pain, fever, neurological deficit or radicular pain.[6]

The most common pathogen causing SEA is *Staphylococcus aureus*. In the 753 SEA patients in the Rheisaus *et al*. study, *Staphylococcus aureus* grew in 551 cases while the most common gram-negative bacteria were *Escherichia coli* seen in 21 cases. *S. marcescens* is very rare and the number of infections in the cervical spine associated with *S. marcescens* was only four between 1976 and 2018 in the literature.[4,7,8] Three of these cases had a history of intravenous drug use and one had a history of cervical disc surgery (Table I).

All four of these cases underwent surgery and only one was given antibiotic treatment for vertebral osteomyelitis. Early surgery should be performed for neurological decompression in SEAs and an aggressive approach with empirical antibiotic treatment targeting the central nervous system (CNS) should be planned to prevent the spread to the CNS.[3]

S. marcescens spinal infections have a mortality and morbidity rate of approximately 50% despite adequate diagnosis and treatment.[9] *S.marcescens* is well-known to have a natural resistance to colistin. In addition, most strains are found to be resistant to ampicillin, amoxicillin, 1st and 2nd generation cephalosporins, and in some cases, gentamicin (plasmid-mediated) –even though the latter is considered to be a reliable option for first-line treatment. Current knowledge demonstrates that the majority of strains are sensitive to 3rd and 4th generation cephalosporins, meropenem, imipenem, and tigecycline. Therefore, even though 3rd and 4th generation cephalosporins may be utilised, the most viable approaches to treatment are accepted to be piperacillin-tazobactam and a combination of aminoglycosides and carbapenem group antibiotics.[2,10] In this case, the isolated strain was sensitive to ciprofloxacin, ceftriaxone, trimethoprim / sulfometaxazole, piperacillin-tazobactam, aminoglycoside, and carbapenem.

It must also be noted that treatment of *Serratia species* with 3rd and 4th generation cephalosporins could lead to the production of inducible beta-lactamases, which may result in treatment failure.[2] In treatment, ciprofloxacin and co-trimaxazole were preferred initially. Ciprofloxacin concentrates well in bone and soft tissues and has high oral bioavailability, so, can be preferred as outpatient therapy.

The characteristics of the presented case when compared with other cervical region *S. marcescens* infections are the lack of any underlying factor predisposing the patient to

infection, the lack of haematological and biochemical parameters suggesting an infection in the preoperative tests of the patient, and the presentation with a neurological deficit only.

In conclusion, cervical SEA caused by *S. marcescens* may develop spontaneously in a patient without any comorbidity, and our study is the first case reported in this regard.

PATIENT'S CONSENT:
Patient's consent was taken orally from the family of the patient.

COMPETING INTEREST:
The authors declared no competing interest.

AUTHORS' CONTRIBUTION:
IS: Data acquisition and analysis, writing and editing, interpretation, and drafting.
DBT: Data interpretation, writing, and editing.
MK: Data interpretation.
All the authors have approved the final version of the manuscript to be published.

REFERENCES

1. Hejazi A, Falkiner FR. *Serratia marcescens. J Med Microbiol* 1997; **46(11)**:903-12. doi: 10.1099/00222615-46-11-903.
2. Donnenberg MS. *Enterobacteriaceae*. In: Mandell GL, Bennett JE, Dolin R, eds. Mandell, Douglas and Bennett's Principles and Practice of Infectious Diseases. ed 7th, Philadelphia; Churchill Livingstone; 2009: pp. 2827-28
3. Parkins MD, Gregson DB. Community-acquired *Serratia marcescens* spinal epidural abscess in a patient without risk factors: Case report and review. *Can J Infect Dis Med Microbiol* 2008; **19(3)**:250-252. doi: 10.1155/2008/210951.
4. Lau JX, Li JY, Yong TY. Non-contiguous multifocal vertebral osteomyelitis caused by Serratia marcescens. *Mod Rheumatol* 2015; **25(2)**:303-6. doi: 10.3109/14397595.2013.874754.
5. Chao D, Nanda A. Spinal epidural abscess: A diagnostic challenge. *Am Fam Physician* 2002; 65:1341-6.
6. Sendi P, Bregenzer T, Zimmerli W. Spinal epidural abscess in clinical practice. *QJM* 2008; **101**:1-12. doi.org/10.1093/qjmed/hcm100.
7. *Mintz L, Mollett GH*. Serratia vertebral osteomyelitis in narcotic addicts. *Ann Intern Med* 1975; **83(5)**:668-9. doi: 10.7326/0003-4819-83-5-668.
8. *Kulkarni AG, Hee HT*. Adjacent level discitis after anterior cervical discectomy and fusion (ACDF): A case report. *Eur Spine J* 2006; **15(Suppl 5)**:S559-63. doi: 10.1007/s00586-005-0003-x.
9. Huang CR, Lu CH, Chien CC, Chang WN. Protean infectious types and frequent association with neurosurgical procedures in adult Serratia marcescens CNS infections: Report of two cases and review of the literature. *Clin Neurol Neurosurg* 2001; **103(3)**:171-4. doi: 10.1016/s0303-8467(01)00138-x.
10. Yu WL, Lin CW, Wang DY. Serratia marcescens bacteraemia: clinical features and antimicrobial susceptibilities of the isolates. *J Microbiol Immunol Infect* 1998; **31(3)**: 171- 9.