

Pyogenic Spondylodiscitis

Spinal infection: an uncommon and diagnostically challenging condition

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Introduction

This poster presents a case of spondylodiscitis identified during the authors training in clinical reporting. Emphasis is on patient presentation, and the interpretation and reporting of the resultant radiographs.

Background

- Pyogenic spondylodiscitis refers to bacterial infection of two consecutive vertebrae and the intervening disc (Knezevic et al. 2009; Tali et al. 2015).
- Staphylococcus aureus* is the most common pathogen with haematogenous spread, direct inoculation and contiguous spread being the possible routes of infection (Gouliouris et al. 2010).
- Affected patients are at risk of chronic pain, permanent disability and death; although with early antibiotic treatment patient outcome is good (Asamoto et al. 2005; Garkowski et al. 2014).
- Spondylodiscitis has an incidence of 2.2 to 5.8 cases per 100,000 (Beronius et al. 2001; Kehrer et al. 2014)
- There is a peak incidence in the 7th decade with male preponderance (Kehrer et al. 2014).
- Back pain is the most common symptom; this makes diagnosis difficult due to the high frequency of back pain in the general population, and the rarity of the disease (Gouliouris et al. 2010).

Presenting signs and symptoms

An 80-year-old man was referred for lumbar spine radiographs by his GP with a clinical history of unremitting and increasing back pain. A recent diagnosis of diabetes mellitus was also recorded.

The differential diagnosis for back pain includes degenerative disease, vertebral compression fracture, metastatic disease, inflammatory spondyloarthropathies and spondylodiscitis (Cottle & Riordan 2008; Santiago et al. 2010; Skaf et al. 2010).

Symptoms of spondylodiscitis include:

- Back pain (~90%);
- Fever (~50%);
- Neurological deficit;
- Weight loss (Garkowski et al. 2014; Gouliouris et al. 2010; Knezevic et al. 2009; Mylona et al. 2008).

Risk factors for spondylodiscitis include:

- Advanced age;
- Diabetes;
- Infection elsewhere (Op. Cit.).

Laboratory features

C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) are elevated in over 90% of patients with spondylodiscitis (Cottle & Riordan 2008; Garkowski et al. 2014; Rowson & Greig 2015).

Justification for the radiographic examination

- Most often back pain is a benign, self limiting disorder attributable to mechanical / degenerative causes (Chou et al. 2007; Jarvic & Deyo, 2002).
- Imaging is not routinely recommended unless there is concern of a serious underlying spinal pathology (ACR, 1996; RCR, 2012).
- From the referral details 3 red flag features are identified (table 1). Imaging is therefore indicated.
- According to guidelines (ACR, 1996; RCR, 2012) magnetic resonance imaging (MRI) is preferable to plain radiographs as the first-line investigation in patients with red flag features.
- Radiographs are still the most commonly used first-line imaging study for patients with back pain (Sans et al. 2012; Santiago et al. 2010; Rowson & Greig 2015).

Table 1. Red flag features suggestive of serious spinal pathology:

a. Neurological
b. Other
<ul style="list-style-type: none"> Age < 20 or > 55 years Systemic illness, previous malignancy, HIV Weight loss, fever IV drug use, steroid use Structural deformity Non mechanical pain, thoracic pain

Adapted from iRefer Guidelines (RCR, 2012)

Practice (radiographic) report

There is destruction of the adjacent end plates and disc space at T11-12. This is likely secondary to infection. A metastatic deposit is another possibility. There are multilevel degenerative disc changes with predominant involvement of T12-L1 and L3-4. Facet joint degeneration is also demonstrated.

Definitive (radiological) report

There is loss of disc space and end plate destruction at T11-12 and T12-L1. There is sclerosis of T12 and L1 vertebrae adjacent to the disc space. These changes are highly suspicious for infectious discitis. There are background degenerative changes with disc space narrowing at L3-4.

Correlation with inflammatory markers and an urgent MRI scan are recommended.

Table 2. Radiographic findings of spondylodiscitis

Early changes
<ul style="list-style-type: none"> Poorly defined vertebral end plates Disc space narrowing
Later changes
<ul style="list-style-type: none"> Definitive bone erosion / destruction Structural deformity End plate sclerosis and osteophytosis Soft tissue extension (suggested by abnormal soft tissue shadow) Acquired vertebral block

Sources: Cottle & Riordan 2008; James & Davies 2006; Sans et al. 2012; Santiago et al. 2010; Skaf et al. 2010; Stieber et al. 2007; Tali et al. 2015

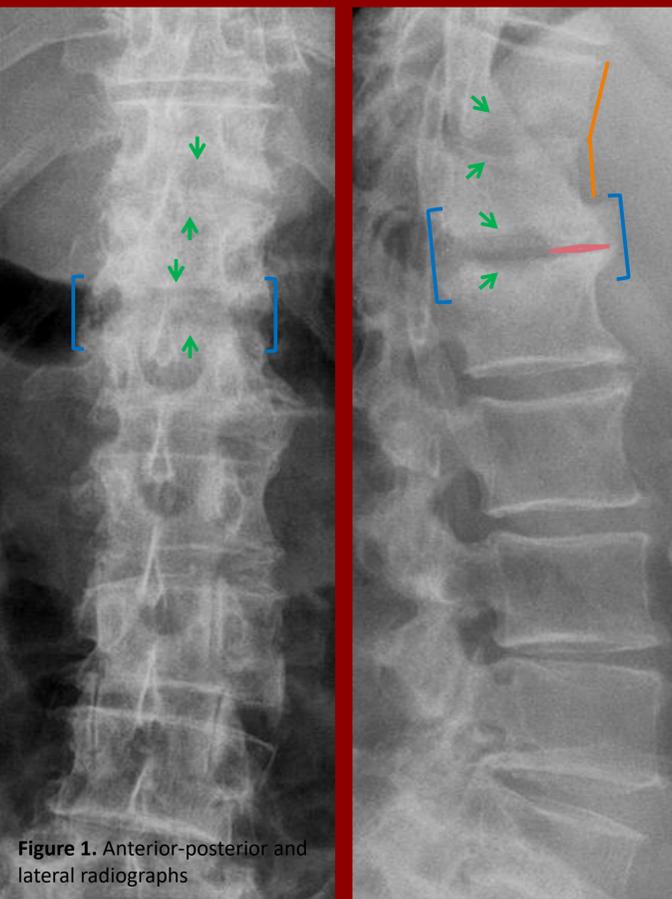


Figure 1. Anterior-posterior and lateral radiographs

Table 3. Radiographic differential diagnoses of pyogenic spondylodiscitis

Differential	Features favouring the differential cause
Degenerative disc disease	Intact end plates, involvement at several levels of the spine, vacuum phenomenon (i.e. intra discal gas)
Neoplasia (primary or metastatic)	Lack of end plate and disc involvement*, pedicle destruction, multifocal (e.g. metastatic disease and myeloma) *Myeloma and chordoma may develop close to the end plate and involve the adjacent disc
Ankylosing spondylitis	The disc space is preserved (initial stage), syndesmophytes, spinal ankylosis (late stage), fracture involving the posterior column
Tuberculosis spondylitis	Anterior vertebral erosion, the disc space is preserved (initial stage), skip lesions, slower progression, involvement of the posterior elements, severe kyphosis (i.e. gibbus deformity), bone fragmentation and migration, calcified paraspinal abscess
Dialysis spondyloarthropathy	Radiographically indistinguishable from spondylodiscitis
Neuropathic (Charcot) spine	Vacuum phenomenon, bone fragmentation (debris), gross disorganisation / dislocation of the spine, exuberant osteophytosis, facet joint involvement

Sources: Barrey et al. 2010; Cottle & Riordan 2008; James 2014; Helms, 2005; Hong et al. 2009; James & Davies 2006; Jevtic 2003; Lury et al. 2006; Santiago et al. 2010; Sans et al. 2012; Stieber et al. 2007; Tali et al. 2015; Wagner et al. 2000

Report comparison

- The resultant radiographs (fig. 1) show several radiographic findings characteristic for spondylodiscitis (table 2).
- There is agreement between the practice and definitive reports on findings suggestive of spondylodiscitis at T11-12. The definitive report also describes involvement of T12-L1. Involvement of >2 contiguous levels has been reported in 16-18% of cases of pyogenic spondylodiscitis (Garkowski et al. 2014; Ledermann et al. 2003).
- The disc space narrowing, sclerosis and osteophytosis seen at T12-L1 were interpreted by the author as degenerative disc changes. However, the vertebral end plates are partially destroyed which points to an infective process (James & Davies 2006; Tali et al. 2015; Stieber et al. 2007). Moreover, later changes of spondylodiscitis include bone reformation seen as peripheral sclerosis and osteophytosis (Cottle & Riordan 2008; Sans et al. 2012; Skaf et al. 2010). Thus, the findings at T12-L1 represent established infection.
- An omission from both reports is the focal kyphosis at T11-12 with anterior height loss of the T11 vertebra. Vertebral destruction and focal kyphosis are seen in the later stages of spinal infection (Cottle & Riordan 2008; Sans et al. 2012).
- Both reports mention degenerative disease. Degenerative changes of the spine are common in older people and frequently coexist with spondylodiscitis (Goel et al. 2000).

A red herring

- The practice report gives a differential diagnosis of a metastatic tumour. This is a red herring. Spinal metastases tend to involve the vertebrae and spare the disc (Hong et al. 2009; Skaf et al. 2010). Although incidences of metastatic involvement of the disc have been reported, it is rare enough to be omitted from the differential (Modic et al. 1985; Ross 2012).
- The radiographic differential diagnoses of spondylodiscitis are presented in table 3.

Advice on follow-up action

- The definitive report makes 2 important recommendations to ensure appropriate patient management:
 - Correlation with inflammatory markers:** Raised ESR and CRP values support a diagnosis of spondylodiscitis. Moreover, CRP is a useful marker to monitor response to treatment (Rowson & Greig 2015).
 - Urgent MRI scan:** MRI can detect cord and nerve root compromise and / or abscess formation, potential indicators for surgical or percutaneous intervention (Mylona et al. 2008; Rowson & Greig 2015; Sans et al. 2012).

Conclusion

- Spondylodiscitis is an uncommon cause of back pain in older people that can be mistaken for a mechanical or degenerative cause.
- The presence of red flag features can help alert the clinician to the possibility of serious spinal pathology and prompt imaging.
- A history of constant back pain in an elderly diabetic patient should raise concern of spondylodiscitis.
- The end plate destruction, disc space narrowing and bone reformation observed is characteristic for established pyogenic spondylodiscitis.
- The definitive report provides an accurate interpretation of the radiographic findings and incorporates advice on appropriate further investigation.
- The extent of spinal infection is undercalled in the practice report with no advice on follow-up action. This was due the author's lack of knowledge at the time the report was made.

References: See separate sheet

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