



CASE REPORT

SPONTANEOUS EMPHYSEMATOUS OSTEOMYELITIS OF SPINE DETECTED ON IMAGING– UNVEILING THE SILENT THREAT

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ABSTRACT

Emphysematous osteomyelitis involving the spine is an uncommon condition characterized by the presence of intraosseous gas. Several predisposing factors such as diabetes mellitus, alcohol abuse, malignancy, Crohn's disease, and other etiologies causing immunosuppression have been identified. Due to its potentially life threatening nature, a prompt and accurate diagnosis is required to expedite effective treatment. In this case report, we highlight the role of imaging in a rare instance of spontaneous emphysematous osteomyelitis of the spine in patient, diagnosed on imaging thus helping timely management.

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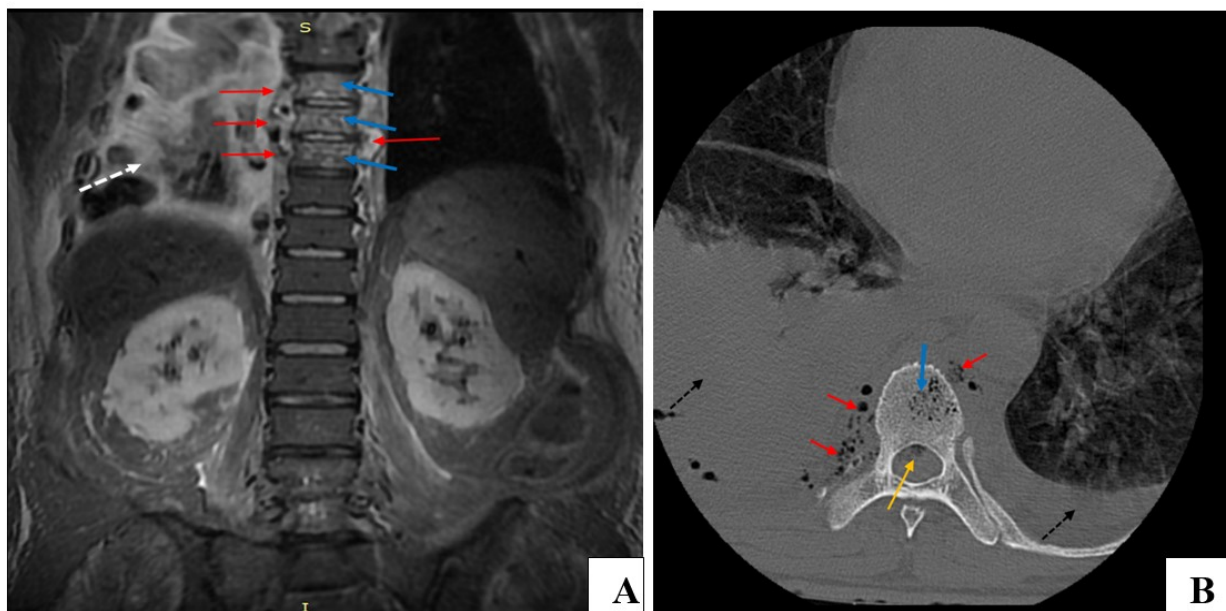
INTRODUCTION

Intraosseous gas is commonly associated with degenerative changes. However, there are nondegenerative causes of air in the spine which includes include trauma, procedural sequelae, infection, osteonecrosis, lymphangiomatosis of the bone, and tumors ⁽¹⁾. Diabetes mellitus is the commonest predisposing factor. The causative organisms are mostly anaerobes or members of the Enterobacteriaceae family. The infection can present as monomicrobial or polymicrobial ⁽¹⁾. Hematogenous spread is the commonest route of spread. Considering the rarity of the disease, limited numbers of cases are reported in the literature on emphysematous osteomyelitis of the spine. Here we report a case of spontaneous emphysematous osteomyelitis of the spine with a particular focus on the crucial role of imaging specially Computed Tomography in diagnosis and prompt initiation of appropriate treatment.

CASE REPORT

A fifty-two-year-old male patient presented with a history of severe back pain and sudden onset weakness of both lower limbs and inability to walk for ten days. Patient did not give history of surgery or trauma. Personal history revealed that the patient is a chronic alcoholic. His random blood sugar was high on presentation to the hospital. His blood investigations

revealed hemoglobin of 10.3 gm/dl, and a total leukocyte count of 11,400/mm³ of which 80% were neutrophils. The erythrocyte sedimentation rate was 21 mm. Blood urea and serum creatinine were 54 mg/ dl and 0.9 mg/dl respectively. Magnetic Resonance Imaging (MRI) of the dorso-lumbar spine with spine screening was performed on 1.5T GE Signa HDxt. On MRI, abnormal signal intensity was noted in the dorsal vertebrae from seven to nine vertebral bodies with osseous destruction and focal kyphotic deformity. Diffusely altered marrow signal intensity was noted in these vertebrae, hyperintense on short tau inversion recovery (STIR) and T2W images and heterogeneously hypointense on T1W images with involvement of the intervening discs. There was pre and paravertebral soft tissue edema and small collections appearing heterogeneously hyperintense on T2W images and STIR images with extension into the anterior epidural space causing compression on the thecal sac. Bilateral neural foramina at these levels appeared partially effaced. Similar abnormal signal intensity was noted involving four and five lumbar vertebral bodies and intervening disc without soft tissue component. On MRI findings, the diagnosis of infective etiology with the possibility of Pott's spine was kept. In Pott's spine, the symptoms are insidious in onset. But our patient presented with sudden onset back pain and paraplegia. Therefore, to rule out other possibilities Computed Tomography (CT) was performed. Computed Tomography (CT) was performed on TOSHIBA Action 16. It showed moderate right-sided pleural effusion with underlying subsegmental lung collapse and



A. Coronal short tau inversion recovery (STIR) image shows increased signal intensity involving D7, D8 and D9 vertebral bodies (blue arrows), and collection in prevertebral and bilateral paravertebral soft tissues (red arrows) with multiple small hypo-intense foci within. **A** white dashed arrow is pointing at right-sided pleural effusion. **B.** Computed tomography Axial multiplanar reformatted image in bone window showing the presence of intra-osseous gas (blue arrows) with the extension of gas into prevertebral and bilateral para-vertebral soft tissues (red arrows) and also the intra-spinal region (yellow arrow). Black dashed arrows are pointing at bilateral (right > left) pleural effusion

minimal left-sided pleural effusion. Multiple foci of air involving seven, eight and nine dorsal vertebral bodies extending to involve the prevertebral, bilateral para-vertebral and intra-spinal region and compressing the cord at these levels and pushing it posteriorly were noted (Figure). These findings of intra-osseous gas on the CT scan came as a surprise which led to a diagnosis of emphysematous osteomyelitis of the spine. Surgical decompression, debridement and stabilization were done. Intra-operatively samples from the vertebral body and soft tissues were collected and sent for histopathological examination and culture. The biopsy was reported as non-tuberculous osteomyelitis and the culture grew *Escherichia coli*.

DISCUSSION

Emphysematous osteomyelitis of the spine is a rare and serious condition characterized by the presence of intra-osseous gas resulting from infection. This gas, often referred to as a vacuum phenomenon occurs when peripheral fibers of annulus fibrosus rupture, commonly seen in degenerative diseases. This intradiscal gas may extend into the vertebral bodies along the discs resulting in the intravertebral vacuum phenomenon. These gas shadows are usually localized and small, surrounded by the sclerotic rim. While most of the cases are benign and do not warrant further investigations, it is important to note that not all cases are harmless. Osteomyelitis is the infection of bones and the presence of extensive intra-osseous gas is suggestive of an extremely rare form of infection known as emphysematous osteomyelitis. The presence of such gas as a sign of infection was first described by Ram et al.⁽²⁾ in 1981. In 2018 R. Ono et al reviewed 34 cases of emphysematous osteomyelitis of the spine⁽³⁾. In one study it was found that the spine is the most common site to be involved followed by the pelvis, femur, tibia/fibula, and sternum⁽¹⁾. Unusual sites like small bones of the hand and foot may also be involved. This condition mostly affects elderly males and is associated with

comorbidities such as diabetes mellitus, alcohol abuse, malignancy, sickle cell anemia, Enteritis and conditions causing immunosuppression⁽¹⁾. These factors are likely to play a crucial role in the development of this serious condition. IT is usually caused by monomicrobial infection⁽⁴⁾. According to the literature, *E. Coli* is the commonest causative micro-organism found in most of the patients followed by *Klebsiella pneumoniae*, *Bacteroides* species, *Fusobacterium*^(1,3). The infection typically occurs through the hematogenous spread, mostly monomicrobial, but it can also result from the contagious spread, mostly polymicrobial from an intra-abdominal source of infection, skin or soft tissue source or following intraabdominal or spinal surgery^(4,5). The diagnosis of this rare pathology cannot be made clinically and requires imaging such as CT and MRI. These imaging techniques specially CT can detect the intra-osseous and intra-spinal gas, aiding in early and accurate diagnosis. The radiologist must be aware that intraosseous gas is a rare but alarming sign of the potentially fatal condition of emphysematous osteomyelitis and should warrant vigilant investigation in a diabetic patient with back pain. Imaging features of emphysematous osteomyelitis are illustrated in Table no 1. Emphysematous osteomyelitis has a high mortality rate of around 32%⁽¹⁾. To prevent devastating consequences, prompt diagnosis with the help of imaging and aggressive management in the form of appropriate antimicrobial treatment and surgery is essential. In summary, emphysematous osteomyelitis of the spine is a rare but serious condition that requires immediate attention once diagnosed. Medical professionals should be vigilant and consider this condition in diabetic patients presenting with back pain, ensuring timely intervention and improving patient outcomes.

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