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CASE REPORT

Primary sternal osteomyelitis due to *Peptostreptococcus anaerobius*

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Abstract Primary sternal osteomyelitis (PSO) is a rare syndrome. In adults, it usually occurs with underlying predisposing factors, such as immunodeficiency, or intravenous (IV) drug abuse. The infecting organism in these patients is usually *Staphylococcus aureus* or *Pseudomonas aeruginosa*. *Peptostreptococcus* species are Gram-positive anaerobic cocci and are part of the normal flora of human mucocutaneous surfaces. *Peptostreptococcus* infection can occur in all body sites, including the central nervous system, head, neck, chest, abdomen, pelvis, skin, bone, joint, and soft tissue. Here, we report on a 32-year-old previously healthy Chinese man who was diagnosed with PSO and *P. anaerobius* was yielded in the bacterial culture. He was treated empirically with antibiotics, but these failed. After additional limited surgical intervention with debridement, the PSO was cured.

Keywords Primary sternal osteomyelitis · *Peptostreptococcus* · Limited surgical intervention

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Introduction

Primary sternal osteomyelitis (PSO) is a rare syndrome [1]. In adults, it usually occurs with underlying predisposing factors, such as immunodeficiency, or intravenous (IV) drug abuse [1]. The infecting organism in these patients is usually *Staphylococcus aureus* or *Pseudomonas aeruginosa*. We report a patient who had developed *Peptostreptococcus*-associated PSO with no identifiable risk factors. To our knowledge, peptostreptococci have not been reported as agents of PSO in the literature. In addition, the clinical course and management of this patient are discussed.

Case report

A 32-year-old previously healthy Chinese man presented to the emergency department (ED) because of fever, chills, chest pain, and progressive swelling of the chest wall for 3 days. His past medical history was negative for diabetes mellitus, alcoholism, steroid use, chest operation, and systemic infections. The patient denied recent history of teeth extraction, local trauma, and recreational drug abuse.

On examination, his respiratory rate was 16 breaths per minute, pulse 62 beats per minute, temperature 37.2°C, and oxygen saturation 98% while the patient was using ambient air. Generally, he appeared ill-looking and lethargic. Examination of the skin over the whole body revealed no purulent lesions except the chest wall, which showed an ill-defined tender swelling, measuring 6 cm in diameter over the middle of the chest wall with local warmness and erythematous change. The results of the pulmonary, cardiac, abdominal, and neurologic examinations were unremarkable.

He had an elevated white blood cell (WBC) count of 22.6 × 10^3 μl^{-1} (4.5–11 × 10^3 μl^{-1}) with neutrophilia, elevated C-reactive protein of 3.26 mg/dl (0–0.5 mg/dl), and an erythrocyte sedimentation rate (ESR) of 105 mm/h (0–15 mm/h). The plasma glucose level was 98 mg/dl. His blood cultures were sterile and his chest radiographies were normal. A contrast-enhanced computed tomography (CT) of the chest showed a lobulated heterogenous mass, measuring 7.5 cm in diameter, with bone destruction at the midline anterior chest wall (Fig. 1). CT-guided needle aspiration and biopsy of the sternum were performed, and *Peptostreptococcus anaerobius* was yielded in the bacterial culture, which was susceptible to penicillin G and ampicillin/sulbactam according to the minimal inhibitory concentration.

He was treated empirically with intravenous (IV) oxacillin for 7 days and was discharged home on oral amoxicillin/clavulanic acid for an additional 4 weeks. However, he returned 2 months later due to fever (38.2°C) and recurrent redness of the anterior chest wall. His blood pressure was 120/78 mmHg, respiratory rate 28 breaths per minute, and pulse 105 beats per minute. The WBC count was 13.8 × 10^3 μl^{-1}. Under the diagnosis of PSO with sepsis, he received surgical debridement during hospitalization. The surgical pathological examination confirmed sclerosing sternal osteomyelitis with findings of fibrosis and granulation formation in the bone tissue specimens. The culture of bone tissue grew *P. anaerobius*. Antibiotic treatment with oral amoxicillin/clavulanic acid was continued postoperatively for an additional 4 weeks. At follow-up after 6 months, the wound healed well and no more recurrence was noted.

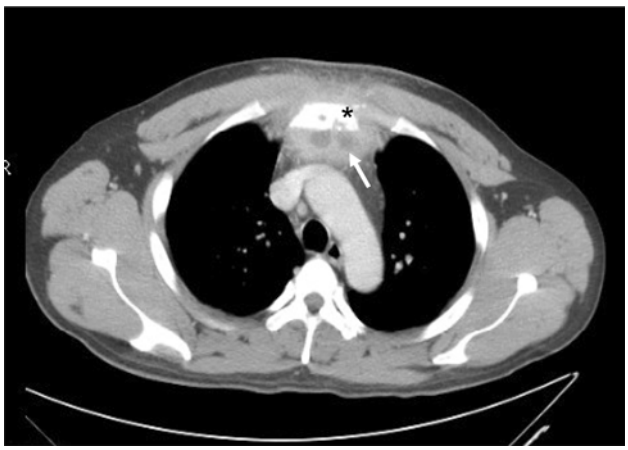

Fig. 1 Computed tomography (CT) of the chest reveals lobulated heterogenous mass (*arrow*), measuring 7.5 cm in diameter, with bone destruction at the midline anterior chest wall (*asterisk*)

Discussion

PSO is a rare disease, comprising 0.3% of all cases of osteomyelitis in the literature [2], and it is usually characterized by the hematogenous spread of causative organisms without a contiguous focus of infection [3]. Predisposing factors of PSO include intravenous drug abusers, immunosuppressive states, diabetes mellitus, and poor nutrition [4]. Nonetheless, there were no apparent risk factors which could be identified in our patient.

The most common causative organism isolated in PSO is *Staphylococcus aureus*, and *P. aeruginosa* is the most common infecting organism in intravenous drug abusers [1, 4]. Other pathogens include *Mycobacterium tuberculosis* [5], *Salmonella typhi* [6], *Salmonella hirschfeldii* [7], *Streptococcus pneumoniae* [6], *Staphylococcus epidermidis* [8], *Aspergillus* species [9], *Actinomyces israelii* [10], and *Nocardia nova* [11]. To our knowledge, there is no previously reported case of PSO caused by *Peptostreptococcus*. *Peptostreptococcus* species are Gram-positive anaerobic cocci and are part of the normal flora of human mucocutaneous surfaces, including the mouth, intestinal tract, vagina, urethra, and skin. The genus *Peptostreptococcus* is genetically and phenotypically heterogeneous, and the most common peptostreptococci in the different infectious sites are also heterogeneous. In bone and joint infections with *Peptostreptococcus*, the *P. anaerobius*, *Finegoldia magna*, *Peptoniphilus asaccharolyticus*, and *Anaerococcus vaginalis* pathogens are common. The antimicrobial drug of choice for *Peptostreptococcus* species is penicillin G, and the oral agents including amoxicillin/clavulanic acid, clindamycin, metronidazole, and cefoxitin are selected in order to simultaneously cover the possible mixed aerobic and other anaerobic organisms [12, 13].

The clinical picture of PSO is often subtle, and early identification is highly important, for it has been shown that delayed diagnosis and inappropriate treatment can be associated with significant morbidity and mortality [2]. The radiological examinations are usually negative in the early stage, and the bone scans are more useful than plain radiography in the early diagnosis of PSO [14]. The CT scan and magnetic resonance image (MRI) can demonstrate the site and extent of bone destruction, and provide useful information in clinical settings. Tissue biopsy of the bone should be done for the differential diagnosis of sternal osteomyelitis and malignant bony disease. The treatment of PSO may require combining antibiotics and debridement. High-dose antibiotic therapy is recommended to ensure adequate blood levels, and are usually administered for a 6–8-week period [7]. Gill and Stevens [6] reported that only a few cases (<10%) of PSO will resolve with antibiotics alone. The limited surgical intervention may be necessary in PSO due to

P. aeruginosa or in chronic cases where antibiotics have failed.

In conclusion, PSO is a rare entity, and this is the first reported case of PSO due to *Peptostreptococcus*. The possibility of *Peptostreptococcus* infection needs to be included in the differential diagnosis of sternal osteomyelitis, even for apparently immunocompetent adults. Proper antibiotics administration should be guided by the organism yielded in the culture. Limited surgical intervention should be considered early if the antibiotic treatment failed.

Conflict of interest All of the authors declare no conflict of interest.

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