

## **Images in Spine Surgery: Vertebral Osteomyelitis**

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Sixty nine year old man presented with 2 months history of progressively increasing neck and shoulder pain. He had experienced a weight loss of 20 lbs in the last 2 months. He had developed some weakness of all 4 extremities over the last 3 days. His bladder and bowel function was normal. The patient also had a painful and swollen knee joint for the last few weeks. On examination the patient was febrile; he had grade 4/5 motor strength in all 4 extremities except that his Biceps (C5), brachioradialis (C6) and Triceps (C7) had 2/5 power on both sides. Sensations were also decreased in the C5, C6 and C7 dermatomes. The biceps, triceps and brachioradialis reflex were absent on both sides. His WBC count, ESR and C- reactive protein were all abnormally raised. Blood, urine and knee aspirate were all sent for cultures and sensitivity. His C-spine X-rays showed destruction of C4, 5 and 6 vertebral bodies with partial involvement of C3 leading to significant kyphosis. Soft tissue swelling could be seen in the lateral view as well. His MRI showed involvement of C3 (partial) to C6

vertebra with retropulsion into the spinal canal and a large soft tissue abscess and induration in the prevertebral area. He was taken to the operating room where anterior approach was used to drain the prevertebral abscess and thorough debridement performed from C3 to C6 vertebrae. Adequate decompression of spinal cord was performed. A tricortical iliac crest graft was used to reconstruct the defect (due to corpectomies) and correct the deformity. No hardware was placed anteriorly. All cultures (blood, urine, knee aspirate and pus from cervical spine) grew staphylococcus



Figure 1. Radiograph of C-Spine, lateral view, destruction of C4, 5 and 6 vertebrae can be seen. This has led to a kyphotic deformity in that region. There is an enlarged soft tissue swelling in front of the spine.

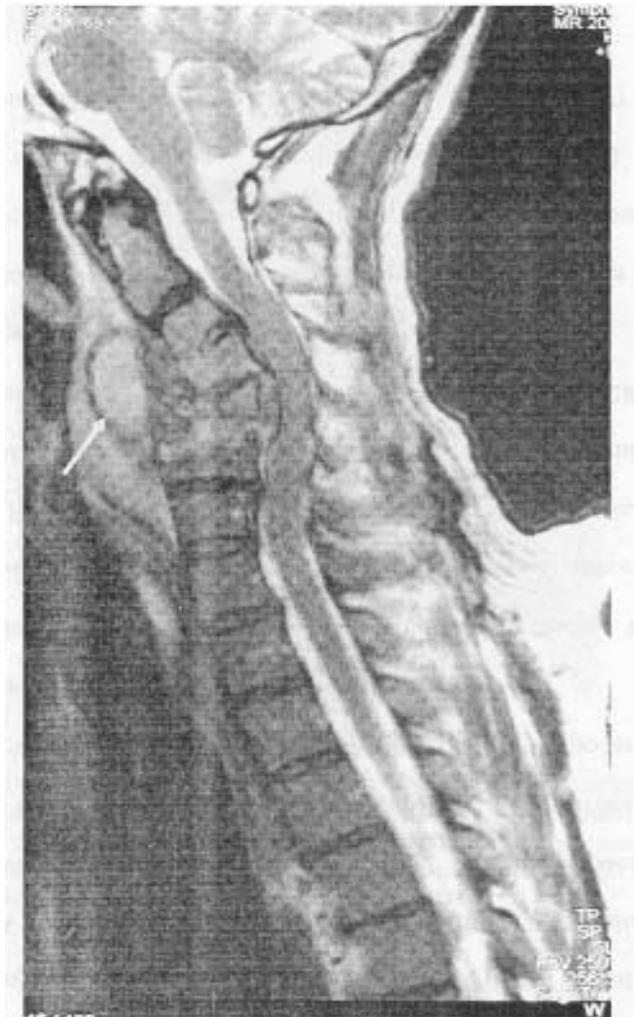


Figure 2. MRI, C- Spine, almost complete destruction of C4,5 and 6 vertebrae with partial involvement of C3 vertebra. The infective process can be seen to erode through the disc spaces. Spinal cord is compressed by the development of kyphotic deformity and retropulsion of bone. A Large soft tissue swelling and an abscess (Arrow) can be seen in the prevertebral area.



Figure 3. Postoperative X-rays, debridement of the involved vertebral bodies (Corpectomy of C4 and 5 and partial corpectomy of C3 and C6) and reconstruction with Tri-cortical iliac crest autograft (Arrow) was performed (Stage I). Supplemental posterior instrumentation with lateral mass screws and rods can be seen from C3 to C7 (Stage II). Correction of Kyphotic deformity can be appreciated as well.

grew staphylococcus aureus sensitive to cloxacillin. After 4 days supplemental posterior stabilization was performed with lateral mass screws and rods from C3 to C7. Patient kept on improving progressively over a period of 2 months and regained complete neurological function.

### Commentary

Vertebral osteomyelitis is associated with a very high morbidity and mortality rate even in the recent series (5-15%).<sup>1</sup> Direct inoculation, contiguous spread from an adjacent infection, or haematogenous seeding can all result in vertebral osteomyelitis. In cervical spine invasion of the prevertebral fascia can lead to spread of infection distally leading to mediastinitis. Vertebral osteomyelitis can also result in epidural abscess. Pyogenic infection can involve adjacent vertebral body by invading through the intervertebral disc, this leads to destruction of vertebral bodies and disc leading to kyphosis and instability.

Vertebral osteomyelitis presents as back or neck pain which is present at rest and sleep and can be associated with

fever and neurologic compromise. Cervical abscess formation may lead to torticollis or dysphagia. Spread of the infection into the epidural space can cause meningitis. Staphylococcus aureus is the most commonly offending organism. The erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) are reliable laboratory investigations. Blood, urine and pus cultures should be taken before starting the patient on antibiotics. Investigations to detect malnutrition and its treatment are very important in these critically ill patients. Closed CT guided biopsies can usually be performed in thoracic and lumbar spine but because of the proximity of vital structures in the cervical spine an open biopsy is appropriate. The biopsy material should always be sent for bacterial, fungal and TB cultures.<sup>2</sup>

Plain radiographs may not demonstrate abnormal findings of vertebral erosion, disc collapse and kyphosis for up to several weeks after the process has begun. When used in conjunction with technetium 99m scans, gallium 67 citrate scans have high sensitivity and specificity in detecting foci of infection. MRI is the investigation of choice in detecting infections of the vertebral column.<sup>3</sup>

The goals of treatment are to eradicate infection, pain relief, neurologic preservation and prevention of spinal deformity. The indications of surgery are to obtain biopsy material, presence of an abscess, neurologic compromise (due to retropulsion of bone/disc, abscess or kyphosis), spinal instability, deformity and failure of non-operative treatment. Surgical treatment involves thorough debridement of infected bone and soft tissue. Choice of approach depends on the location of pathology, but in case of vertebral body involvement, in cervical spine, it is approached anteriorly. The defect created by the debridement is reconstructed using autograft or mesh cages. Supplemental posterior fixation may be required in some cases as well.

In the absence of above mentioned indications non-operative treatment can be considered. This will include minimum 6 weeks of parenteral antibiotics followed by oral antibiotics. Bracing should be employed to prevent any deformity due to vertebral and disc collapse. Nutritional supplementation is very important for these critically ill patients during this hyper catabolic state.

### References

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3. Modic MT, Feiglin DH, Piraino DW, Boumpfrey F, Weinstein MA, Duchesneau PM, Rehm S. Vertebral osteomyelitis: Assessment using MR. *Radiology*. 1985;157:157-66.