

Clinical Note

Pseudomonas aeruginosa osteomyelitis of the cervical spine

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Non-tuberculous pyogenic spinal osteomyelitis compromise only 2-4% of all cases of osteomyelitis. The incidence is estimated at 1:250,000 per year in the general population. Cervical involvement is observed in less than 10% of the cases of spinal osteomyelitis. Pyogenic spinal osteomyelitis is usually caused by gram positive pyogens like *Staphylococci* and *Streptococci* species. They are usually seen in immuno-compromised patients or intravenous drug users.¹ They frequently pose diagnostic and therapeutic challenges for the internists, radiologists, and surgeons. *Pseudomonas aeruginosa* (*P. aeruginosa*) are gram-negative bacilli that rarely cause osteomyelitis. It usually affects immuno-compromised or hospitalized patients on long-term antibiotic therapy for other conditions.¹⁻³ Only a few short series and case reports in the literature described spinal osteomyelitis secondary to *Pseudomonas* species including *aeruginosa*. The vast majority of these cases were reported in immuno-compromised patients. We present in this report a rare case of vertebral osteomyelitis of the cervical spine caused by *P. aeruginosa* infection.

A 60-year-old black male presented with a few weeks history of throat pain that progressed to involve the whole neck. Later, his symptoms became more intense and associated with severe neck stiffness and occipital headache. He is known diabetic, on oral hypoglycemic medications under good control. He is also a heavy smoker. He denied any history of swallowing or breathing difficulties, nausea, or vomiting. He also denied a history of fever or night sweating. He had mild weakness of the 4 limbs, but denied any sensory symptoms or sphincter disturbances. There was no recent history

of contact with known patients suffering tuberculosis infection. The patient was still ambulating in a spastic gait with support. On physical examination, he was awake, oriented with fluent comprehensive speech. He had a stiff neck with very limited range of movements in all directions. He had a normal cranial nerves examination. Motor power grades in the 4 extremities were 4/5 with normal reflexes, down going planters, and normal exam of all sensory modalities. Plain x-ray images of the cervical spine demonstrated changes that involved C2, C3, and C4 vertebral bodies associated with para-vertebral soft tissue expansion at these levels and the retropharyngeal spaces. An MRI study of the cervical spine revealed an extensive destructive process in the upper cervical region extending from C2-C4 spinal segments. Evidence of intervertebral disc space involvement, and a partial collapse of the C4 vertebral body were observed. Prominent pre-, para-, and retro-spinal soft tissue involvements are demonstrated with anterior epidural extension resulting in significant spinal cord compression and signal changes within the cord parenchyma at the level of the compression (Figure 1). The images were highly suggestive of an infectious process. Blood test results obtained more than once and revealed; white cells count (WBC) ranged from $8.6-12.3 \times 10^9/L$ (normal range [NR]: $3.90 - 11.00 \times 10^9/L$) with differential counts of more than 90% neutrophils. Erythrocyte sedimentation rate (ESR) ranged from 80-140 mm/Hr (NR: up to 20 mm /Hr). The C-reactive protein (CRP) ranged from 4.8-5.7 mg/L (NR: ≤ 3 mg/L). Blood, urine, and sputum microbiological culture results were all negative. Other serological studies including HIV infection were non-reactive, and Brucella agglutination antibodies titer was less than 1:20. A rigid cervical orthosis was fitted on the patient's neck. He was started on intravenous Vancomycin empirically covering the more common



Figure 1 - Presenting MRI of the cervical spine showing: a) sagittal view T2 MRI illustrating the significant cord compression at the affected level with signal changes within the cord. b) A sagittal view T1 MRI post gadolinium injection illustrating extensive discitis/osteomyelitis with pre and para vertebral epidural inflammatory changes.

gram positive pyogens. Eventually, he underwent an open biopsy of the lesion. Histopathological studies revealed non-specific inflammatory changes. Gram stain was negative. Microbiological cultures revealed a growth of *P. aeruginosa* colonies sensitive for Tazocin, Ceftriaxone, Cefepime, Imipenem, but resistant to Ciprofloxacin, Gentamicin, and Meropenem. He was started on Tazocin intravenously for 6 weeks. His clinical condition improved dramatically with time. His ESR dropped in 3 months to 45 mm/hr. A few months later, he presented with clinical and radiological evidence of cervical instability. He underwent C3 corpectomy and C2-C4 fusion with autologous bone grafting via an anterior cervical approach. His later symptoms improved following surgery. In a follow up visit 2 years later, he continued to do well with satisfactory lateral cervical spine x-ray documenting radiological evidence of bony fusion.

The diagnosis of vertebral osteomyelitis is frequently difficult to establish early in its clinical course, often because of the initial nonspecific symptoms or absence of clear clinical signs. Acute symptoms and signs may include pain, localized tenderness, rigidity, and fever. Neurological deficits may or may not be present.^{1,2} Vertebral osteomyelitis is rare and represents only 1% of all cases of bone infection. Of these, only 3-6% involve the cervical vertebrae, the commonest causative agents are gram positive cocci such as *Staphylococcus aureus*.¹

Pseudomonas aeruginosa cervical osteomyelitis is quite rare and has been reported in the literature affecting intravenous drug users, following urinary tract infection, teeth extraction, polytrauma patient, otitis media, post percutaneous nucleotomy, post epidural injection and one case of spontaneous cervical osteomyelitis with no obvious risk factor.¹⁻⁴ Spinal osteomyelitis caused by *Pseudomonas* species other than *aeruginosa* were also reported in the literature. These include *P. mendocina*, an organism that rarely affect humans, *P. pickettii* affecting the lumbar spine in a patient on chronic hemodialysis, and *P. cepacia* in a case of cervical osteomyelitis.

The possible risk factors in our case were diabetes mellitus (well controlled), heavy smoking, and old age. Non-operative management with appropriate antibiotics

is effective in patients with minimal destruction of the vertebral body. However, surgical procedures are indicated in the presence of retropharyngeal abscess, impending or established pathological fractures, functionally significant neurological deficits, persistent septicemia, and spinal instability. The treatment of the osteomyelitis in these cases involves debridement of infected tissue, restoration of vertebral column alignment, surgical decompression of neural elements, and stabilization of the spine.

In conclusion, rare pathogens like *P. aeruginosa* may be responsible for spinal osteomyelitis. This case report stresses the need for early intervention in cases of spinal osteomyelitis to establish the diagnosis, identify the responsible pathogen, and to select the appropriate antibacterial pharmacotherapy.

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