

Radiological signs and findings in Ankylosing Spondylitis

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Abstract

Background: Ankylosing spondylitis is inflammatory seronegative spondyloarthropathy disease in which the hallmarks of the disease is erosion and ankylosing, the first radiology finding is bilateral and symmetrical sacroiliitis manifested by erosion and reactive sclerosis at the iliac side of both sacroiliac joints.

Radiological imaging is essential part of the work up management for ankylosing spondylitis patients, conventional radiograph, Computed Tomography, Magnetic Resonance Imaging (MRI) are useful in diagnosis and monitoring the disease and to rule out any complications.

Aim: To evaluate the radiological characteristics and findings of Ankylosing Spondylitis.

Keywords: Ankylosing Spondylitis, Radiology findings

Introduction

Ankylosing Spondylitis is one of the inflammatory seronegative spondyloarthropathy, which is seen more in males than females with ratio of 6:1, the severe form of the disease is also more seen within male patients.

Seronegative disease means that the patients are Rheumatoid Factor (RF) negative, HLA-B27 is the most associated gene with Ankylosing Spondylitis which is seen in almost 90% of patients with Ankylosing Spondylitis.

The age group of Ankylosing Spondylitis is between second and third decades, the earliest symptoms starts typically at the third decade however in 20% of cases it Present within the second decade.

Method

This retrospective study was conducted at the radiology department – King Hussein Medical Center of the Royal Medical Services, Amman/Jordan in the period from January 2024 to December 2025 to evaluate the radiological signs and imaging findings in patients known to have ankylosing spondylitis or suspected to have Ankylosing Spondylitis.

Inclusion criteria includes adult patients (more than 18 years old), images of both sacroiliac spine and whole spine. While the exclusion criteria include incomplete imaging (absent of pelvic or spine images), history of previous pelvic or spinal surgery, other alternative diagnosis such as infection, inflammation or malignancy.

The outcome results can be divided according to the imaging modality (Conventional Radiograph, MRI and CT scans), and/or anatomical location (pelvic and spinal vs extra spinal).

Results

This retrospective study includes 68 patients with Ankylosing Spondylitis during the 2024-2026, 49 (72.1%) male patients and 19 (27.9%) female patients with mean age 42.1 years.

Spinal and pelvic radiograph images for the patients was evaluated and showed that 64 (94.1%) of patients manifest bilateral sacroiliitis.

23 (33.8%) patients showed spinal changes including formation of marginal Syndesmophytes (Bamboo spine), 7 (10.2%) patients showed ossification of the interspinous ligament (Dagger sign)

18 (26.4%) patients showed positive signs in the MRI including shiny corner sign (Romans sign), Anderson sign and enthesitis.

Discussion

The Hallmark of the Ankylosing Spondylitis is new bone formation of the vertebral column, Sacroiliitis is the first manifestation of the Ankylosing Spondylitis.

Conventional radiographs are the gold standard for the diagnosis, assessment and follow up for the patients with Ankylosing Spondylitis, although conventional radiograph uses ionizing radiation but it still considered safe for elderly patients.

Radiological findings of ankylosing spondylitis within the conventional radiograph includes: The pelvic radiographs will show Sacroiliitis which appears bilateral and symmetrical, the sacroiliac joint space showed widening in the early phase of the disease then showed narrowing, at the end stage of the disease it appears as a thin line or even not visualized.



Fig 1: Frontal pelvic radiograph showing bilateral symmetrical sacroiliitis.

The spine lateral radiograph will show small erosions at the vertebral body corners with surrounding reactive sclerosis giving the appearance of shiny corner sign representing Romanus lesions.



Fig 2: Lateral spine radiograph showing the shiny corner sign (Romanus sign).

Syndesmophytes are thin ossifications, marginal with vertical orientation seen within the lower thoracic and lumbar vertebra, arising from the annulus fibrosis and gives the appearance of Bamboo spine.



Fig 3: The frontal spinal radiograph will show ossification of the supra and infraspinous ligaments giving the appearance of Dagger spine.



Fig 4: Frontal spine radiograph showing the Dagger sign.

Erosion and irregularity of the vertebral endplates centrally is called Andersson lesions which is seen at the late stages of Ankylosing Spondylitis.

Regarding Computed Tomography (CT) it could be used in selected cases when the findings are equivocal in radiograph or in cases with normal sacroiliac joint, CT is better than MRI to detect bony changes associated with Ankylosing Spondylitis such as erosions and sclerosis, and considered the modality of choice in suspected cases of the spinal fracture in patients with history of Ankylosing Spondylitis. Magnetic Resonance Imaging (MRI) is more sensitive than both conventional radiograph and CT scans to detect inflammatory changes such as bone marrow edema, which is best seen within the STIR images, synovium inflammation (Synovitis) is manifested by gadolinium enhancement in T1 post contrast images, the degree of the synovitis is correlates with the activity of the disease. Inflammation of the entheses (Enthesitis) which is the attachment of the tendon or ligament to the bones, is highly associated with Ankylosing Spondylitis and can be detected by MRI by showing enhancement of the interspinous ligaments.

MRI does not involve ionizing radiation and do not increase the risk of malignancy, the disadvantages of the MRI include high cost, long examination time and not being always available.

The role of the bone scan is limited in cases of Ankylosing Spondylitis, bone scan is reserved for equivocal cases or cases with normal sacroiliac joint radiographs, it depends on the uptake and accumulation of the radionuclide within the sacroiliac joint, when the ratio of the sacroiliac joint uptake is 1.3:1 or more is considered diagnostic for Ankylosing Spondylitis.

Conclusion

Imaging is essential part of the diagnosis and monitoring of the Ankylosing Spondylitis, findings in Conventional radiograph and Magnetic Resonance Imaging are characteristics for Ankylosing Spondylitis.

The hallmark of Ankylosing Spondylitis is new bone formation with ossification of the supra and infraspinous tendons.

The first and diagnostic radiological feature of the Ankylosing Spondylitis is bilateral and symmetrical Sacroiliitis.

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