

Retropharyngeal abscess with cervical discitis and vertebral osteomyelitis caused by *Escherichia coli* in a patient with liver cirrhosis

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SUMMARY

We describe the case of a 67-year-old male with liver cirrhosis who presented with fever and neck pain. Magnetic resonance imaging of the spine detected cervical vertebral osteomyelitis, and enhanced CT of the neck and spine revealed retropharyngeal abscess. The patient was treated with empirical antimicrobial therapy and surgical drainage due to significant airway involvement. *Escherichia coli* was cultured from the blood and pus in inferior cervical vertebrae which was a rare

pathogen. Haematogenous spread may have resulted in cervical vertebral osteomyelitis and retropharyngeal abscess.

With high mortality rates, early diagnosis of retropharyngeal abscess is required to avoid debilitating complications such as airway obstruction.

Keywords: Retropharyngeal abscess, *Escherichia coli*, cervical vertebrae, airway obstruction, osteomyelitis.

INTRODUCTION

Complicated deep neck infections remain potentially fatal especially when life-threatening complications occur [1]. In particular, retropharyngeal abscess leads to fatal complications such as septic thrombophlebitis of the internal jugular vein, airway obstruction, mediastinitis and pericarditis if left untreated. The mortality rate for patients with mediastinitis was reported to be as high as 40% [2]. Timely diagnosis and proper management of these complications are essential.

Retropharyngeal abscess as a manifestation of bacterial cervical vertebral osteomyelitis in adults are rarely reported [3]. In addition, *Escherichia coli*

is a rare pathogen for retropharyngeal abscess where it was reported in only one case report [4]. Patients with liver cirrhosis are prone to severe infection either by capsulated agents or by intracellular agents as in the present case [5, 6]. We herein report a successful treatment of a patient with retropharyngeal abscess accompanied with cervical vertebral osteomyelitis caused by *E. coli* in a case of liver cirrhosis.

CASE REPORT

A 67-year-old male presented with two days of fever, posterior cervical pain and percussion tenderness of his cervical vertebrae. Although he complained of nocturnal dyspnea, he showed no signs of sore throat, dysphagia and odynophagia. His medical history included alcoholic cirrhosis, hypertension and hyperuricemia. He had no known history of diabetes mellitus.

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Table 1 - Laboratory findings on admission.

Complete blood count		Blood chemistry		Blood coagulation	
WBC	15180/ μ L	TP	7.6 g/dL	PT %	51%
Neutrophils	74.0 %	Alb	3.9 g/dL	PT INR	1.41
Eosinophils	0.0 %	T-Bil	2.2 mg/dL	APTT	45.0 sec
Basophils	0.0 %	AST	392 U/l	D-dimer	37.8 μ g/dL
Monocytes	1.0 %	ALT	83 U/l	FDP	118.3 μ g/dL
Lymphocytes	7.0 %	LDH	986 U/l	Arterial blood gas (while breathing ambient air)	
RBC	410 x 10 ⁴ / μ L	ALP	372 U/l		
Hb	13.0 g/dl	CK	14200 U/l	pH	7.470
Ht	37.0 %	BUN	36.7 mg/dL	PCO ₂	27.6 mmHg
MCV	91.4 fl	Cre	1.78 mg/dL	PO ₂	96.8 mmHg
MCH	31.8 pg	Na	131 mEq/L	HCO ₃	19.6 mmol/L
MCHC	34.8 %	K	3.6 mEq/L	AG	20.0 mmol/L
Plt	7.6 x 10 ⁴ / μ L	Cl	94 mEq/L		
		IP	13.7 mg/dL		
		CRP	28.2 mg/dL		
		BS	86 mg/dL		

He consumes alcohol in moderation and has never smoked. On examination, he was alert and oriented with uncomfortable appearance. His body temperature was 40.0°C, blood pressure at 106/64 mmHg, pulse rate at 106 beats per minute, respiratory rate at 25 breaths per minute and oxygen saturation 93% while breathing in ambient air. His neck was not swollen although detailed physical examination revealed tenderness on the fifth cervical spine.

Cardiopulmonary examination did not reveal abnormal findings. The abdomen was non-distended, with normal bowel sounds and no tenderness. The patient had no motor paralysis and sensory disturbance. He had neck stiffness. The laboratory findings on admission are shown in Table 1. Blood levels of leukocyte, liver enzyme and renal function were abnormal.

Cerebral spinal fluid analysis revealed cell count 19/ μ L with 15% neutrophils, protein 41.6 mg/dL, and glucose 47 mg/dL.

Computerized tomography (CT) scan of the chest and abdomen revealed no source of infection. Magnetic resonance imaging (MRI) of the spine confirmed high intensity area in the prevertebral area at C3-7 with T2-weighted image (Figure 1).

He was treated empirically with 1 g of vancomycin once a day and 2 g of ceftriaxone twice a day for cervical vertebral osteomyelitis, bacterial meningitis and pharyngeal soft tissue infection according to the current guidelines [7]. As the blood culture result yielded gram-negative bacilli, vancomycin was discontinued on hospital

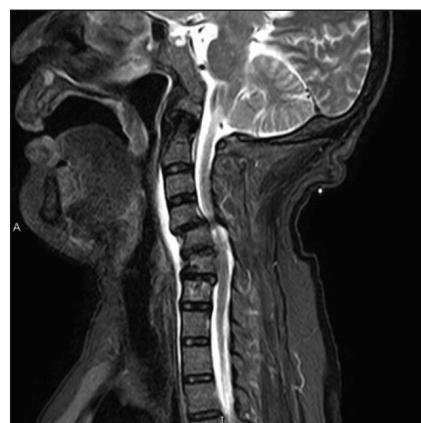


Figure 1 - Magnetic resonance imaging (MRI) of the spine. High intensity area in the prevertebral area at C3-7 with T2-weighted image.

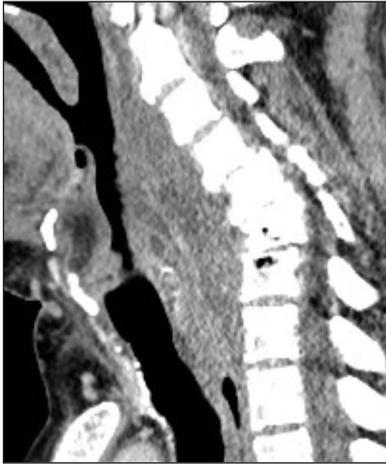


Figure 2 - Enhanced CT of the neck and spine. The respiratory tract was compressed by low density area with contrast enhancement, with fluid and air in the retropharyngeal space adjacent to bony destruction of C6 and C7.

day 3. However, his symptoms did not improve and was accompanied with loss of appetite, sore throat and dysphagia. His oxygen saturation level decreased to 88% while he was breathing ambient air and his respiratory rate increased to 33 breaths per minute. Shallow respiration using accessory muscle was not apparent. Two liters per minute of supplemental oxygen was delivered via nasal cannula. Enhanced CT of the neck and spine showed that the respiratory tract was compressed by the low density area with contrast enhancement, with fluid and air in the retropharyngeal space adjacent to bony destruction of C6 and C7 (Figure 2).

Considering the impending risk for respiratory obstruction, open drainage operation was performed to control infection upon diagnosing retropharyngeal abscess. There were lesions filled with pus in the inferior cervical vertebrae, longus colli muscle and intervertebral disk. His blood and pus culture yielded the same pathogen, *E. coli*. Culture of cerebrospinal fluid yielded no bacteria. After seven days of treatment with ceftriaxone, the antimicrobial regimen was switched to 20 days course of cefotiam followed by cephalexin according to the antimicrobial susceptibility testing. The patient was making satisfactory progress after drainage treatment and was discharged on hospital day 46.

■ DISCUSSION

Except for traumatic cases, retropharyngeal abscess in adults is extremely rare. Most nontraumatic retropharyngeal abscess are seen in infants and younger children as a complication from retropharyngeal lymph nodes infection. By the age of 4, the retropharyngeal lymph nodes usually disappear [8]. Adult cases are increasingly reported in patients with immunodeficiency such as diabetes mellitus and human immunodeficiency virus (HIV) infection, and patients undergoing hemodialysis [9]. In the present case, alcoholic liver cirrhosis might play a role as a predisposing factor [10]. Early diagnosis is required to avoid debilitating complications such as airway obstruction, involvement of the carotid sheath, spread into the mediastinum, or septic shock. The risk of severe complications is high, especially among patients with visceral anterior space involvement, bilateral neck swelling, presence of diabetes mellitus, or other comorbidities [11, 12]. Red flag signs of airway obstruction are reported as marked tachypnea with shallow breathing, use of accessory muscles, orthopnea, dyspnea, stridor and patient adoption of the sniffing position [13]. Our patient also presented with dyspnea and tachypnea. It is imperative to detect these warning signs as early as possible to prevent life threatening complications.

The most common site of vertebral osteomyelitis is the lumbar spine. Cervical vertebral osteomyelitis occurs less frequent, representing only 11% of all cases of vertebral osteomyelitis. However, cervical vertebral osteomyelitis entails more epidural abscess and early neurologic deficit as a complication compared with other sites of the spine owing to the smaller diameter of the spinal canal [14, 15]. Detailed history taking for known risk factors and thorough physical examination should be focused on the screening of cervical vertebral osteomyelitis to avoid life-threatening complications. Patients with cervical osteomyelitis typically present with unremitting neck pain which affects more than 90% of patients [16, 17]. Fever, loss of appetite and weight loss may occur [18]. Neurologic impairment is reported in many cases of cervical spondylodiscitis (68-80%) [19, 20]. Tenderness of the spine on percussion, although infrequent, is also present [14]. In the present case, severe neck pain with percussion

tenderness prompted us to seek a definite diagnosis.

To the best of our knowledge, only one case of retropharyngeal abscess caused by *E. coli* has been reported [4]. Kohlmann et al. reported a case of a 53-year-old female with known history of chronic obstructive pulmonary disease, vertebral disk herniation and obesity suffering from meningitis caused by *E. coli* accompanied with retropharyngeal abscess and cervical spondylodiscitis. The interval between the onset of symptoms and diagnosis was a few weeks for this case, whereas our case was diagnosed within five days from the onset of neck pain, which enabled us to cope with the acute progression of the retropharyngeal abscess. While *E. coli* is a rare pathogen for retropharyngeal abscess, it can however be transported by discitis/osteomyelitis as it is adjacent to the deep neck tissue.

Furthermore, the present case with liver cirrhosis has a predisposition to severe infection by capsulated agents including *E. coli* [5]. The presence of cirrhosis might play a role in the acute progression of the retropharyngeal abscess by the agent. Common bacterial pathogens of cervical osteomyelitis include *Staphylococcus aureus*, *E. coli*, *Proteus*, *Klebsiella* and *Enterobacter*, coagulase-negative *Staphylococcus* and *Streptococcus*, whereas retropharyngeal abscess are typically caused by anaerobic organisms and beta-hemolytic streptococci, *viridans* group *Streptococci*, *Staphylococcus aureus*, *Haemophilus influenzae* and *Streptococcus pneumoniae* [14, 21, 22]. From etiological point of view, retropharyngeal abscess could be secondary to cervical vertebral osteomyelitis. Many cases of spondylodiscitis arise from haematogenous spread [14]. Most common source of infection is the genitourinary tract with other sources including the skin, soft tissues, respiratory tract, gastrointestinal tract, oral cavity and endocarditis [14, 17]. Our patient's medical history was negative for cutaneous, urinary tract and gastrointestinal tract infection symptoms. CT scan of the chest and abdomen showed no evidence of respiratory infections and deep abscess. Haematogenous spread occurs via the arterial supply to the vertebral bodies and the venous circulation. The pre-vertebral retropharyngeal venous plexus may play a role as a route for bacterial seeding [23]. Bacterial translocation from intestinal lumen to extraintestinal site may play a role as a potential

source of *E. coli* bacteremia in patients with liver cirrhosis.

The therapeutic strategy for retropharyngeal abscess with cervical vertebral osteomyelitis is composed of antimicrobial therapy and surgical drainage as well as neck immobilization. Empiric intravenous antimicrobial agent should be administered prior to identification of causative organism. Although non-operative treatment is reported to be successful in patients who are not critically ill, surgical drainage is recommended for patients with significant airway involvement or mass effect as in the present case [24, 25]. Especially, when the abscess originated by vertebral infection disseminated to retropharyngeal area as in this case, the treatment should consider both antibiotic therapy and surgical approach to permit the faster resolution of the symptoms.

In conclusion, *E. coli* retropharyngeal abscess is a rare and critical complication of cervical vertebral osteomyelitis. Patients with cirrhosis should be cautious against haematogenous spread from bacteremia. Timely surgical drainage and antimicrobial therapy are essential for retropharyngeal abscess with impending airway obstruction.

Conflict of interest. The authors have no conflicts of interest to disclose.

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