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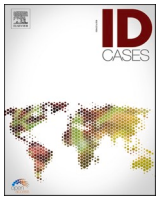

Case report

Epidural abscess secondary to *Streptococcus pneumoniae*. A case report and review of the literature

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ABSTRACT

While spinal epidural abscess is a well described disease process, this condition is rarely caused by *Streptococcus pneumoniae*. This case describes a case of spinal epidural abscess secondary to S. pneumoniae in an otherwise healthy, immunocompetent 61-year-old female without a history of spinal procedures, obvious source of hematogenous seeding, or clear risk factors for invasive pneumococcal infection. She was treated with IV and oral antibiotic therapy and made a full recovery.

Background

Spinal epidural abscess (SEA) occurs at an incidence of 2–8/10,000 hospital admissions [1]. SEA is predominantly caused by Staphylococcus aureus (63% of cases) and followed by gram-negative bacilli (16%) with SEA secondary to *S. pneumoniae* rarely described [2]. SEA classically presents with a triad of fever, back pain, and neurological deficits, but many cases can present with nonspecific signs. Back pain is the most sensitive sign followed by neurologic deficits, with fever the most likely to be absent [3–5]. When considering a diagnosis of SEA, acute onset back pain in the presence of positive inflammatory markers should trigger additional imaging with a contrast-enhanced MRI [17,18].

S. pneumoniae as a causative organism of SEA has rarely been documented in the literature [6]. Here we describe a case of SEA secondary to *S.* pneumoniae in an otherwise healthy, immunocompetent 61-year-old female with no history of spinal procedures, obvious source of hematogenous seeding, or other known risk factors for infection and present a literature review of all previously published cases of S. pneumoniae SEA to date.

Case presentation

A 61-year-old female presented with progressive and severe back pain that started after lifting a heavy box 12 days prior to presentation. Prior to admission the patient was previously healthy without known chronic medical conditions. She had no history of pneumococcal immunization. The pain was localized to her lower back and radiated down her left buttock and leg and was refractory to oral analgesic medications. Due to the pain an MRI was ordered which revealed a 1.2 × 5.5 cm paraspinal abscess with extension to the spinal canal, causing narrowing at L3-L4, L4-L5, and L5-S1 (Figs. 1–3). The severe pain and MRI findings prompted presentation to the emergency department.

At presentation, physical exam was consistent with right paraspinal tenderness in the lumbar region, right elbow pain and swelling consistent with bursitis, and a grade 3/6 systolic murmur loudest at the apex. Neurologic exam revealed no neurological abnormalities.

Laboratory studies were significant for a white blood cell count (WBC) of 24.04 cells/mm^3, erythrocyte sedimentation rate (ESR) of 120 mm/hr, and C-reactive protein (CRP) of 18.35 mg/dL. Aspirate of the right olecranon bursa yielded no growth on routine culture after 4 days of incubation.

Ultrasound-guided needle aspiration of the epidural abscess was performed and yielded 10 cc of purulent fluid. Aerobic and anaerobic culture of the aspirate grew 4 + S. pneumoniae susceptible to amoxicillin, erythromycin, levofloxacin, tetracycline, and vancomycin. The isolate was intermediately susceptible to trimethoprim-sulfamethoxazole. Blood cultures drawn from two different sites were negative after five days of incubation. Echocardiogram was negative for valvular vegetations and did not reveal valvular abnormalities.

Repeat MRI performed following aspiration demonstrated that the epidural abscess had decreased in size from prior with a small amount of enhancing epidural material remaining dorsally at L3–4, but with greatly reduced spinal canal stenosis.

Ceftriaxone 2 g IV daily was initiated and her back pain gradually

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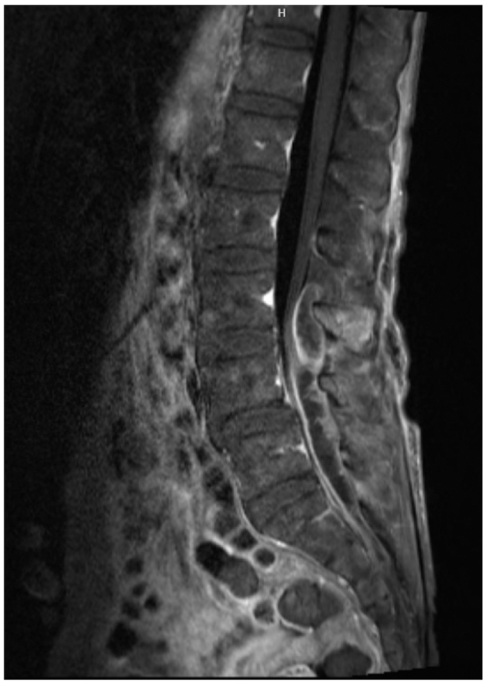

Fig. 1. T1 Flair Sagittal Image.

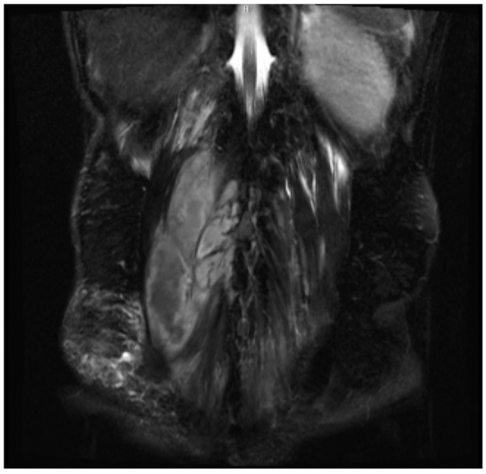

Fig. 2. T2 Weighted Coronal Image.

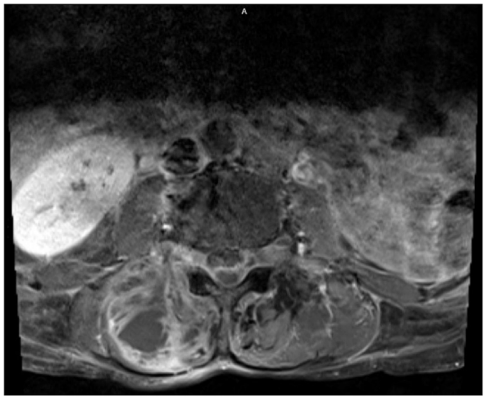

Fig. 3. T1 Weighted Axial Image.

improved. She received six weeks of outpatient intravenous ceftriaxone. Repeat MRI following this course of antibiotics revealed much improvement in the SEA, but with some residual fluid. After completion of ceftriaxone, she was treated with four additional weeks of amoxicillin 2 g orally twice daily. The patient's symptoms resolved, and she has not had recurrence of signs of infection or symptoms.

Discussion

SEA is a life-threatening infection capable of producing permanent neurological deficits through a variety of proposed mechanisms [1]. Risk factors for SEA include diabetes mellitus, alcoholism, immunocompromised states, malignancy, intravenous drug use, trauma, and spinal surgery [7]. This pathology can occur indirectly via hematogenous seeding from a distant source of infection (i.e., cardiac valves, soft tissue, urinary tract), or directly, by inoculation or invasion of the epidural space (i.e., epidural injections, nearby septic arthritis) [8,9]. In one-third of cases, no source of infection is identified [2]. The epidural space is inherently sterile; however, once bacteria develop a nidus, host immune defenses lead to inflammation and pus in a constricted area. It is the combined effect of spinal nerve impingement and cytokine release from the developed abscess that can manifest as a classic triad of fever, back pain, and neurological deficits. When left untreated, the abscess can progress to cause significant morbidity and mortality [10,19]. When considering a diagnosis of SEA, acute onset back pain in the presence of positive inflammatory markers should prompt advanced imaging, preferably with a contrast-enhanced MRI [17,18].

In this case, *S. pneumoniae* was identified as the causative agent of SEA in an immunocompetent, otherwise healthy, and active individual with no medical comorbidities and no identified source of her infection. *S. pneumoniae* as a causative organism in SEA in adults is rarely described (see Table 1). A single case series reporting on *S. pneumoniae* as the etiologic agent of spinal infections contained eight patients, with five involving the epidural space [11]. A literature review of *S. pneumoniae* spinal infections from 1906 to 2012 identified 52 cases with 19 adult cases involving the epidural space [6]. Since 2012 four additional cases of *S. pneumoniae* SEA have been identified [12,13,31,32].

Of the 23 identified adult cases of *S. pneumoniae* SEA since 1909, there was a predilection towards males with 17 cases reported (81%). 11 cases (52%) presented with fever, and 20 (95%) had leukocytosis. Of the cases that reported ESR, all were elevated [12]. 16 cases had involvement of the lumbar spine, seven of the thoracic spine, and eight of the cervical spine. A wide variety of antimicrobial strategies were employed (see Table 1). Most cases underwent surgical intervention (laminectomy and/or drainage). Only six did not have a neurological deficit upon presentation, including the present case. Seven of the 23 adults with SEA died.

The present case is unique as the patient presented without neurological deficits. Her only apparent risk factor was a mechanical injury prior to diagnosis. She presented without fever, and with an elevated WBC and inflammatory markers. This case adds to the sparce data that exists on SEA caused by *S. pneumoniae* and outlines a treatment course that successfully managed the infection without neurological sequelae.

Conclusion

This case of spinal epidural abscess (SEA) due to *S. pneumoniae* in a previously healthy patient with atypical symptoms illustrates the need to maintain awareness of SEA in the differential diagnosis of invasive pneumococcal infection even in the absence of common risk factors. Spinal epidural abscess secondary to *S. pneumoniae* is infrequent but should be considered in patients who present with signs or symptoms of spinal infection and specific risk factors for invasive pneumococcal disease.

Table 1
Summary of all S. pneumoniae SEA adult cases identified from 1909 to present, including this present case.

Patient	Age (y)/ sex	Concomitant conditions, risk factors	Temp (°F)	WBC ($\times 10^3$/ mm^3)	ESR (mm/ hr)/ CRP (mg/L)	Level of infection	Tissue involved	Source of isolate	Antimicrobial	Days of therapy	Mortality	Reference
1	40/ M	Leptomeningitis	NS	NS	NS	Lower cervical, upper thoracic on autopsy	SEA	CSF, "Frankel's pneumococcus" (NS)	None	n/a	Died	[20]
2	49/ M	Pneumonia	NS	21	NS	C4–7, L4–5	VO (C5), SEA, myelitis	Sputum, autopsy: C5 purulence gs + ve (NS)	None	n/a	Died	[30]
3	58/ NS	Endocarditis and meningitis	102	13.7	NS	T5–6	SEA	Blood, epidural, purulence, and CSF	NS	n/a	Died	[14]
4	77/ M	Menintigitis	104	20.4	NS	T11-L2	SEA, PA	Blood and CSF	NAF + CN iv (ns) → P/ C iv (ns)	NS	Died	[21]
5	69/F	Recent URI, endocarditis, diabetes mellitus	98.6	32	142/ NS	L4–5	VO, SEA	Blood, epidural/ disk purulence	NAF/CN (8d) → P iv (6w+)	> 6 weeks	Survived	[15]
6	66/ M	Bacteremic pneumonia 3 m prior, DM, chronic alcoholism	97	6.8	113/ NS	L4–5	VO, SEA, PA	Disk purulence	VA iv (6w) → CD po (6 m)	30 weeks	Survived	[22]
7	43/ M	New diagnosis of HIV, URI	Feb	NS	NS	NS	VO, SEA	Blood	NS	n/a	NS	[23]
8	51/ M	Crohn's disease, arthropathy	101.3	24.6	NS	C3-T1	SEA	Epidural purulence	P iv (3w) → AML po (3w)	6 weeks	Survived	[11]
9	65/ M	Cervical spondylosis	99	24.7	> 90/ NS	C3–4	VO, SEA	Blood, epidural purulence	P iv (3w) → AML po (4w)	7 weeks	Died	[11]
10	75/ M	Cervical spondylosis, bullous pemphigoid, prednisolone therapy, recent URI	96.8	13.4	69/NS	C6-T1	VO, SEA	Blood, epidural purulence	P iv (6w) → AML po (ns)	> 6 weeks	Died	[11]
11	59/ M	DM, recent URI	98.4	12.6	> 90/ NS	L4–5	VO, SEA, PA	Epidural purulence	P iv (5w) → P po (5w)	10 weeks	survived	[11]
12	72/ M	Spondylosis, chronic alcoholism	98.2	11.2	> 90/ NS	C6–7, T9–10, L4–5	VO, SEA	Blood, epidural purulence	P iv (23d)	23 days	Died	[11]
13	31/F	Epidural anesthesia 8 d prior	NS	NS	NS	T4-L1	SEA	NS	NS	n/a	Survived	[24]
14	60/ M	HIV (CD4 = 320) off ARV for 6 m, pneumococcal sepsis 10 y prior	102.2	13.7	118/ NS	L4-S1	VO (L5-S1) SEA (L4-S1)	Blood	CRO iv (6w) → AML po (8w)	14 weeks	Survived	[25]
15	51/F	Meningitis	101.3	20.2	125/ NS	L3–4	VO, SEA, PA	CSF, L3 bone	CRO iv (6w) → NS po (4w)	10 weeks	Survived	[26]
16	43/ M	HIV on ARV	100.8	22.3	107/ 8.3	C1–2	VO, SEA, PA	Blood, retropharyngeal/ epidural purulence	CTX iv (3 w)	3 weeks	Survived	[16]
17	58/ M	Sinusitis	Afeb	16.4	NS/ 271	L2-S1	VO (L5-S1) SEA, PA	PA aspirate purulence	CTX iv (2 w) + FOS iv (2 w) + CN iv (5d) → MXF po (10 w) + RD po (10 w)	12 weeks	Survived	[27]
18	73/ M	NS	Feb	High	NS/ High	C4–7, L4–5	VO, SEA	Blood and CSF	Given but NS	NS	Survived	[28]
19	75/F	Remote L1 compression fracture	36.8	13.2	102/ 28.56	L3-S1	SEA	Blood	P iv (24d) → LEV (21w)	NS	Survived	[31]
20	35/ M	Meningitis, cavernous sinus thrombosis, otitis	101.7	25.2	NS/9	T4–9, L2–3	SEA	CSF	CRO iv (8w) + LZ iv (8w)	8 weeks	Survived	[29]

(*continued on next page*)

Table 1 (*continued*)

Patient	Age (y)/ sex	Concomitant conditions, risk factors	Temp (°F)	WBC ($\times 10^3$/ mm^3)	ESR (mm/ hr)/ CRP (mg/L)	Level of infection	Tissue involved	Source of isolate	Antimicrobial	Days of therapy	Mortality	Reference
		media/externa, petrositis							+ VA iv (7w)			
21	53/ M	HIV (CD4 = 139/ μL) on ARV, concurrent pneumonia	100.4	18.43	NS/ 38.5	C2–3	SEA, VO	Blood	CD po (5d) → AMS iv (26d) → AUG (ns)	> 5 weeks	Survived	[30]
22	55/ M	Morbid obesity	101.3	19	66/182	L4–5	SEA, PA	Epidural purulence	CD (ns) and SCF (ns)	6 weeks	Survived	[12]
23	65/F	UTI, asplenia	102.7	25.3	114/ 17.8	L3-S2	SEA	Blood, epidural purulence	VA iv and CRO iv (8wks)	8 weeks	Survived	[13]
Present study	61/F	Mechanical back pain	98.3	24.04	120/ 18.35	L3-S1	SEA, PA	Epidural purulence	CRO iv (6wks) → AML po (4wks)	10 weeks	Survived	

ARV – anti-retrovirals, DM – diabetes mellitus, URI – upper respiratory infection.
Afeb – afebrile, Feb – febrile, NS – not specified, PA – paraspinal abscess, SEA – spinal epidural abscess, VO – vertebral osteomyelitis, d – day(s), w – week(s), m – month (s), y – year(s), gs+ve – seen on Gram stain, C – cervical vertebra, T – thoracic vertebra, L – lumbar vertebra, S – sacral vertebra, → – followed by, all – allergy.
AML – amoxicillin, AMP – ampicillin, AMS – ampicillin/sulbactam, AUG – augmentin, C – chloramphenicol, CD – clindamycin, CN – gentamicin, CRO – ceftriaxone, CTX – cefotaxime, FOS –Fosfomycin, LEV – Levofloxacin, LZ – metronidazole, MXF – moxifloxacin, NAF – nafcillin, P – penicillin, RD – rifampin, SCF – cefoperazone-sulbactam, VA – Vancomycin, it – intrathecal, Iv – intravenous, po – per oral.

Ethical approval

Design of the work has been approved by the local ethical committee: Samaritan Health Services Regional Institutional Review Board and HCA Healthcare Institutional Review Board.

Consent statement

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Ethics approval and consent to participate

Design of the work has been approved by the local ethical committee: Samaritan Health Services Regional Institutional Review Board and HCA Healthcare Institutional Review Board. Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Statement of independence of researchers from funders

No funding was obtained for this present study and authors are free of any financial incentives or involvement in the promoting of this study.

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Transparency declaration

The lead author affirms that the manuscript is an honest, accurate, and transparent account of the study being reported and that no important aspects of the study have been omitted.

Declaration of Competing Interest

All authors have no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work, no other relationships or activities that could appear to have influenced the submitted work.

Data Availability

Data sharing is not applicable to this article as no datasets were generated or analyzed during completion of the current study.

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