

*Research Article***The role of MRI in evaluation of ankylosing spondylitis related posterior pelvic articular changes****Kristen R. El-Komos Gerges<sup>1</sup>, Mohammad F. Abdelbaki Allam<sup>1</sup>, Sara M. Ragaey<sup>1</sup> and Ahmed H. Ismail<sup>2</sup>.**<sup>1</sup> Department Diagnostic Radiology, Faculty of medicine, Mina University, Egypt<sup>2</sup> Department Rheumatology and rehabilitation, Faculty of medicine, Mina University, Egypt**Abstract**

**Background:** The objectives of our study is to assess the MRI findings of sacroiliac joint in patients with sacroiliitis related ankylosing spondylitis and to evaluate the active and chronic changes of sacroiliitis. **Methods:** The study entrolled forty patients suffered from low back pain and diagnosed with ankylosing spondylitis. They were referred from Rheumatology Clinic to the MRI unit to be recruited in the study. Each patient who participate in the study obtained counseling and a written informed consent. **Results:** MRI study plays an important role in the diagnosis of sacroiliitis related ankylosing spondylitis MRI can detect the active and chronic changes sacroiliitis. we found different abnormal findings of sacroiliac joint on MRI which assess the disease activity. **Conclusion:** In this study, we found that MRI study shows the active and chronic changes in sacroiliac joint in patients with ankylosing spondylitis, which CT study and conventional radiography can detect these chronic changes later.

**Keywords:** Sacroiliac joint, Magnetic resonance image, Radiology**Introduction**

Spondyloarthropathy comprises a group of chronic inflammatory rheumatic diseases, including ankylosing spondylitis, reactive arthritis (Reiter's syndrome), arthritis, or spondylitis associated with inflammatory bowel disease, psoriatic arthritis, and undifferentiated spondyloarthritis. These afflictions predominantly affect the axial skeleton, causing pain and stiffness are seronegative for rheumatoid factor, and are often associated with the presence of human lymphocyte antigen (HLA)-B27 [1].

Sacroiliitis is an inflammatory disease induced by an immune-mediated mechanism and is the most common initial feature, The usual presenting symptom is inflammatory low back pain<sup>[2, 3]</sup>.

Imaging of sacroiliitis provides critical objective evidence for diagnosis. Plain radiography, computed tomography (CT),

magnetic resonance imaging (MRI) and quantitative SI scintigraphy is the available imaging modalities to evaluate sacroiliitis [4].

Ankylosing spondylitis develops through complex interactions between genetic background and environmental factors as an autoimmune disease [5].

**Materials and methods****Patient populations**

This observational analytic study was conducted in the MRI unit, department of Diagnostic Radiology, Faculty of Medicine, Minia University, during the period from June 2021 to Jan 2022, after being approved by the Medical Ethics Committee of the department.

Forty patients diagnosed with AS were referred from Rheumatology Clinic to the MRI unit to be recruited in the study through counseling and a written informed

consent were obtained from each patient prior to participating in the study.

**All recruited patients were submitted to the following:**

- 1- Thorough medical **history** taking and examination using Ankylosing spondylitis Disease Activity Score (ASDAS) [6, 7].
- 2- Underwent MRI examination.
- 3- All patients underwent CT scan.

MRI study of the SIJs using Ingenia 1.5 T Philips closed MR scanner using body phased-array coil.

**Image analysis:**

- Adequate preparations are done to all patient acquiring an optimal MRI examination.

- Psychological preparation was done for the patient about scanner environment and informing the patient about each step to make the patient felt comfortable and safe, which are critical and essential for avoiding patient movement, that may decrease image quality to great extent.
- The patient lied in a supine position, head first for MRI examination of the sacroiliac joints.
- All metallic substances were removed prior to examination.

**Results**

The study entrolled 40 patients, 27 patients are male (67.5 %) and 13 patients (13 %) are females. Mean age of entrolled patients was 34+/- 11 years, Table 1.

**Table 1: Demographic data**

Demographic data	Cases N= 40
<b>Gender (N%)</b>	
<b>Males</b>	27 (67.5%)
<b>Females</b>	13 (32.5%)
<b>Age: Mean ± SD</b>	34.93 ± 11.21

The current study showed that sensitivity and specificity for Backfill on MRI Dixon is higher than sensitivity and specificity for Backfill on MRI T1 in comparison with erosions on CT, Table 2.

**Table 2: Sensitivity and specificity for Backfill on MRI Dixon/ MRI T1 in comparison with erosions on CT**

	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
<b>Backfill on MRI T1</b>	100%	45.5%	82.86%	100%
<b>Backfill on MRI Dixon</b>	100%	90.91%	96.67%	100%

PPV (positive predictive value), NPV (Negative predictive value).

**Discussion**

Bone erosions seen on T1W images and in-phase T1W based 3D Dixon images, our results show that number of erosions on

Dixons images is higher than number of erosions on T1WI in same patients using CT study as a reference. This is in agreement with (Huang, H. et al., 2020) [8].

Our results showed that both in-phase and fat-only T1W based 3D Dixon images are considered superior in detecting subchondral sclerosis in sacroiliac joints in comparison with conventional T1-weighted images. This is in agreement with (Özgen, A., 2017).<sup>[9]</sup>

Water-only T1w based 3D Dixon images couldnot show active subchondral bone marrow changes of sacroiliitis unlike Water-only T2-weighted multipoint Dixon images is considered superior for the detection of the active changes<sup>[9]</sup>

### Conclusion

Radiography plays an important role in the diagnosis of sacroiliitis. However, these diseases are typically not detected until three to seven years after their onset. In addition, X-ray allows structural changes to be identified only when the damage has already become irreversible<sup>[10]</sup>.

CT is more sensitive than conventional radiography for the detection of structural changes; therefore, it allows a more detailed assessment of the sacroiliac joints and higher grades of sacroiliitis<sup>[11]</sup>.

Magnetic resonance imaging (MRI) has been proposed as an imaging method to detect sacroiliitis earlier<sup>[11]</sup>.

### References

1. Navallas, M., et al., Sacroiliitis associated with axial spondyloarthritis: new concepts and latest trends. *Radiographics*, 2013. 33(4): p. 933-956.
2. VAN, D. and M. HEIJDE, Ankylosing Spondylitis A. Clinical Features. *Primer on the Rheumatic Diseases*, 1998: p. 193.
3. Zhang, M., et al., Assessment of active and inactive sacroiliitis in patients with ankylosing spondylitis using quantitative dynamic contrast-enhanced MRI. *Journal of Magnetic Resonance Imaging*, 2017. 46(1): p. 71-78.
4. Inanc, N., et al., The investigation of sacroiliitis with different imaging techniques in spondyloarthropathies. *Rheumatology international*, 2005. 25(8): p. 591-594.
5. Shamji, M.F., M. Bafaquh, and E. Tsai, The pathogenesis of ankylosing spondylitis. *Neurosurgical focus*, 2008. 24(1): p. E3.
6. Machado, P., et al., Ankylosing Spondylitis Disease Activity Score (ASDAS): defining cut-off values for disease activity states and improvement scores. *Annals of the rheumatic diseases*, 2011. 70(1): p. 47-53.
7. Zochling, J., Measures of symptoms and disease status in ankylosing spondylitis: Ankylosing Spondylitis Disease Activity Score (ASDAS), Ankylosing Spondylitis Quality of Life Scale (ASQoL), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Functional Index (BASFI), Bath Ankylosing Spondylitis Global Score (BAS-G), Bath Ankylosing Spondylitis Metrology Index (BASMI), Dougados Functional Index (DFI), and Health Assessment Questionnaire for the Spondylarthropathies (HAQ-S). *Arthritis care & research*, 2011. 63 (S11): p. S47-S58.
8. Huang, H., et al., Qualitative and quantitative assessment of sacroiliitis in axial spondyloarthritis: can a single T2-weighted Dixon sequence replace the standard protocol? *Clinical radiology*, 2020. 75(4 p. 321. e13-321. e20.
9. Özgen, A., The value of the T2-weighted multipoint Dixon sequence in MRI of sacroiliac joints for the diagnosis of active and chronic sacroiliitis. *American Journal of Roentgenology*, 2017. 208(3): p. 603-608.
10. Castro, M. R. d., et al., Spondyloarthritis: diagnostic imaging criteria for the detection of sacroiliitis. *Radiologia brasileira*, 2017. 50: p. 258-262.
11. Guglielmi, G., et al., Imaging of the sacroiliac joint involvement in seronegative spondylarthropathies. *Clinical rheumatology*, 2009. 28(9): p. 1007-1019.