Differentiating Modic Type 1 Changes from Acute Pyogenic Spondylodiscitis in Patients with Low Back Pain

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Why is this topic Important

- Modic Type 1 changes, characterized by edema-like signal alterations in vertebral endplates on MRI, often present a diagnostic challenge in clinical practice due to overlapping imaging and clinical features with acute pyogenic spondylodiscitis.
- The inability to distinguish between these two conditions on conventional MRI and post-contrast sequences further complicates the diagnostic process.
- Guidance is advocated, based on the available literature to aid in the differentiation of degenerative Modic Type 1 changes and spondylodiscitis, ensuring timely and accurate diagnosis and management.
- Misdiagnosis of spondylodiscitis may lead to unnecessary antibiotic therapy, while overlooking infection can result in severe complications such as abscess formation and/or sepsis.

Literature Review/Process

- >300 articles screened
- 19 articles reviewed for inclusion
  - 15 did not meet inclusion criteria
- 5 publications agreed upon and incuded

Findings from Literature

Role of Diffusion Weighted MR (DWI) and CT Imaging:

- When results of clinical and conventional MR findings are equivocal, diffusion-weighted MR imaging provides significant advantages in the differential diagnosis between degenerative and pyogenic spondylodiscitis changes of the spine.

- CT imaging is valuable in identifying degenerative changes, such as discal vacuum phenomenon or well-defined sclerosis and erosions of vertebral endplates without significant bone destruction on levels where differential diagnosis with DWI is unresolved. These findings strongly favor a diagnosis of Modic Type 1 changes over spondylodiscitis.

Findings from Literature

Claw Sign on DWI - MRI:

- The presence of a claw sign on 3.0 T MRI - a sharp demarcation of edema-like changes at the endplate - is highly suggestive of degenerative Modic changes. Conversely, the absence of a claw sign strongly suggests the presence of diskitis/osteomyelitis.

Findings from Literature

Endplate contour and Paravertebral/Psoas Enhancement on MRI:

- In high field (3.0T) MRI sequences with vertebral bone marrow oedema, the presence of an irregular, yet intact T1-w endplate contour, provides high diagnostic accuracy for identifying degenerative changes. In contrast, the absence of an irregular, yet intact endplate contour is highly suggestive of infection, and particularly of early-stage spondylodiscitis in patients without abscess formation.

- Paravertebral and/or psoas muscle enhancement on gadolinium-enhanced sequences is more commonly associated with late-stage spondylodiscitis rather than early-stage disease or Modic Type 1 changes.

Findings from Literature

Role of FDG-PET Imaging:

- The addition of FDG-PET imaging enhances diagnostic accuracy in distinguishing between Modic changes and spinal infections. FDG-PET is particularly sensitive in detecting spondylodiscitis and can help identify infectious activity that may not be apparent on conventional MRI.

Findings from Literature

Multimodality Imaging and Endplate Scoring:

- Incorporating multimodality imaging techniques, such as combining CT with detailed endplate scoring, can provide deeper insights into the etiology of Modic changes. This approach can help identify degenerative patterns that may otherwise be overlooked on MRI alone.

Question:

Can we confidently differentiate Modic inflammatory changes from acute pyogenic infections in MRI?

Response:

- No, MRI does not confidently differentiate of Modic Type 1 changes from acute pyogenic spondylodiscitis
- It requires a multimodal approach with integration of advanced imaging techniques such as CT, FDG-PET, and MRI features.

❖ Vote:

Agree – 93.9%, Disagree – 2%, Abstain – 4.1%
(Unanimous Consensus)