

A Case of Lumbar Vertebral Osteomyelitis Following Community-Acquired *Serratia Marcescens* Bacteremia with Enteritis

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Abstract

An 80-year-old man was urgently hospitalized by septic shock due to *Serratia marcescens* enteritis. The patient had recovered from shock state and been well by antibiotics therapies, but suddenly had a body temperature of 39°C and complained of a lower back pain on the 21st day of hospitalization. Again, *Serratia marcescens* was isolated from blood culture. A Computed tomography scan examination showed lumbar vertebral osteomyelitis between the levels of L₂ and L₄ and abscesses in bilateral iliopsoas muscles. He had treatments with intravenous antibiotics for 6 weeks until discharge and followed by 12 weeks of oral antibiotics as an outpatient. This is the first case report of lumbar vertebral osteomyelitis following community acquired *Serratia marcescens* bacteremia due to enteritis.

Keywords: *Serratia marcescens*; Enteritis; Vertebral osteomyelitis

Introduction

Lumbar vertebral osteomyelitis is usually caused by hematogenous bacterial infection. The majority of the patients have underlying medical conditions or risk factors, including diabetes, alcoholism, chronic hepatic disease, spinal surgery and steroid uses [1-3]. The major primary focus of infection is the urinary tract, skin, or soft tissue and common causal organism is *Staphylococcus aureus* followed by *Escherichia coli* [1,2,4,5]. *Serratia marcescens* as being causative organism is extremely rare [6]. We experienced such a rare case of the vertebral osteomyelitis associated with community acquired *Serratia marcescens* bacteremia caused by enteritis.

Case Presentation

An 80-year-old man was brought to the emergency department of our hospital with fever, chills and extreme fatigue. Three days before the admission he had noted severe diarrhea. His medical history included old myocardial infarction; radiation proctitis resulted of radiation therapy for prostate cancer, and a left nephroureterectomy for ureteral stone. On examination, his body temperature was 36.3°C, blood pressure was 65/44 mmHg, pulse was 86 beats/min, respiratory rate was 18 breaths/min, and oxygen saturation was 96% with ambient room air. Initial laboratory tests revealed elevated inflammatory markers, liver enzymes, and creatinin level, and coagulation abnormalities (Table 1). A Computed tomography (CT) scan of his abdomen showed the slight thickening of the wall between the descending colon and the rectum and a mirror surface image in the transverse colon (Figure 1). His clinical course was summarized in Figure 2. He was diagnosed as being septic shock due to bacterial enteritis and disseminated intravascular coagulation (DIC) and therefore treated with a massive infusion of lactated Ringer's solution along with norepinephrine (0.2 µg/kg/min), intravenous meropenem (MEPM)(2 g/day), and antithrombin concentrates and recombinant

thrombomodulin (γTM). The results of blood and stool cultures performed by the microbiology laboratory confirmed the predominant presence of *Serratia marcescens*. Cardiovascular stabilization was achieved and then norepinephrine administration was discontinued after the 3rd of hospital day. His clinical symptoms, especially diarrhea, and the level of CRP was improved. On the 9th day of hospitalization, he had a relapse of diarrhea and was found the stool contained clostridium difficile (CD) toxin, and therefore treatment with MEPM was changed to ceftazidime (CAZ) (3 g/day) and metronidazole (MNZ) (1500 mg/day), and those were continued for following 1 week.

Elements found in laboratory test	Value	Elements found in laboratory test	Value
WBC	4050/µl	Na	137 mEq/l
RBC	357 × 10 ⁴ /µl	K	3.4 mEq/l
Hb	11.6 g/dl	Cl	105 mEq/l
Ht	34.10%	CRP	18.87 mg/dl
PLT	83 × 10 ³ /µl	PT-%	>150%
Neut	97%	PT-INR	0.83
TP	5.3 g/dl	AT III	66%
Alb	2.9 g/dl	FDP	25 µg/ml
T-Bill	0.6 mg/dl	D-dimer	22.2 µg/ml
AST	0.6 mg/dl	ABG	room air
ALT	217 IU/l	pH	7.468
ALP	410 IU/l	pCO ₂	20.1 Torr
LDH	350 IU/l	pO ₂	69.7 Torr
γGTP	186 /µl	HCO ₃ ⁻	14.2 mmol/l

CK	5317 IU/l	BE	-7.4 mmol/l
BUN	61 mg/dl	Lac	35.2 Torr
Cr	3.13 mg/dl		

Note: WBC: White Blood Cells; RBC: Red Blood Cells; Hb: Hemoglobin; Ht: Hematocrit; PLT: Platelets; Neut: Neutrophils; TP: Total Protein; Alb: Albumin; T-Bill: Total Bilirubin; AST: Aspartate aminotransferase; ALT: Amino Alanine Transferase; ALP: Alkaline phosphatase; LDH: Lactate dehydrogenase; γ GTP: Gamma-glutamyl transpeptidase; CK: Creatine Kinase; BUN: Blood Urea Nitrogen; Cr: Creatine; Na: Sodium; K: Potassium; Cl: Chloride; CRP: C-Reactive Protein; PT-%: Prothrombin time and pro time; PT-INR: Prothrombin time and pro time international normalized ratio; AT III: Antithrombin III; FDP: Fibrin degradation products; ABG: Arterial blood gas; pCO₂: Partial Pressure of Carbon Dioxide; pO₂: Partial Pressure of Oxygen

Table1: Laboratory findings.

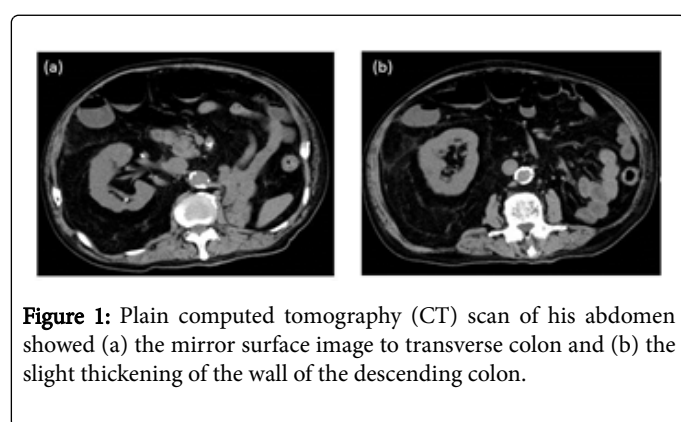
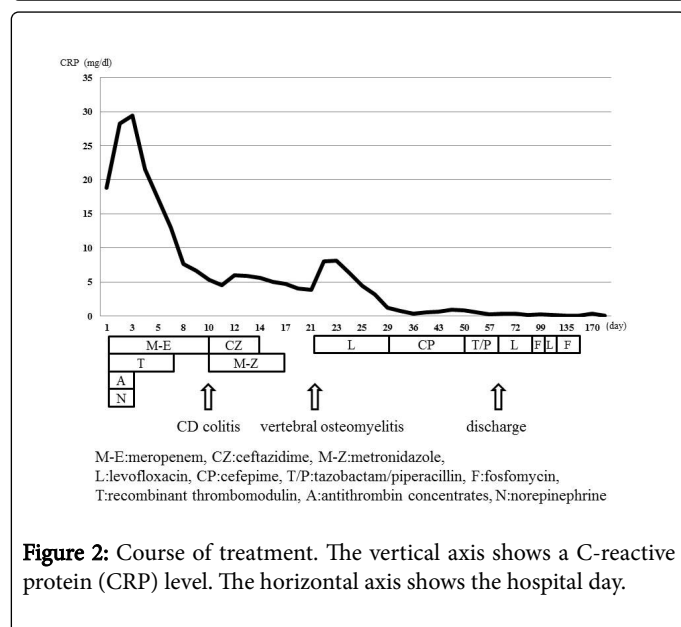


Figure 1: Plain computed tomography (CT) scan of his abdomen showed (a) the mirror surface image to transverse colon and (b) the slight thickening of the wall of the descending colon.



The relapsed diarrhea was gradually improved, but on the 21st hospital day, he suddenly developed fever of 39°C and complained lower back pain. CT scan showed abscesses in bilateral iliopsoas muscle and lumbar vertebral osteomyelitis at the levels of L2-L4 (Figure 3). We had regarded this as hematogenous infection due to *Serratia marcescens* bacteremia and treated with intravenous levofloxacin (LVFX) (500 mg/day), because *Serratia marcescens* in blood sample on admission showed susceptibility to LVFX (Table 2).

On the next day, the CT guided drainage for iliopsoas muscle abscesses were performed, but the amount of drained fluid was so small that the culture was not able to detect any bacteria. As expected, *Serratia marcescens* was again revealed from the blood cultures, having identical patterns of sensitivity to antibiotics at admission. A subsequent magnetic resonance imaging (MRI) scan demonstrated vertebral osteomyelitis between the levels L₂ and L₄ (Figure 4). He was treated with intravenous LVFX for one week followed by three weeks of intravenous cefepime (CFPM) (2 g/day), followed by two weeks of tazobactam/piperacillin (TAZ/PIPC) (4.5 g/day). He had a satisfactory clinical condition and the following CT scan at 58th hospital day revealed the abscesses nearly disappearing, but osteolytic changes appearing in the lumbar vertebrae (Figure 5). After the 59th hospital day, he was outpatient and treated with oral fosfomycin (FOM) (2000 mg/ day) and LVFX (500 mg/day), and those were taken in every 2 weeks rotation for 3 months, and then had been in free of symptoms and shown a normal CRP value.

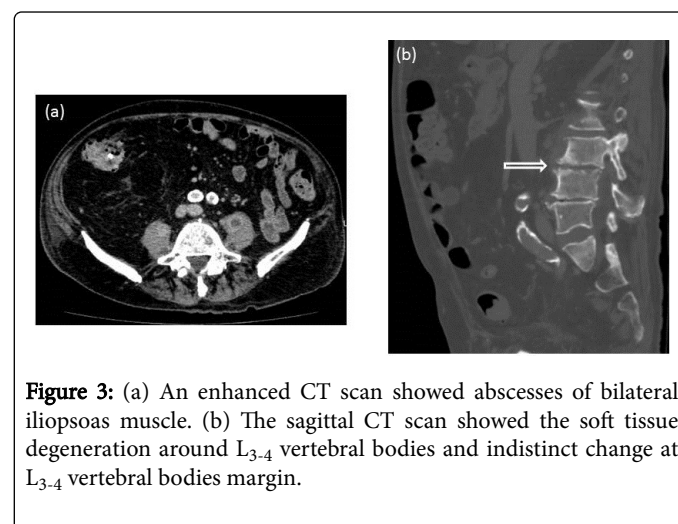


Figure 3: (a) An enhanced CT scan showed abscesses of bilateral iliopsoas muscle. (b) The sagittal CT scan showed the soft tissue degeneration around L₃₋₄ vertebral bodies and indistinct change at L₃₋₄ vertebral bodies margin.

Antibiotic	Effect	MIC
Ampicillin	R	16
Piperacillin	S	≤ 4
Cefazolin	R	≥ 64
Cefotiam	S	≤ 8
Cefpodoxime	R	0.5
Cefotaxime	S	≤ 1
Ceftazidime	S	≤ 1
Cefepime	S	≤ 1
Cefmetazole	S	8
Imipenem	S	1
Meropenem	S	≤ 0.25
Amikacin	S	4
Gentamicin	S	≤ 1
Minocycline	I	8

Levofloxacin	S	0.25
Ciprofloxacin	S	≤ 0.25
Fosfomycin	S	≤ 16
Sulfamethoxazole Trimethoprim	S	≤ 20
S: Susceptible; I: Intermediate; R: Resistant; MIC: Minimum Inhibitory Concentration		

Table 2: Susceptibility of antibiotics for *Serratia marcescens*.

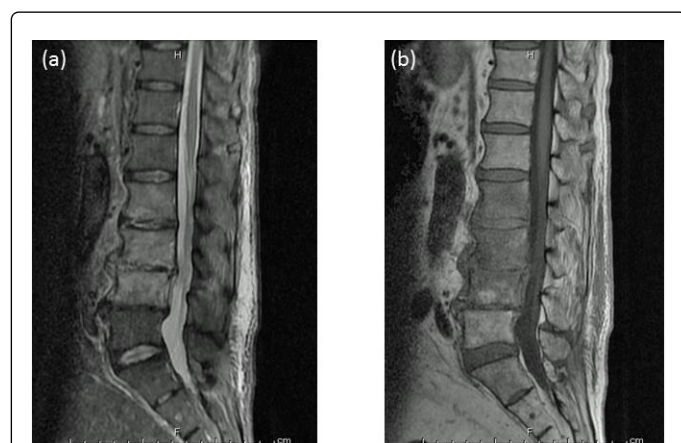


Figure 4: (a) A T2 short-tau inversion recovery weighted sagittal MRI image showed high intensity area in the vertebral corpora between the levels of L₂ and L₄. (b) A T1 weighted sagittal MRI image showed low intensity area through the L₂ -L₄ levels of vertebral corpora.



Figure 5: (a) A following axial CT scan at 58th hospital day revealed the abscesses disappearing. (b) The sagittal CT scan showed the osteolytic changes at L₂-L₄ vertebral bodies.

Discussion

Serratia species are aerobic Gram-negative bacillus, occupied 92% in *Serratia marcescens* [7] and prone to cause septic shock accompanying with endotoxin. It is important to know it as a pathogen of the nosocomial infection, associated with outbreaks of nosocomial

infections [8]. The incident rate of nosocomial bacteremia of *Serratia* species is 1.2 to 1.4 % [9-12] and the incidence of the community acquired bacteremia was only 0.49 per a population 100,000 people [13]. Gastrointestinal as being the focus of infection of the community acquired *Serratia marcescens* bacteremia is extreme rare [5].

Vertebral osteomyelitis is usually caused by hematogenous infection [12,14] and also rare infection as indicated an annual incidence rate of 2.4 per a population of 100,000 people [12,15]. The common causal organism is *Staphylococcus aureus* followed by *Escherichia coli* [1,2,4,5]. *Serratia marcescens* as being causative organism is extremely rare [6]. Such a rare case of lumbar vertebral osteomyelitis following community acquired bacteremia caused by enteritis due to *Serratia marcescens* has been presented.

The vertebral osteomyelitis is a relatively uncommon disease, and physicians are unaccustomed to diagnose it [4,16]. In this case, CT and MRI examinations were timely performed because he had a sudden spike fever and complained of lower back pain. However, back pain is not specific symptom and fever is variably present as seen in the 35% to 60% cases [5,17], and therefore the diagnoses are sometimes overlooked.

The diagnosis of vertebral osteomyelitis is possible with positive results of blood cultures and of image findings of such as CT and MRI [5]. Infectious Diseases Society of America [17] recommends a total duration of 6 weeks of antibiotics therapy when the disease was identified. In this case, the patient had continued the antibacterial treatment for 18 weeks and did not show any side effects, although the incidence of adverse drug reactions due to long-term antibiotics treatment was reported to be high as 45.2 % in patients with vertebral osteomyelitis [18].

Conclusion

The vertebral osteomyelitis following community acquired *Serratia marcescens* bacteremia with enteritis is extremely rare, but exist, and the long-term antimicrobial treatment is needed once if it was given the diagnosis.

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