Spondylodiscitis diagnosis

Early diagnosis is crucial in the management of spondylodiscitis because delayed treatment can lead to increased morbidity and mortality.

Diagnosis is verified by MRI. Microbial aetiology is pursued by blood cultures or surgical biopsy, however, some cases remain culture-negative [1)].

Clinical examination

The clinical examination includes inspection concentrating on local changes and taking a detailed neurological status. There is typically pain on heel strike, impaction, and percussion, but little local pain on pressure. The patient takes a relieving posture and avoids stressing the ventral sections of the spinal column. In particular, inclination and re-erection are described as being painful.

Laboratory features

The laboratory parameters to be determined are leukocytes, C reactive protein (CRP), and erythrocyte sedimentation rate (ESR). In patients with acute disease, there is a massive increase in the inflammation parameters and in the ESR. In patients with chronic disease, these may be normal or exhibit threshold increases. There may be no leukocytosis, but a marked increase in CRP is typical.

Blood culture

Blood culture is the easiest procedure to detect the pathogen. A positive culture can be expected in as many as 70% of patients not previously treated with antibiotics. Sobottke et al., recommend that at least two to three pairs of blood cultures should be taken. The pathogen is often successfully detected, not only in the acute phase of fever or with septic disease, but also in clinically bland cases and afebrile patients.

Pathogen detection

Specific antibiotic therapy is one of the keystones of spondylodiscitis treatment and this necessitates specific identification of the decisive pathogen and determination of its sensitivity to antibiotics. Overall, the pathogen can be detected in 49% to 83% of cases – more often in acute than in chronic cases. One of the main reasons for failure to identify the pathogen is prior systemic antibiotic therapy.

For this reason, it is particularly important only to start antibiotic therapy after the material for the microbiological diagnosis has already been isolated. If antibiotic treatment had already started, the authors have considered its discontinuation for some days up to the puncture of the focus of infection, coupled to close monitoring of the course of the disease.

Radiology

Irregularity of the adjacent vertebral endplates, with sparing of the pedicles (except for tuberculosis, which may involve the pedicles)

Conventional x-rays – If a patient suffers from diffuse pain in the spinal column, the first investigation is to take a conventional x-ray, although this procedure is unreliable in the early phase of spondylodiscitis, as there are usually no skeletal changes.

Even in the later stages, the radiological changes may only be slight and may be impossible or difficult to distinguish from degenerative diseases of the spinal column.

Magnetic resonance imaging (MRI)

Spondylodiscitis Magnetic resonance imaging

CT-guided biopsy in suspected spondylodiscitis

CT-guided biopsy in suspected spondylodiscitis

Computed tomography (CT)

Three basic changes on CT [2] (if all 3 are present, pathognomonic for discitis; if only the 1st 2 are present, then only 87% specific for discitis):

1. endplate fragmentation

2. paravertebral soft-tissue swelling with obliteration of fat planes

3. paravertebral abscess

Computed tomography is inferior to magnetic resonance imaging with respect to the specificity and sensitivity in the diagnosis of spondylitis.

On the other hand, computed tomography provides a much more detailed image of bone destruction.

Moreover, compute tomography can provide good images of paravertebral abscesses after administration of contrast medium.

Computed tomography is indicated when magnetic resonance imaging is not possible, perhaps because the patient wears a cardiac pacemaker.

Nuclear medicine

Very sensitive for discitis and vertebral osteomyelitis (85% sensitivity), but may be negative in up to 85% of patients with Pott’s disease. Uses either technetium-99 (abnormal as early as 7 days following onset of clinical symptoms) or gallium-67 (abnormal within 14 days). A positive scan shows focal increased uptake in adjacent endplates, and may be differentiated from osteomyelitis which will involve only one endplate. A positive scan is not specific for infection, and may also occur with neoplasms, fractures, and degenerative changes.

Multiple phase scintigraphy

With skeletal scintigraphy, it is not possible to distinguish between infections of the bone and activated osteochondroses. This is therefore not the diagnostic method of first choice. On the other hand, a normal skeletal scintigram provides very reliable evidence for the absence of osseous inflammation.

Inflammation scintigraphy with labeled leukocytes or Tc-99m-labeled antibodies

Leukocyte scintigraphy is a supplement to multiphase scintigraphy, in which radioactively labeled native blood cells or (now preferably) Tc-99m-labeled anti-granulocyte antibodies are used to detect inflammatory changes in bone tissue. However, anti-granulocyte antibodies also label hematopoeisis in the bone marrow, so that the spinal column is subject to physiological enrichment. In-flammation scintigraphy is therefore more suitable for the extremities.

Positron emission tomography with fluorine-18 fluorodeoxyglucose (F-18 FDG PET)

F-18 FDG PET is of increasing importance in the diagnosis of spondylodiscitis. There is hardly any physiological enrichment of F-18 FDG in the bone marrow or the spinal column, so that inflammatory processes are imaged as “hot spots.” The degree of uptake of F-18 FDG is linked to the enhancement of glucose metabolism in the inflammatory cells. The advantages of F-18 FDG PET include the rapid imaging and the relatively low exposure to radiation (3.7 to 7.4 mSv).

In contrast to MRI, it is perfectly possible to distinguish between initial spondylodiscitis and degenerative changes in the vertebral body endplates. On the other hand, specific differentiation from malignant processes may present a problem [3].

Owing to the high specificity of this method, a negative PET result in the setting of a diagnostically unclear case diminishes the need for surgical intervention. 18F-FDG-PET is therefore an important tool in inflammation imaging and can be used in the diagnostic cascade of difficult cases with suspected spondylodiscitis. In contrast, a positive PET result does not always clearly establish the cause of increased 18F-FDG uptake [4]

18F-FDG-PET/CT

FDG-PET/CT demonstrated limited areas of abnormality allowing accurate delineation, and is thus useful to narrow the surgical fields. Since overall diagnostic accuracy of FDG-PET/CT was superior to that of MRI, FDG-PET/CT is a useful technique to narrow the surgical field for successful less invasive surgery [5].

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