# MRI Sacroiliac Joint Imaging in Inflammatory Sacroiliitis : Diagnostic Pitfalls illustration using pre-implementation cases and introduction of ASAS/ESSR-recommended new MRI Protocol in New Territories West Cluster (NTWC).

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## Objective

To highlight diagnostic pitfalls in suspected inflammatory sacroiliitis through a review of pre-implementation cases from our cluster and to introduce our cluster's adoption of the latest international consensus on a standardized minimal MRI protocol for the sacroiliac joints (SIJ).

## Materials and Methods

We retrospectively analyzed SIJ MRI examinations performed prior to new protocol adoption across NTWC hospitals to identify interpretation pitfalls and mimics. Moreover, there is a review of 2024 ASAS-SPARTAN consensus protocol[1] and ESSR recommendations[2] was conducted.

## Pre-implementation cases illustration

All example cases were acquired before protocol implementation, and these revealed the pitfalls contributing to potential overcalling or misclassification:

### Case 1 — Mechanical Load–Related Stress Pattern

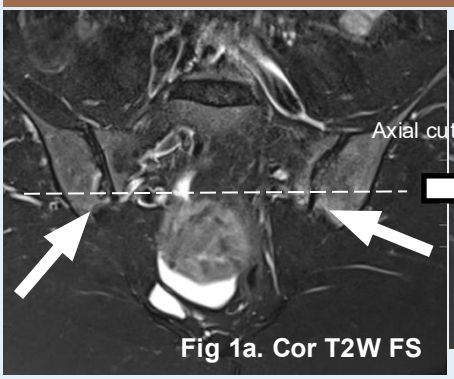



Fig 1a. Cor T2W FS

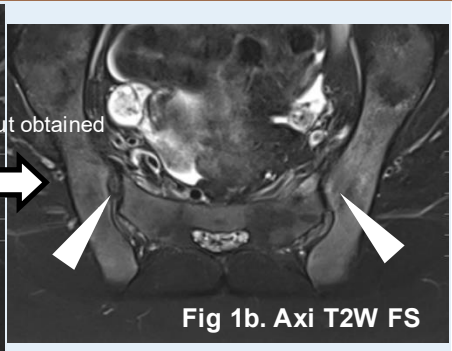


Fig 1b. Axi T2W FS

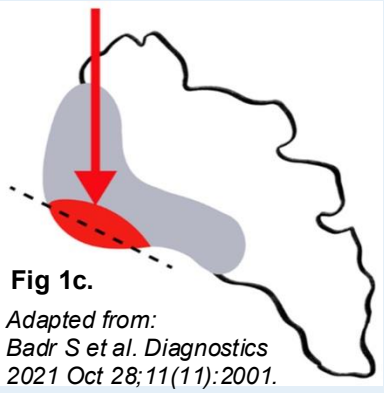


**Fig 1c.**

*Adapted from: Badr S et al. Diagnostics 2021 Oct 28;11(11):2001.*

MRI demonstrates focal subchondral bone marrow edema in the characteristic anterior mid-third of the bilateral sacroiliac joints (Figs. 1a, 1b). This distribution is a hallmark of mechanical stress, reflecting the zone of highest biomechanical load[4] (red arrow shown in Fig. 1c), and is a key discriminator from inflammatory sacroiliitis.

☆ In newly adopted protocol, the acquisition of **perpendicular imaging planes (coronal and axial oblique)** is critical for confident diagnosis. It confirms the precise anatomical localization and excluded a false-positive finding from phase-encoding artifact[1], which is typically not replicated across orthogonal sequences.

## Case 2 — Osteitis Condensans Ilii (OCI)

Fig 2a. Axi T1W

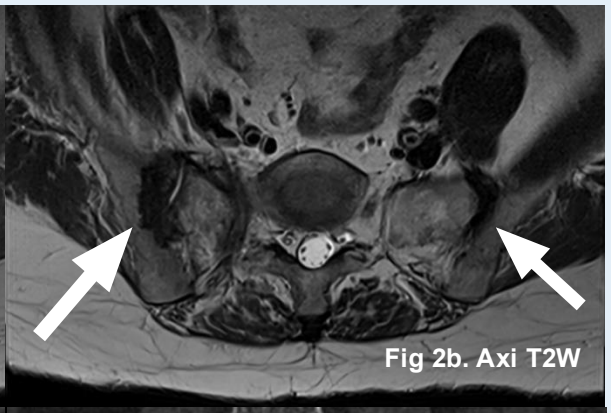


Fig 2b. Axi T2W

Fig 2c. Axi bone window

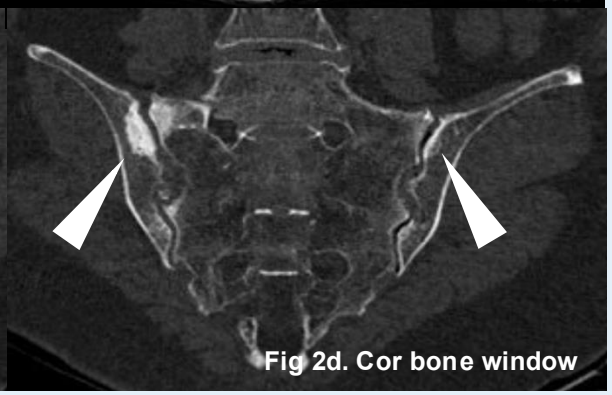


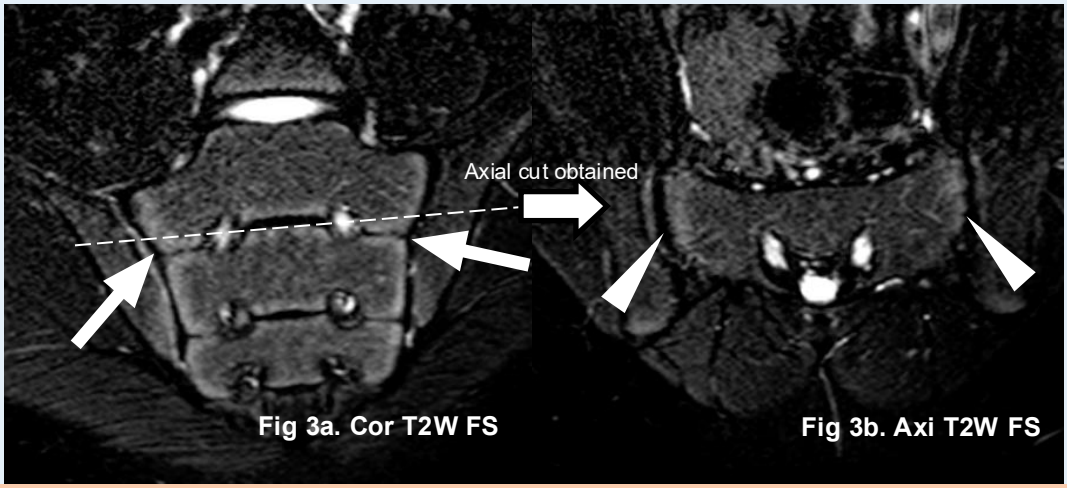
Fig 2d. Cor bone window

The MRI shows well-defined, triangular areas of low signal intensity on T1 and T2 sequences (arrow in Fig 2a & b ) , primarily on the iliac sides. CT correlation confirms the bilateral sclerosis (arrowhead in Fig 2c & d).

☆ In newly adopted protocol**, the addition of the thin-slice T1W 3D GRE sequence**[1] definitively demonstrates preserved joint spaces without erosions or ankylosis. This finding is pivotal, as the absence of structural damage confidently distinguishes this benign entity from inflammatory sacroiliitis.

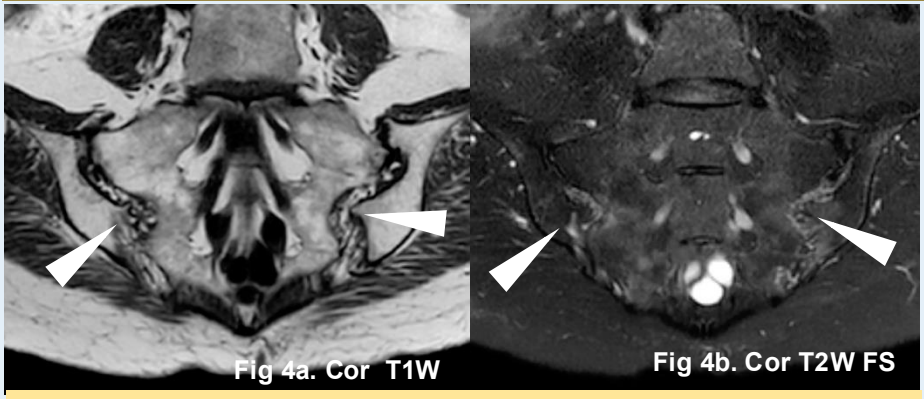
# Pre-implementation cases illustration (con't)

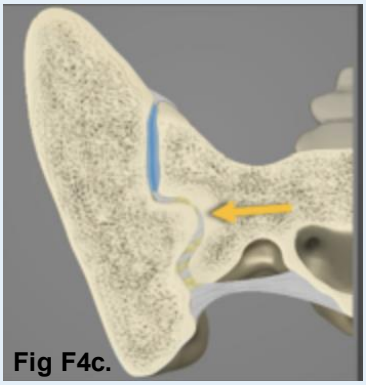
## Case 3 — Normal appearances of the sacroiliac joint in the growing skeleton




In this asymptomatic 11-year-old boy, the MRI shows homogeneous high T2 FS signal (arrowhead in Fig. 3b) adjacent to the sacroiliac joints, tracking along the unfused sacral apophyses (Arrow in Fig. 3a). This represents normal metaphyseal-equivalent cartilage[3] and is a common pitfall, distinguishable from sacroiliitis by its characteristic location, uniform signal, and lack of clinical symptoms.

## Case 4 — Anatomical variation of the SIJ




**Schematic diagram for iliosacral complex**
*Adapted from : Waldman et al. Skeletal Radiol. 2025*

The MRI demonstrates bilateral prominent convex iliac bony notches with corresponding sacral grooves in the mid to lower sacroiliac joints (arrowheads in Fig. 4a & b), characteristic of an iliosacral complex[5]. The associated trace bone marrow signal is likely mechanical, related to the altered joint biomechanics. The patient was asymptomatic, confirming the incidental nature of this common variant.

☆ In the newly adopted protocol, the **combined assessment of T1-weighted and fluid-sensitive (e.g., STIR) sequences** enables a more comprehensive diagnostic evaluation. This integrative approach allows for precise delineation of bone marrow edema extent on STIR images, while the T1-weighted sequence provides essential structural context[1]. Together, they facilitate the accurate differentiation of true inflammatory lesions from background findings, such as normal developmental anatomy in the growing skeleton or anatomical variants.

# The new adopted minimal protocol comprised four sequences in NTWC, in aligned with 2024 ASAS-SPARTAN consensus protocol[1] and ESSR recommendations [2]

| Sequences | Orientation | Purposes / Key features |
|---|---|---|
| (1) T1W | Coronal oblique | **Fat** sensitive; for structural damage |
| (2) Fat-suppressed T2 (e.g. STIR / DIXON) | Coronal oblique | **Fluid** sensitive → Bone marrow edema; For for active inflammation |
| (3) T1W 3D GRE | Coronal oblique | **Erosion specific** → bone cartilage interface ; for structural damage |
| (4) Fat-suppressed T2 (e.g. STIR / DIXON) | Axial oblique | **Fluid** sensitive; For for active inflammation & localization with coronal oblique plane |


## Scan time comparison

| Prior SI joint protocol | New SI joint Protocol |
|---|---|
| **Coronal** oblique<br>- T1 : 2min<br>- T2 STIR : 3 min (or T2 DIXON : 4 min)<br>- +/- T1+C : 2 min | **Coronal** oblique<br>- T1 : 2min<br>- T2 STIR : 3min<br>- **T1W 3D GRE : 5min (similar in both 3T & 1.5T)** |
| **Axial** oblique<br>- T1 : 3 min<br>- T2 STIR : 3 min (or T2 DIXON : 4 min)<br>- +/- T1 FS +C : 3.5 min | **Axial** oblique<br>- T2 STIR : 3min |
| **Overall scan time : up to 18.5 min** | **Overall scan time : 13 min** |

## Practical notes and Implementation in NTWC :

- Typical ~ approximately around 13 minutes for completing all sequences in our clusters.
- Contrast are not required as default.
- Applicable to all MRI Machines in NTWC (i.e. 3T Philips MR7700, 1.5T Siemens Sola, 1.5T Philips Ambition; 1.5T Siemens Aera)
- Overall scan time up to ~ 30% reduction and avoid contrast usage related risk.

## Conclusion

The implementation of the international consensus minimal MRI protocol at NTWC establishes a standardized, efficient, and non-contrast approach for imaging suspected sacroiliitis. Our pre-implementation review demonstrates that common non-inflammatory mimics—such as mechanical stress, osteitis condensans ilii, normal pediatric development, and anatomical variants—are frequent diagnostic pitfalls. By combining vigilant recognition of these key pitfalls with the structured application of the new protocol sequences, we can ensure reliable differentiation from true inflammatory sacroiliitis.

## Reference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