



Detection of Spinal Tuberculosis by F-18 FDG PET/CT as a Cause of Unusual Referred Pain in the Right Upper Quadrant of Abdomen

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Abstract

Keywords

- ▶ tuberculosis spine
- ▶ positron emission tomography
- ▶ referred pain
- ▶ epidural phlegmon
- ▶ right upper quadrant pain

Tuberculous involvement of the spine (tuberculosis [TB] spine) can cause severe morbidity unless detected and treated early. Apart from the constitutional symptoms, it can present with back pain, kyphosis, gait abnormality, and paraplegia secondary to the bone or spinal cord involvement. There had been instances of TB spine presenting directly as abdominal pain due to psoas abscesses. Herein, we report a very rare clinical manifestation of TB spine as *referred pain* in the right upper abdominal quadrant due to right epidural phlegmon associated with T7 vertebra, detected by positron emission tomography.

Introduction

Tuberculosis (TB) is a serious public health burden in India with varied clinical manifestations. Tuberculous involvement of the spine (tuberculosis [TB] spine) can cause severe morbidity unless detected and treated early.¹ Apart from the constitutional symptoms such as low-grade fever, irritability, and weight loss, it can present with back pain, kyphosis, gait abnormality, and paraplegia secondary to the bone or spinal cord involvement.¹ Due to insidious onset of symptoms with slow disease progression, suspicion of TB and diagnosis could be delayed. There had been rare reports of TB spine presenting as abdominal pain due to psoas abscesses.^{2,3} A very unusual presentation of TB spine as *referred pain* in the abdomen due to perivertebral abscess had been reported in a 25-year-old Indian man⁴ Herein, we report an even rare presentation of *referred pain* in the right upper abdominal quadrant due to right epidural phlegmon associ-

ated with TB of T7 vertebra, detected by fluorodeoxyglucose F-18positron emission tomography/computed tomography (¹⁸F-FDG PET/CT).

Case Report

A 26-year-old man presented with upper abdominal discomfort and belching.

Upper gastrointestinal endoscopy was unremarkable except for nonspecific antral gastritis and bulbar duodenitis. He was managed conservatively. He presented again after 1 year due to deep dull aching upper abdominal pain. By this time, he complained of pain predominantly in the right upper quadrant (RUQ). The pain was aggravated in the postprandial state and on forward bending. But no tenderness could be elicited.

His total leucocyte count was 9290 cells/cu.mm with 75% neutrophils, 18% monocytes, 6% monocytes, and 1%

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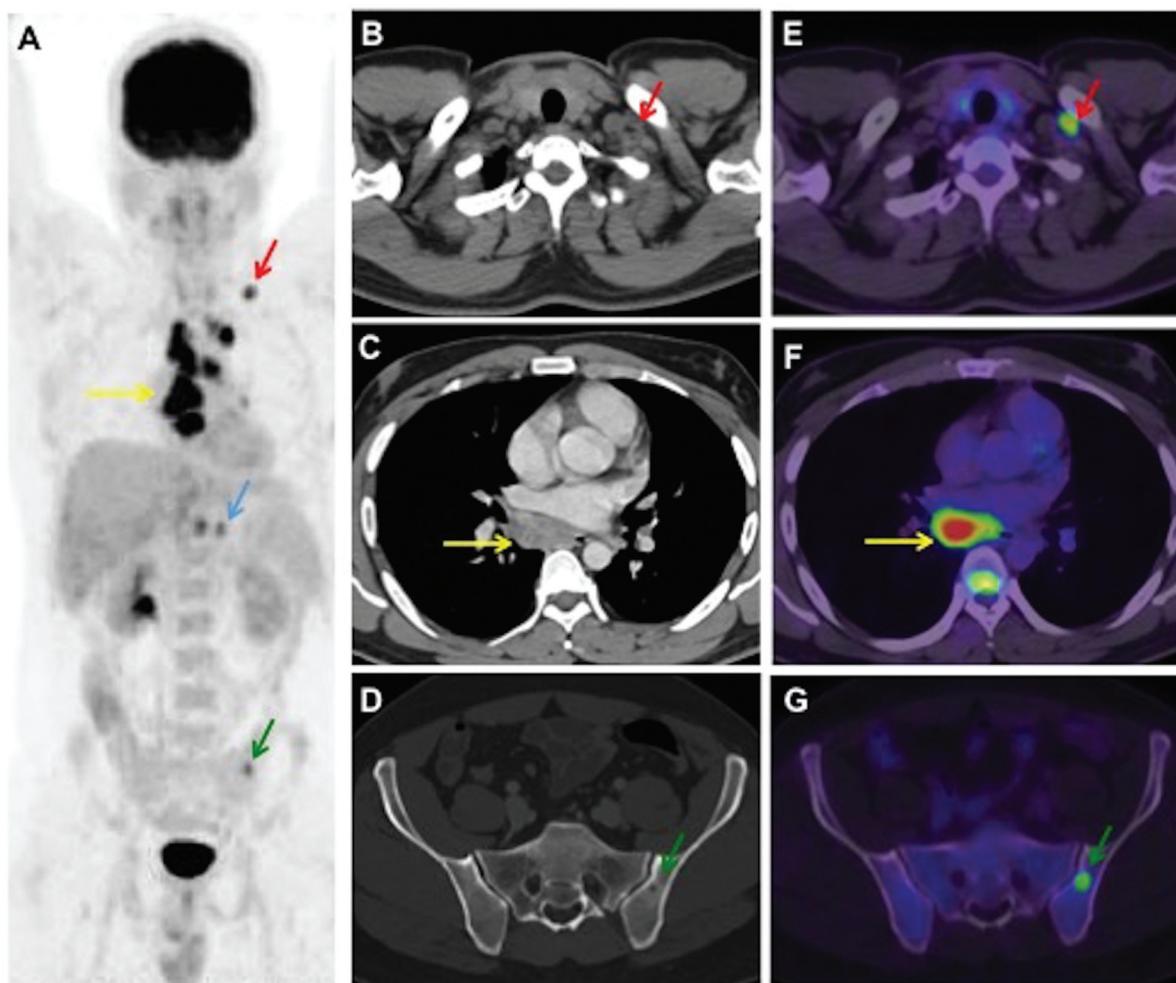


Fig. 1 Positron emission tomography/computed tomography (PET/CT)-anterior maximum intensity projection image (A) shows abnormal fluorodeoxyglucose avid foci in left supraclavicular, mediastinal, abdominal, and left iliac regions (arrows). Corresponding axial computed tomographic (B–D) and PET/CT (E–G) images show necrotic hypermetabolic nodes and left iliac lytic lesion (arrows).

eosinophils; other routine blood parameters were also unremarkable. Ultrasonography of the abdomen was normal. Contrast-enhanced computed tomography (CECT) of the abdomen also showed no significant abnormality in the visceral organs; few enlarged lesser omentum and periportal nodes were visualized. The lower thoracic sections showed enlarged subcarinal node. Due to lymphadenopathy, the possibilities of lymphoma, TB, and sarcoidosis were considered. He was subsequently referred for FDG-PET/CT (→ Fig. 1). It showed hypermetabolic necrotic left supraclavicular node (measuring $\sim 13 \times 8$ mm) and mediastinal prevascular, upper, and lower paratracheal, subcarinal (largest measuring $\sim 35 \times 22$ mm) and left hilar nodes. A small hypermetabolic lytic lesion (~ 5.0 mm) was also noted in the left iliac bone. Metabolically active lytic lesion (measuring ~ 11 mm) was noted in the posteroinferior aspect of right side of T7 vertebral body. There was contiguous extension of FDG uptake into the right intervertebral foramen and superior end plate of T8 vertebra. On reviewing the CECT study, a rim of enhancing right and anterior epidural soft tissue (thickness measuring ~ 4.4 mm) was visualized at the T7 vertebral level with contiguous extension into the right intervertebral

foramen of T7 vertebra (→ Fig. 2). Since the lesion was very small and the patient had no musculoskeletal complaints, the CECT finding had been likely overlooked by the imaging specialist. Based on these findings, a provisional diagnosis of tuberculous adenitis and osteomyelitis was made. CT-guided biopsy from the left iliac lesion showed granulomatous osteomyelitis with necrosis suggesting TB. The patient was relieved of RUQ pain following 3 weeks of anti-TB treatment and is continuing the therapy.

Discussion

TB spine predominantly involves lower thoracic and upper lumbar vertebrae.¹ It can present with kyphosis, gait abnormality, and paraplegia secondary to the bone or spinal cord involvement.¹ It has characteristic insidious onset of symptoms with slow disease progression. Hence, suspicion of TB and diagnosis could be delayed in some situation. There had been rare manifestations of TB spine presenting as abdominal pain.^{2,3} In these reports, the patients had large psoas abscesses that were the direct cause of abdominal pain. A very unusual presentation of TB spine as referred pain in the

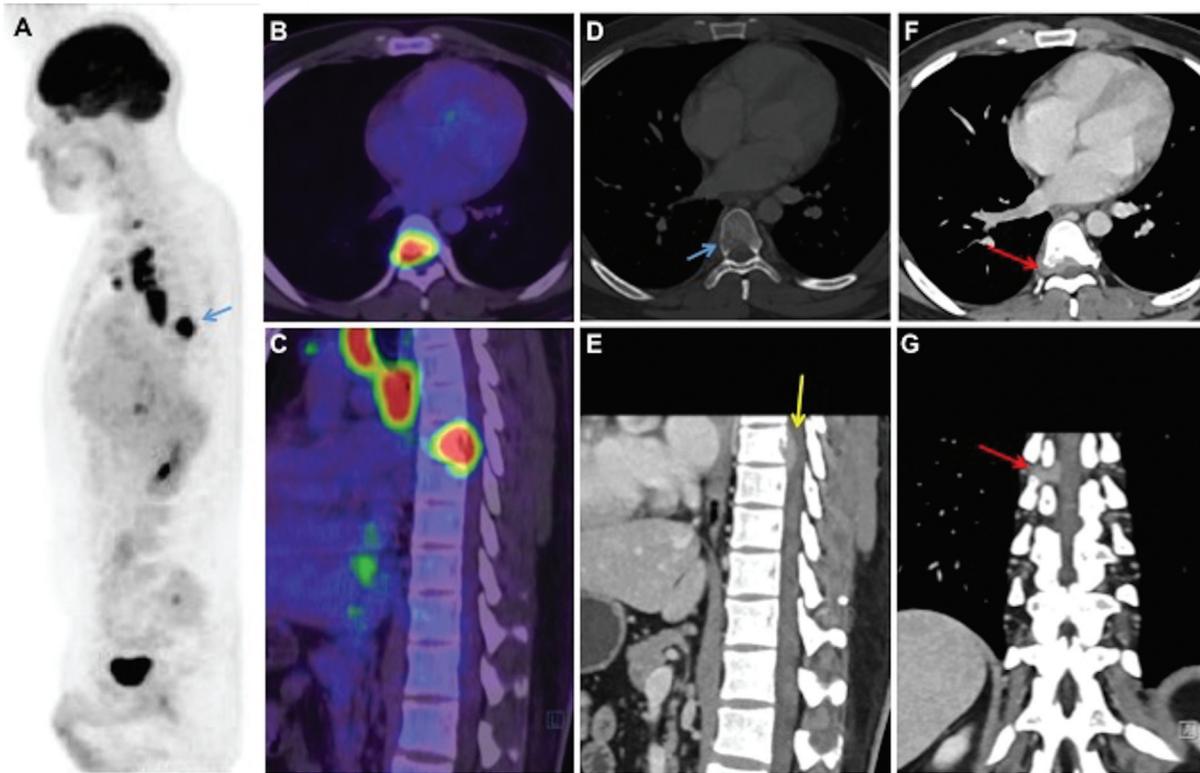


Fig. 2 Lateral maximum intensity projection image (arrow in A), axial (B) and sagittal (C) positron emission tomography/computed tomography show hypermetabolic lytic lesion in T7 vertebral body (arrow in D). Sagittal (E), axial (F), and coronal (G) images of contrast-enhanced computed tomography abdomen show epidural soft tissue (with thecal sac compression, arrow in E) extending into right T7 to T8 intervertebral foramen (arrows in F and G).

abdomen had been reported in a 25-year-old Indian man.⁴ However, only when the patient developed upper backache after 3 months of abdominal pain was spinal problem suspected and later magnetic resonance imaging (MRI) demonstrated perivertebral collection from T2 to T7 vertebrae as the cause of referred abdominal pain.

In our case, the patient had abdominal pain as the only presenting symptom over 1 year period and the pain was localized to the RUQ with no tenderness. Only after PET/CT showed the thoracic vertebral involvement, the CECT images were reviewed that demonstrated epidural phlegmon along the T7 vertebral canal and right intervertebral foramen giving lead to the diagnosis of referred RUQ pain from TB spine.

Segmental visceral distribution of referred pain from T7 vertebral ligament exactly corresponds to the upper abdominal quadrant as shown experimentally by Kellgren.⁵

In our case, the referred pain is likely due to the irritation of the posterior longitudinal ligament/right T7 to T8 intertransverse ligament by the epidural phlegmon extending along the right T7 to T8 intervertebral foramen and TB is known for subligamentous spread.⁶ Though there was lesion near the right T7 nerve root, the patient did not have any neurologic deficit or pain in the corresponding dermatome.

True visceral pain due to primary pathology in the intra-abdominal organs is usually associated with nausea and vomiting,⁷ whereas referred visceral pain lacks this feature. Explanation for such referred spinal pain has been given by

the theories of axon reflex and convergence.⁸ Whole body FDG PET/CT imaging is the imaging modality of choice to identify the hidden infective focus in pyrexia of unknown origin⁹ and it has an unequalled utility in evaluating TB spine and extent of involvement.¹⁰⁻¹³ It could be considered as a complementary or alternative tool to the imaging gold standard MRI for spondylodiscitis.¹⁴ In our case, the intervertebral disc was spared, which is a characteristic feature to differentiate TB from bacterial cause in early vertebral osteomyelitis. Patients with thoracic spine disease are at risk of paraparesis or paraplegia and the disease has to be identified at the earliest.¹ To our best knowledge, this is the first report where the findings of ¹⁸F-FDG PET/CT led to the diagnosis of referred pain from spinal TB as the cause of abdominal pain, which is a very rare presentation.

Funding

None.

Conflict of Interest

None declared.

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