Learning objectives

Brucellosis is a systemic infection, caused by facultative intra-cellular bacteria of the genus Brucella that can involve many organs and tissues. The spine is the most common site of musculoskeletal involvement, followed by the sacroiliac joints. The aim of this study is to describe the imaging features of Brucella Spondylodiscitis with emphasis on characteristic signs.

Background

Brucellosis is a disorder of worldwide distribution, relatively frequent in Mediterranean countries, in Middle East and parts of central and south America [1]. Brucellosis is a zoonosis caused in humans by one of four species of the Brucella genus: B. melitensis, B. abortus, B. canis and B. suis. B. melitensis is the most virulent and invasive [2]. Brucella organisms are found in the excreta of infected animals (urine, stool, milk and products of conception). Human can be affected by direct contact with infected animals or after ingestion of infected dairy products. The brucellian infection mainly affects organs rich in mononuclear phagocytes, such as the liver, the spleen, the lymph nodes and the bone marrow [3].

Brucellar spondylitis represents 6 to 58% of musculoskeletal localizations.

It typically occurs in men over 40 years of age. The lumbar spine is the most affected (60%), particularly at the L4-L5 level, followed by thoracic (19%) and cervical spine (12%). More than one level is affected in 6% to 14% of the cases. Involvement of the spine may be either focal or diffuse. The focal form is confined to the anterior portion of an endplate morphologically known for its rich blood supply. The diffuse form may involve the entire vertebral body and extend to the adjacent disc, vertebrae and epidural space. Infection diffuses via the ligaments and vascular communications. Posterior elements involvement and facet joint arthritis may occur [4].

Non-destructive pattern, duration of symptoms (chronic course), age of patients (older individuals) and paucity of fever and malaise may help to clinically suspect the diagnosis.

Imaging findings OR Procedure details

Radiographic manifestations usually appear 3 weeks to 5 weeks after the onset of clinical symptoms. The lower lumbar spine is the preferential location. The focal erosions of the superior or inferior vertebral body angle (brucellar epiphysitis) are characteristic of
brucellosis. (Fig. 1). Focal anterior or diffuse disc collapse is very frequent but late and moderate. A vacuum phenomenon may be observed, especially in the anterior part of the disc, possibly secondary to ischaemic changes in the disc, with subsequent necrosis (Fig. 1) [4].

Bone destruction is less severe than in tuberculous spondylitis. Vertebral body destruction is mild whereas condensation is early and marked. Peri-lesional bone formation with osteophytosis and osteophyte formation at the anterior vertebral endplate (parrot's beak) are typical (Fig. 2). Productive bone changes occur earlier than in tuberculous spondylitis.

Because bony remodelling can progress slowly, radiographic changes might not be easy to differentiate from those of degenerative disease. Evidence of infective spondylodiscitis is best documented by bone scintigraphy, CT or MR imaging [5].

Bone scintigraphy enables early and highly sensitive detection of all osteoarticular sites of the disease. Several scintigraphic patterns can be observed. An increased uptake limited to the anterior vertebral body angle is highly suggestive of brucellosis [4].

CT may be positive early in the course of the disease. The affected disc appears hypodense. Disc flattening and vertebral endplate destruction may be detected when plain radiographs are still negative. (Fig. 3).

Disc gas can be detected in 25-30% of the cases [5] (Fig. 4a and b), and is generally peripheral and of small amount.

CT after administration of contrast agent can define extension of inflammatory process and can easily diagnose paravertebral abscess with psoas involvement. The intraspinal extent of epidural abscesses causing posterior displacement of the dural sac can be shown on post-contrast CT, but these changes are better defined by MRI.

Extensive bone destruction is uncommun in brucellar spondylitis; however, important bone destruction or large or calcified paraspinal soft tissue collections may be observed, and they constitute the so called brucellar pseudo-Pott’s disease. (Figs. 5 and 6).

MRI is the method of choice for the diagnosis, the assessment of the disease local extension and follow-up of brucellar spondylitis. MRI shows high accuracy for detecting the disease in the early stages and provides excellent definition of paravertebral and epidural extension.
It also allows the detection of other spinal foci [3]. In acute brucellar infections, MRI shows low to intermediate signal intensity on T1-weighted images of the intervertebral disc and low signal intensity in the adjacent vertebral bodies. The signals in these areas become hyperintense on T2-weighted MRI sequences, with either a homogeneous or heterogeneous pattern. The intravenous administration of gadolinium allows better definition of the spinal inflammatory lesions and a more complete assessment of soft tissue involvement and epidural extent (Figs. 7 and 8). These features are best shown when fat-suppression techniques are applied to the contrast enhanced images. Paravertebral abscesses are observed in approximately 30% of cases and are typically characterised by well-defined margins [1]. In the chronic stages, the MRI pattern of the discs and vertebral bodies may vary. However, vertebral bodies usually show heterogeneous signal intensity [1-3].

Images for this section:
Fig. 1: Lateral radiograph of the lumbar spine in a 45-year-old man. shows erosion of the anterosuperior angle of the vertebral body with a parrot's beak appearance and a vacuum phenomenon in the intervertebral disc (asterisk)
Fig. 2: Parrots' beak appearance on a lateral radiograph of the lumbar spine in a 54-year-old man

Fig. 3: A 60-year-old woman. Transverse CT image in soft tissue algorithm shows the vertebral body destruction and paravertebral soft tissue mass on soft tissue window
Fig. 4: CT reformations in the sagittal plane with soft tissue (a) and bone (b) algorithm windows in a 76-year-old man show disc space narrowing with erosions of the vertebral endplates and an epidural mass. Note the small amount of gas in the anterior portion of the disc.

Fig. 5: Atypical CT features of brucellar spondylitis show erosion of the anterior edge of the vertebra and the vertebral endplate with large, paraspinal, soft tissue collections comprising the so-called brucellar pseudo-Pott's disease.
**Fig. 6:** Atypical CT presentation of brucellar spondylitis in a 59-year old man shows disco-vertebral and facet joint involvement with calcified paraspinal (arrow) and epidural abscesses

**Fig. 7:** Brucellar spondylitis in a 54-year-old woman. Images of the lumbar spine from an MR examination show bone oedema of the S1 superior endplate and paravertebral and epidural abscess. a Sagittal T1-weighted image; b sagittal T2-weighted image; c sagittal
contrastenhanced T1-weighted image and d MRI sagittal view and axial T2-weighted image. Note also the peripheral disc enhancement (c) after gadolinium administration

Fig. 8: Sagittal T1-weighted MR image after gadolinium injection (a) and sagittal T2-weighted image (b) in a 57-year-old man demonstrate an abnormal signal intensity and enhancement, with contiguous involvement of the C4, C5 and C6 vertebrae, cord compression, and epidural extension. Note also the prevertebral soft tissue mass
Conclusion

Clinical and imaging features help to suspect this rare and potentially severe entity that requires a specific treatment. Only rapid and effective management may prevent irreversible neurological and bony complications. Diagnostic confirmation relies on bacteriological and immunological studies.

References


Personal Information