Cervical spine spondylodiscitis mimicking teardrop fracture

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Pyogenic spondylodiscitis can have nonspecific clinical and imaging presentations. In this report, we describe a case of pyogenic spondylodiscitis of cervical spine mimicking teardrop fracture on radiography. Subsequent CT-guided biopsy helped identify the correct diagnosis and the responsible pathogen, *Staphylococcus aureus*.

**Introduction**

Although discitis/osteomyelitis of the cervical spine is a relatively common and well-documented condition, it can have variable presentation. Type I modic degenerative change, acute postoperative changes of discectomy, dialysis-related spondyloarthropathy, granulomatous discitis, rheumatid arthritis, gout, and some tumors such as aneurismal bone cyst, giant-cell tumor, chondroma, and Ewings may mimic spondylodiscitis on imaging (1). This report describes a case of biopsy-proven, cervical, infectious spondylodiscitis that mimicked traumatic fracture on initial radiograph. Our literature search yielded very few case reports of cervical spondylodiscitis mimicking trauma, and none mimicking teardrop fracture.

**Case report**

A 55-year-old male was found in his home unresponsive. At emergency department admission, the patient’s vital signs were as follows: pulse 105, BP 110/60, and temperature 37.4°C. Significant laboratory studies included elevated WBC of 37.2 with 95% neutrophils, and blood glucose of 576. Insulin drip, fluid resuscitation, and broad-spectrum antibiotics were administered. On clinical exam, the patient was found to have Fournier’s gangrene and was taken for emergent debridement, urethral dilation, and cystoscopy by the urology and plastic surgery services. The patient was then admitted to the ICU and remained intubated for three days. Perineal tissue pathology and blood cultures were significant for methicillin-sensitive *Staphylococcus aureus* (MSSA).

There was a vague history of neck pain prior to admission, based on interview with family members. On day 5 of admission, the patient complained of increased neck pain. Significant laboratory findings included ESR 18 and CRP 6.47. A cervical spine radiograph revealed focal kyphotic angulation at C3/C4, with endplate irregularity and a triangular bony fragment anterior to C3. Marked prevertebral soft-tissue thickening was noted (Fig. 1).

Cervical spine MRI showed prevertebral edema and soft-tissue enhancement with abnormal marrow signal in C3 and C4 as well as collapse of the endplates, which was concerning for infectious etiology (Fig. 2).

Discussion with the clinical team revealed no specific history of recent trauma, although the patient was a poor historian at baseline.

On day 7 of admission, a CT-guided core needle biopsy/aspiration of the C3/C4 disk space and endplates was performed along with tissue and blood cultures. Aspiration revealed frank pus mixed with blood products; cultures grew MSSA.
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Figure 1. 55-year-old male with cervical spine spondylodiscitis. Lateral radiograph shows a triangular fragment of bone anterior to C3 (black arrow) with collapse of C3 on C4 and marked prevertebral soft tissue thickening. Closer review reveals irregularity of the endplates of C3 and C4 and local resorption of bone (white arrow), suggesting a more chronic process.

Discussion

In adults, infective spondylitis often presents with involvement of the adjacent intervertebral disc, due to the direct spread of infection from the endplates (2). It is thought that the direct hematogenous spread into the disc, especially, is less common in adults, unlike in pediatric patients, due to vessels transversing the cartilage and plates, which usually disappear by age 7 (3).

Commonly, the condition is termed spondylodiscitis. The most common causative bacterial pathogen in spondylodiscitis that includes the cervical segment is Staphylococcus aureus (4). Mechanisms for infection in spondylodiscitis may include direct inoculation due to penetrating injury, intraoperative contamination, and spread from adjacent structures. However, the most common mechanism for infection is hematogenous seeding (2, 4, 5, 6).

In our case, hematogenous spread of MSSA was the most likely mechanism of infection, as MSSA was also the causative agent in the patient’s Fournier’s gangrene. Several factors may increase a patient’s risk for the development of cervical spondylodiscitis, including diabetes mellitus, steroid therapy, chronic disease, immunosuppression, and advanced age (4, 5). Our patient did not have a prior diagnosis of diabetes mellitus but did present with severe hyperglycemia; it is not clear if this represented previously undiagnosed diabetes or was due to the acute stress of sepsis. Fournier’s gangrene is also more frequently seen in diabetics, so the combination of these infections raises the possibility that the patient did have underlying untreated/uncontrolled diabetes, rendering him essentially immunocompromised.

Insidious onset of pain at the level of the affected vertebra is the most common early clinical manifestation of cervical spondylodiscitis. As symptoms can be nonspecific, there is an average lag time of 11 to 14 weeks between onset of symptoms and diagnosis (4).

Despite the fact that abnormalities may take weeks to appear on radiography, this is often one of the first studies performed in patients presenting with cervical pain. Significant radiographic features of spondylodiscitis may include narrowing of the intervertebral disc space as well as destruction of the endplates of adjacent vertebrae. There may be associated prevertebral soft-tissue thickening related to paraspinous inflammation/abscess (7). CT can show enhancing soft-tissue abscesses and cortical destruction/fragmentation. MRI is sensitive to the early changes of infective spondylodiscitis (1). T2W images display involvement of the affected vertebral bodies as marrow hyperintensity (7, 8). Involvement of the disc shows T2 hyperintensity with loss of normal hypointensity from the nuclear cleft. Administration of intravenous contrast shows enhancement of the involved vertebral body and disc. Also, contrast administration can show epidural extension and abscess formation. Despite its exquisite sensitivity, early changes on MRI may still lag behind clinical symptoms (1).

In our case, the initial radiograph presented a confusing picture. Focal kyphosis and the triangular-shaped bone fragment anterior to C3 mimicked a teardrop fracture. However, flexion teardrop fracture usually occurs at C4 through C6, and extension teardrop fracture typically occurs at C2; thus, the location in our case is not characteristic for either type of fracture. In addition, the irregular appearance of the endplates suggests a more chronic process with underlying bony abnormality. Prevertebral soft-tissue thickening is nonspecific; in an acute traumatic setting, it could represent hemATOMA, and in nontraumatic setting, it is more concerning for abscess or inflammation. Flexion teardrop fractures are usually sustained in traumas involving forced flexion and axial compression of the cervical spine, such as motor vehicle accidents and diving in shallow water, and are unstable with frequent neurologic compromise (9). This patient did not have a history of any major trauma, and did not have clear neurologic compromise, but rather had insidious neck pain with documented bacteremia. The constellation of imaging and clinical findings favored infection over trauma.

Image-guided biopsy is usually performed when spondylodiscitis is suspected on clinical grounds and from imaging. The reported yield to identify a pathogen from image-guided biopsy may vary, up to 70%. Various factors, including recent initiation of antibiotic treatment, are considered to be responsible for this variable rate. Acute inflammatory markers C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are elevated in more than 90% of cases in the acute phase and may aid in diagnosis. Early
image-guided biopsy should be considered when spondylodiscitis is suspected (10).

**Conclusion**

We present a case of biopsy-proven cervical spondylodiscitis with endplate fragmentation that initially mimicked teardrop fracture on radiography. However, it is important to correlate with patient history and clinical factors, and to look for subtle imaging signs that might broaden the differential diagnosis, keeping in mind that myriad other entities, including infection, can mimic trauma. Due to the potentially devastating mechanical and neurological consequences associated with infectious spondylodiscitis, it is imperative to keep this entity in mind and consider further evaluation with cross-sectional imaging and tissue sampling.

**References**

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Figure 2. 55-year-old male with cervical spine spondylodiscitis. T1 precontrast (A) and postcontrast (B), T2 (C), and STIR (D) sagittal MRI images show enhancing prevertebral soft tissue, collapse of C3 on C4, and abnormal T2 hyperintensity and enhancement in the C3/ C4 disk space.
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