SACROILITIS- ASSOCIATED WITH SPONDYLOARTHROPATHY (PART 2)

DR SHIKHA DHAUNDIYAL

MBBS,MD

SPORTS & EXERCISE MEDICINE SPECIALIST

MEDICAL COMMITTEE at AIFF

SCIENTIFIC COMMITTEE at ISSEM

MEDICAL OFFICER NCOE HOCKEY & SWIMMING

SPORTS AUTHORITY OF INDIA

TEAM DOCTOR

U-20 & SENIOR WOMEN INDIAN FOOTBALL TEAM

Medical Conditions--- Involving SIJ

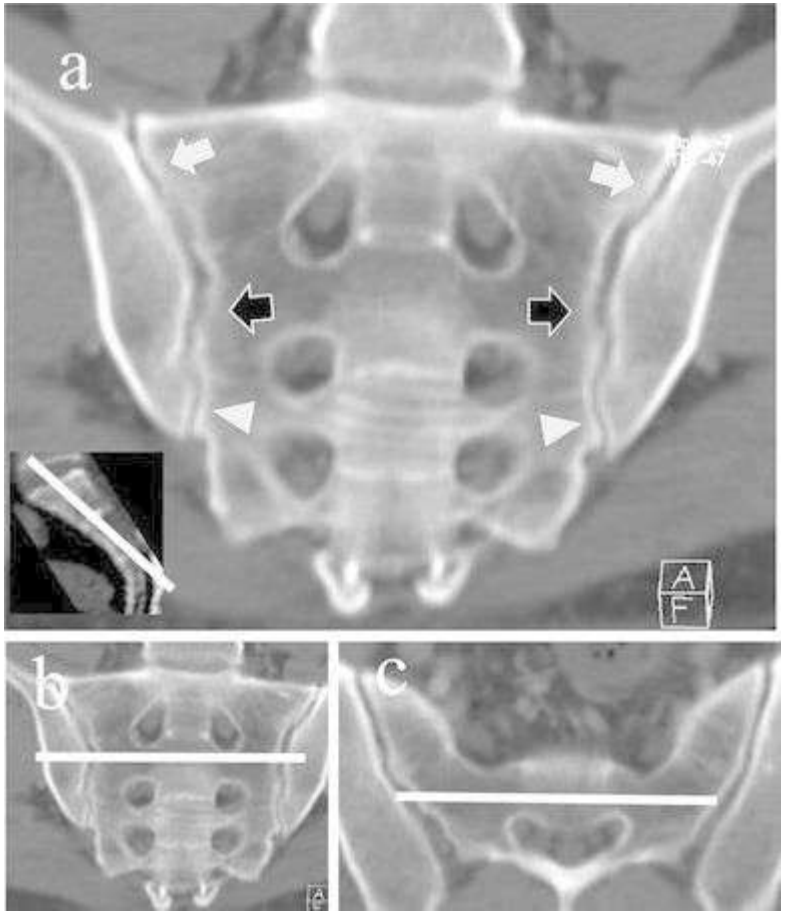
Rheumatic inflammatory diseases	Rheumatic noninflammatory diseases	Infectious diseases	Other diseases
✔ Ankylosing spondylitis and other SpA ✔ Familial Mediterranean fever ✔ Bechet's disease ✔ SAPHO (synovitis, acne, pustulosis, hyperostosis, osteitis) ✔ Gout and pseudogout	✔ Osteitis condensans ilii ✔ Diffuse idiopathic skeletal hyperostosis ✔ Osteoarthritis ✔ Multicentric reticulohistiocytosis	✔ Pyogenic sacroiliitis ✔ Brucellosis ✔ Tuberculosis ✔ Whipple disease	✔ Hyperparathyroidism ✔ Lymphoma and other malignancies

Imaging Modalities for Evaluation of sacroiliitis

RADIOLOGY	CT	MRI
✔ Seen only after 5 years of disease activity. ✔ Not useful in detecting early disease	✔ Screening of early disease ✔ Relatively less expensive imaging modality, compared to MRI.	✔ Forms an important component of the ASAS criteria. ✔ helpful in demonstrating the response to therapy and can detect the activity of disease (acute-on-chronic disease)
	❖ Erosions, sclerotic changes, and ankylosis better than MRI.	❖ Can detect early findings of sacroiliitis like bone marrow edema, capsulitis, and enthesitis.
	❖ Multiplanar oblique coronal and oblique axial scans oriented parallel and perpendicular to the long axis of sacrum.	❖ Fast spin echo T1W and STIR T2-weighted (T2W) sequences in oblique, axial and coronal planes

CT

- It is a useful modality for screening of early disease.
- CT scan of SI joints involves multiplanar oblique coronal and oblique axial scans oriented parallel and perpendicular to the long axis of sacrum.



MRI

- The basic protocol includes fast spin echo T1W and STIR T2-weighted (T2W) sequences in oblique, axial and coronal planes for evaluation of SI joint.
- Although Noncontrast MRI findings are sufficient to diagnose spondyloarthropathy-related sacroiliitis, contrast MRI may demonstrate additional supportive signs of sacroiliitis like synovitis, capsulitis, and enthesitis.

Assessment of Spondyloarthritis

International Society Criteria for Spondyloarthropathy

- A diagnostic criteria for axial spondyloarthropathy using a combination of clinical, imaging, and laboratory findings
- ASAS criteria, the imaging findings are based on demonstration of sacroiliitis on MRI and/or radiography.

In patients with ≥3 months back pain and age at onset <45 years
A) Sacroiliitis on imaging plus (≥1 spondyloarthropathy feature)
or
B) HLA-B27 plus (≥2 spondyloarthropathy feature)
Spondyloarthropathy features
Inflammatory back pain
Arthritis
Enthesitis
Uveitis
Dactylitis
Psoriasis
Crohn's/ulcerative colitis
Good response to nonsteroidal anti-inflammatory drugs
Family history for spondyloarthropathy
HLA-B27
Elevated C-reactive protein

HLA: Human leukocyte antigen, ASAS: Assessment of spondyloarthritis international society

ASAS MRI FINDINGS--

(a) Sequence and signal-presence of bone marrow hyperintensity on short TI inversion recovery (STIR) images or contrast enhancement on fat-suppressed T1-weighted (T1W) images;

(b) Site- periarticular or subarticular location

(c) Number of lesions- >=2 areas of bone marrow hyperintensity/enhancement on a single slice, or in cases of single area of bone marrow hyperintensity/enhancement, the area should be clearly seen on two consecutive slices.

Presence of structural lesions (erosions, sclerosis, subchondral fatty change, capsulitis, enthesitis, and bony bridges) alone on MRI in the absence of bone marrow edema is considered insufficient for the diagnosis of sacroiliitis according to the ASAS criteria, and this is considered to be a prominent limitation.

- Out of all the imaging modalities given which would form important component of the ASAS criteria?

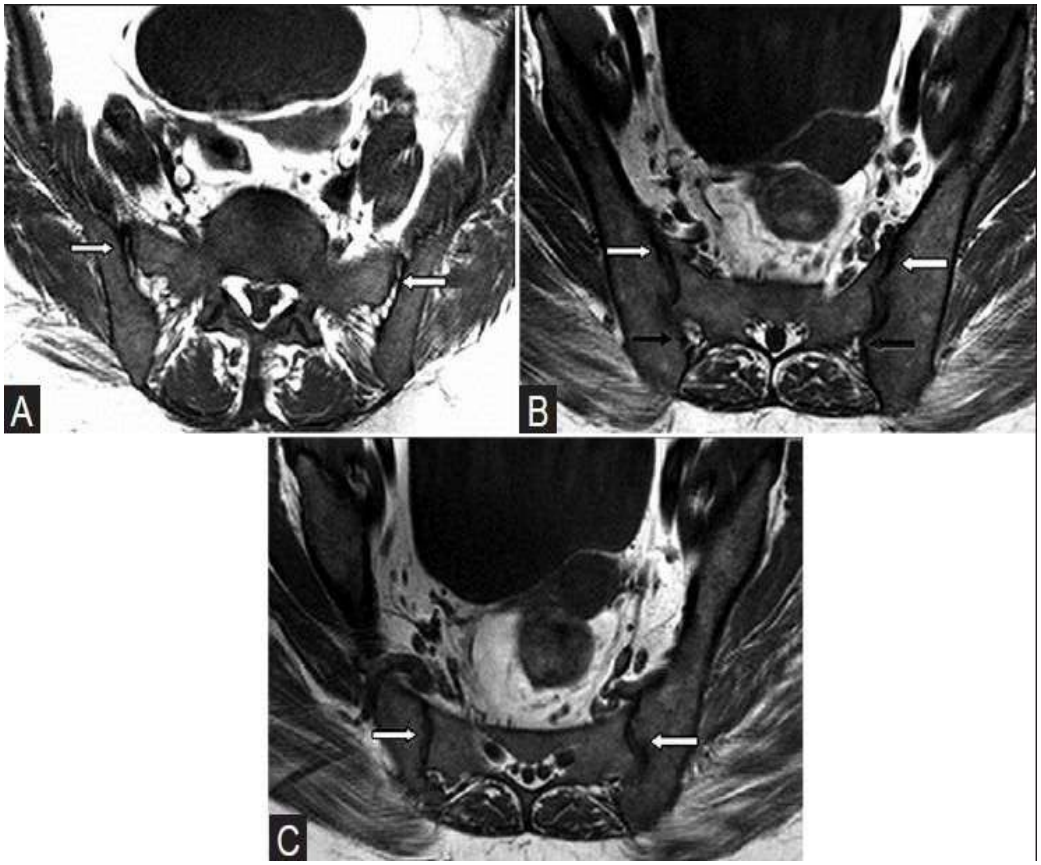
1. Radiology
2. CT
3. MRI
4. NONE

Normal Anatomy of SI Joint

- (A) Oblique coronal STIR MRI images show smooth and parallel margins of the cartilaginous lower ventral portion of the joint (arrows).
- (B) Oblique coronal STIR MRI images in more posterior aspect show irregular edges of the fibrous or ligamentous upper dorsal portion of the joint (arrows). Distinction between compartments of sacroiliac joints is possible on MRI images

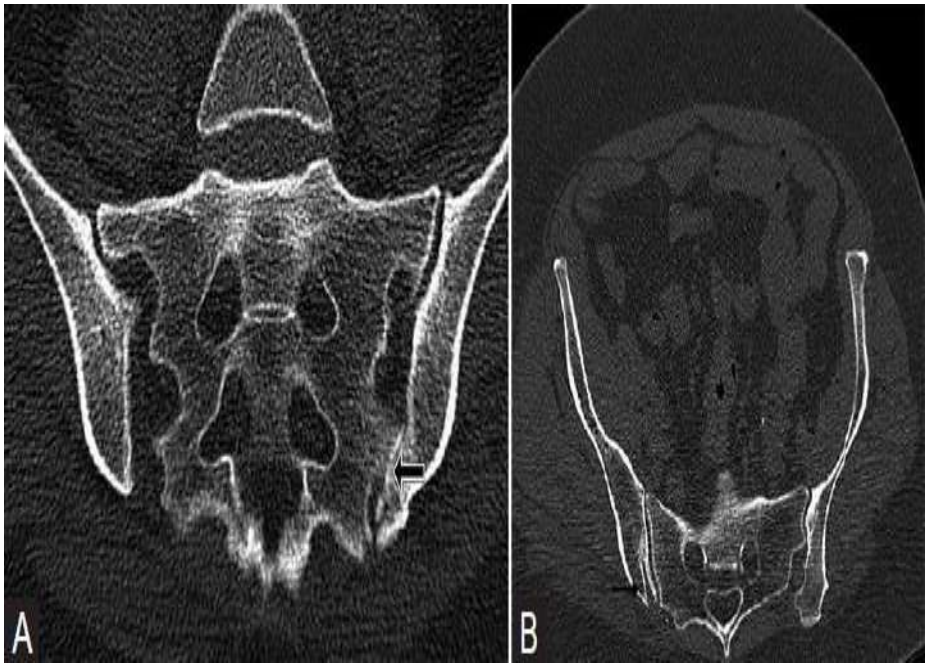
Normal Anatomy of SI Joint

- Axial T1W MRI images at three different levels :
- (A) upper portion is predominantly ligamentous (arrows);
- (B) mid portion is cartilaginous in its anterior aspect (white arrow) and ligamentous in its posterior aspect (black arrows);
- (C) lower portion is cartilaginous only (white arrows).



Anatomic variants of the sacroiliac joints.

- (A) Oblique coronal CT section of the sacroiliac joint shows left accessory sacroiliac joint (black arrow) with degenerative changes and osteophytes.
- (B) Oblique coronal CT image shows right bipartite iliac bone plates (black arrow)

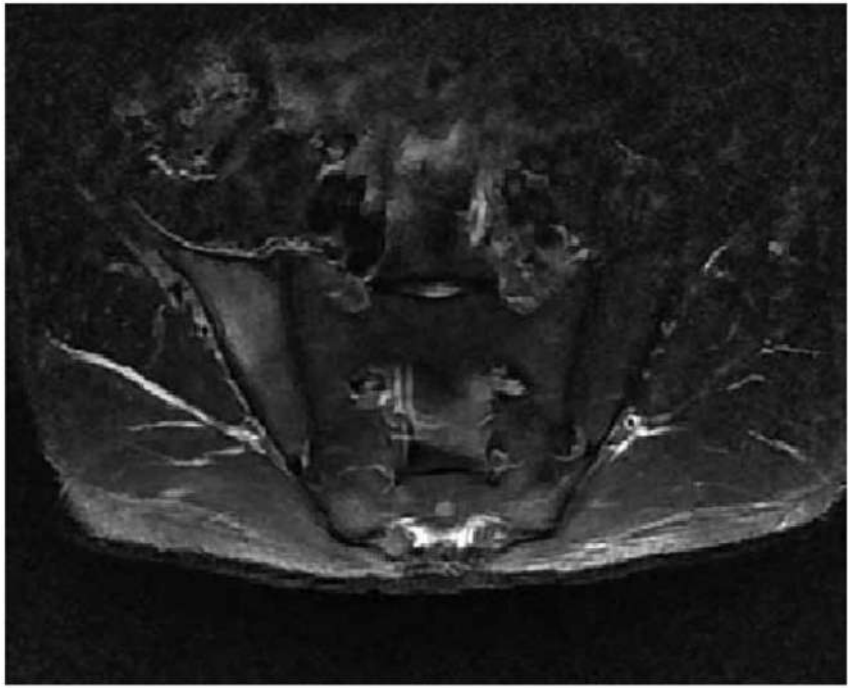


ACUTE SACROILITIS- MRI

1.Subchondral bone marrow edema	✔ **Earliest imaging sign** ✔ **Forms an important component of the ASAS criteria.** ✔ **Symmetrical or asymmetrical** ✔ **Involves lower and posterior portion of the joint surface**
2. Erosions	✔ **Erosions are defects in joint surface** ✔ **Iliac surface (early) >> Sacral surface (later)**
3. Synovitis and joint effusion	✔ **It is seen as hyperintensity within the joint.** ✔ **Contrast MRI can help differentiate synovitis from joint effusion by demonstrating enhancing synovium in synovitis**
4.Capsulitis and enthesitis:	✔ **MRI as STIR hyperintensity or contrast enhancement of the capsule.** ✔ **Enthesitis is seen as junctional zone T2W hyperintensity which may extend into the surrounding soft tissue.**

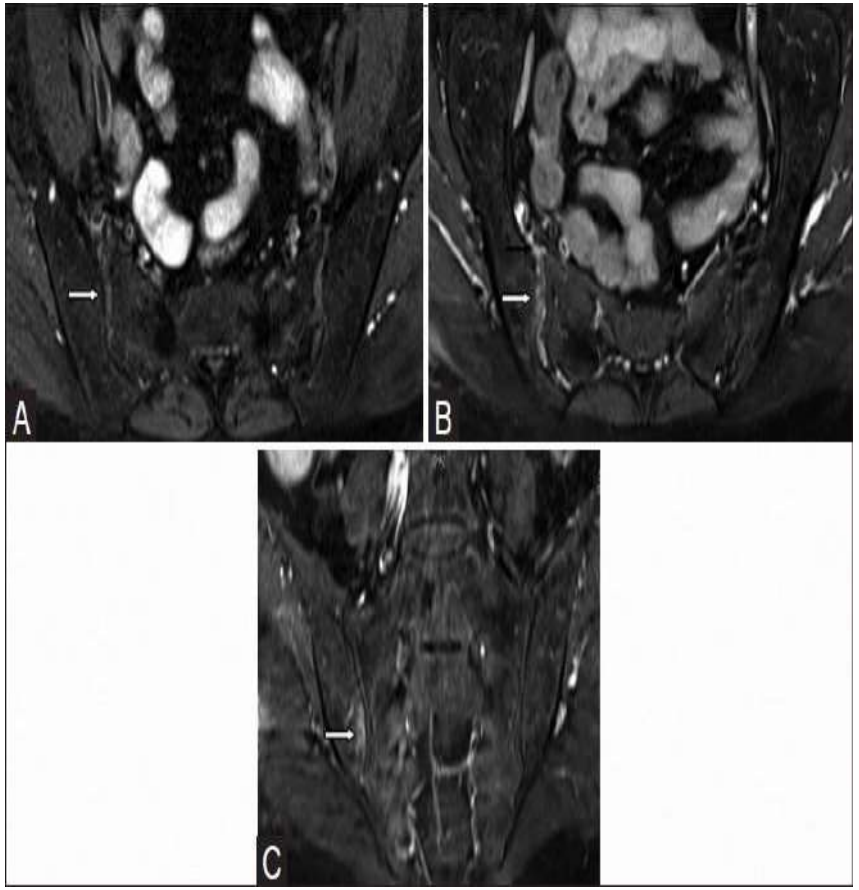
ACUTE STAGE

- Subchondral bone marrow edema: It is considered to be an earliest imaging sign of sacroiliitis and forms an important component of the ASAS criteria.
- It can be symmetrical or asymmetrical and typically involves lower and posterior portion of the joint surface



Findings of Acute Sacroiliitis on MRI -

- Synovitis and marrow enhancement.
- Axial T1W fat-saturated
- (A) pre-contrast and
- (B) post-contrast MR images show enhancing joint synovium on the right side consistent with synovitis (white arrows), enhancement of anterior capsule is also seen (black arrow).
- (C) Coronal T1W fat-saturated post-contrast MR image shows subchondral bone marrow enhancement in the right iliac bone, findings consistent with active osteitis (white arrow)



CHRONIC SACROILITIS- MRI

1.Subchondral fatty deposition	✔ **It is an important indicator of chronic sacroiliitis.** ✔ **It is seen as subchondral T1W hyperintensity which gets suppressed on fat-saturated images.**
2. Subchondral sclerosis	✔ **Sclerosis is seen on both iliac and sacral subchondral surfaces, and is seen as T1W and T2W hypointensities on MRI.** ✔ **It should extend at least 5 mm from the SI joint surface**
3.Erosions	✔ **Erosions are seen involving both iliac and sacral surfaces with associated joint space narrowing.** ✔ **Large confluent erosions may result in pseudo-widening of the joints**
4.Bony bridges and total ankylosis	✔ **Fusion of joint surfaces is seen which may be focal, asymmetrical or symmetrical, and complete.** ✔ **The surrounding bone may show subchondral fatty changes.**

Findings of Chronic sacroiliitis on MRI.

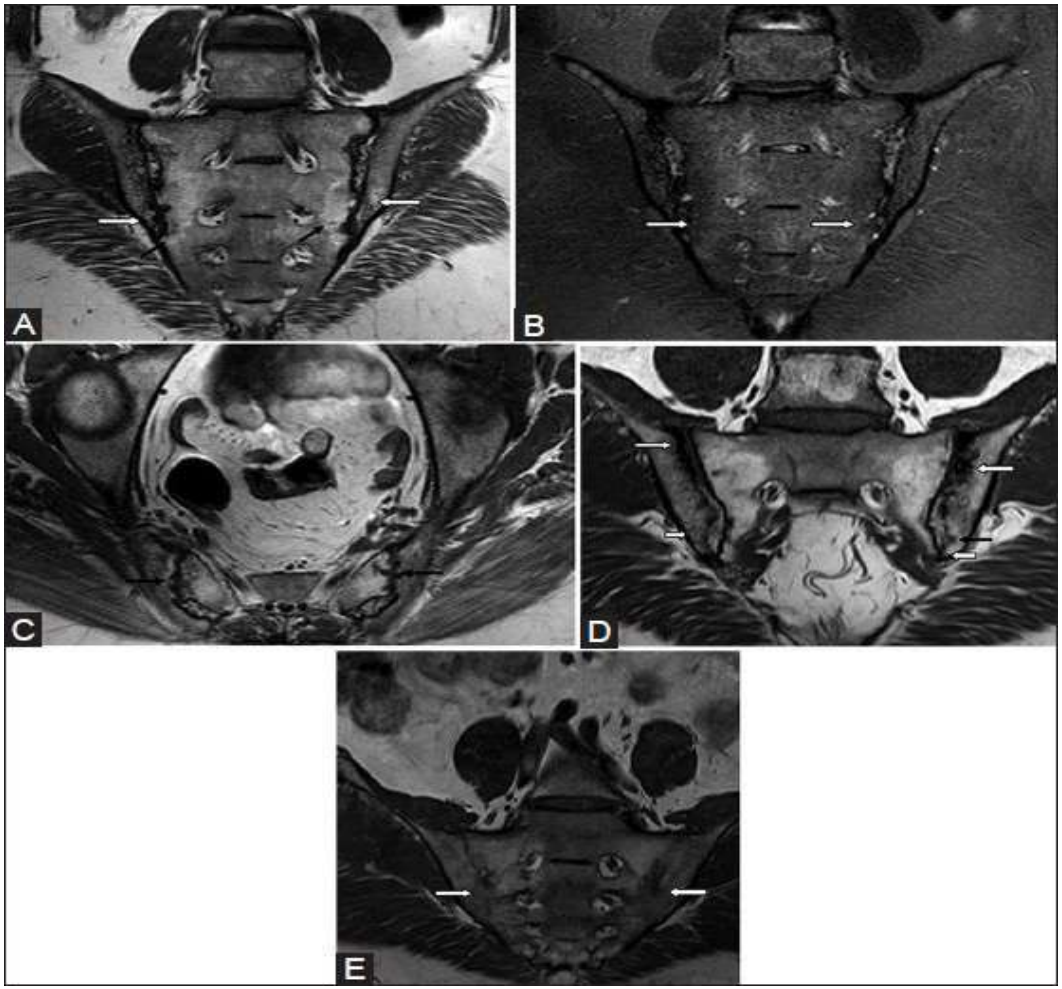
(A) Coronal oblique T1W MR image without fat suppression shows fatty deposition on both iliac (white arrows) and sacral surfaces (black arrows).

(B)Suppression of fat signal (white arrows) without any edema.

(C) Multiple subchondral erosions (black arrow).

(D) T1W oblique coronal image without fat suppression shows subchondral sclerosis (thin white arrow), erosion (black arrow), and fatty deposition around the sacroiliac joint (short white arrow).

(E) Coronal oblique T1W images without fat supression through sacroiliac joints show complete joint ankylosis (white arrows) with ankylosing spondylitis



ACUTE ON CHRONIC

- Subchondral bone marrow edema may be seen in a background of subchondral fat deposition and other signs of chronic sacroiliitis.
- Active erosions may show underlying bone marrow edema and enhancement on post-contrast scans.

Acute-on-chronic sacroiliitis.

- (A) Coronal oblique T1W MR image without fat suppression with ankylosing spondylitis shows fat deposition on both sacral sides (black arrows) and iliac sides (white arrows).
- (B) Corresponding STIR images through sacroiliac joint show subchondral edema (active sacroiliitis) (white arrows), areas of fat suppression (chronic sacroiliitis) (black arrows), and synovitis (thick white arrows)

Associated Findings

1. Facetal arthropathy	✔ **It is seen as facet joint erosions, facetal osteophytes, and parafacetal ossification on CT.** ✔ **On MRI, facet joint effusion, facet joint fusion, bone marrow edema, and fatty changes in the superior and inferior facets are seen**
2. Enthesitis	✔**Greater trochanter and ischial tuberosity**
3.MRI corner sign and bridging syndesmophytes	✔ **Bone marrow edema (anterior and posterior corners of the lower lumbar vertebrae) in the acute stage + Fatty deposition in the (chronic stage)** ✔ **and Bridging anterior and posterior syndesmophytes may be seen**
4.Hip joint effusion	**Spondyloarthropathy can have associated hip joint effusion and synovitis.**

CT FINDINGS

1. Subchondral demineralization	✔ **Early sign and equivalent of subchondral bone marrow hyperintensity seen on MRI, but is a nonspecific finding**
2.Erosions	✔ **Erosions are seen on the iliac side(early) stage of the disease with (later) sacral surface.** ✔ **Erosions are associated with narrowing of joint space**
3. Subchondral sclerosis	✔ **Sclerosis can be focal or diffuse,** ✔ **Asymmetrical or symmetrical,** ✔ **More than 5 mm on iliac surface**
4. Bony Bridges	**Transarticular bony bridges. and total ankylosis in late stage result in complete obliteration of the joint space**

CT FINDINGS

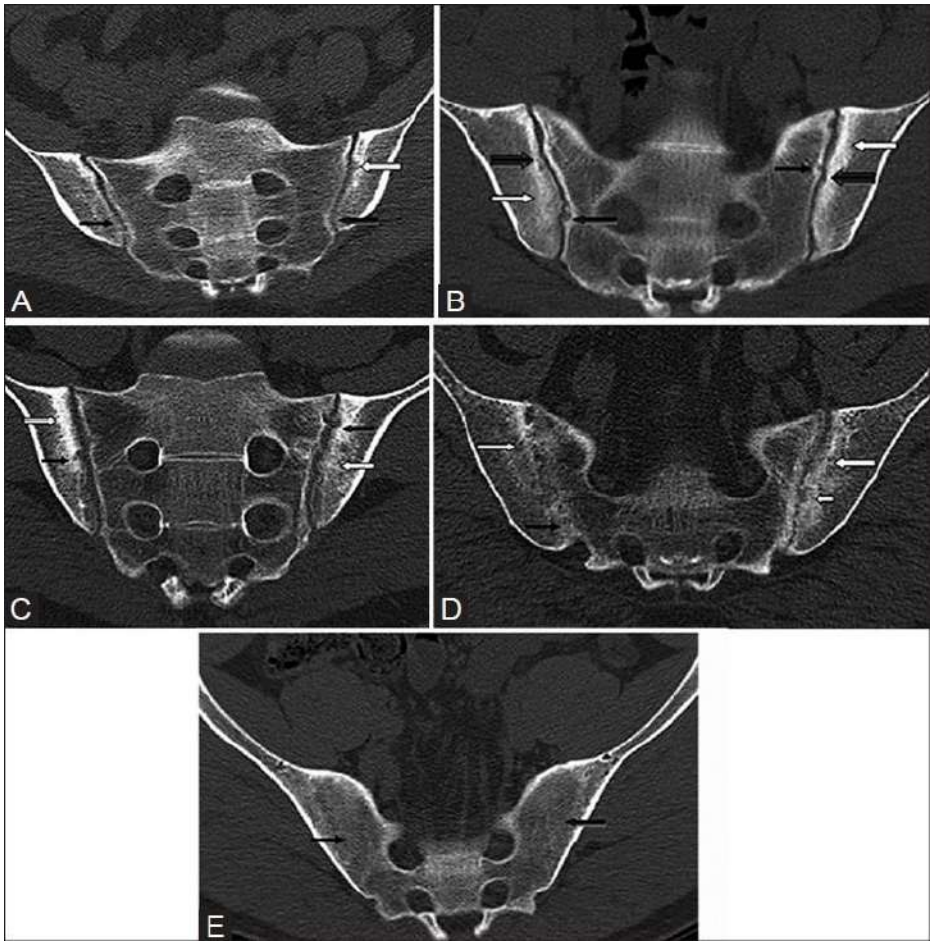
A. Oblique coronal CT scan in a ankylosing spondylitis shows erosion on the left iliac articular surface (white arrow) with bilateral diffuse reduction of joint spaces and blurring of the articular cortex (black arrows).

B. Bilateral reduction in joint space, erosions on both iliac side (thick black arrows) and sacral side (thin black arrows), along with bilateral Subchondral sclerosis (white arrows).

C. Multiple erosions (black arrows), subchondral sclerosis (white arrows), and widening of the joint space bilaterally.

D. Bony bridges on the right side (black arrow), subchondral sclerosis on iliac sides bilaterally (white arrows), and erosions in the left ilium (small white arrow)

E. Ankylosing spondylitis shows complete ankylosis of both sacroiliac joints (black arrows).



Infective sacroiliitis

- Gram-positive cocci were the mostly isolated common bacteria, with a predominance of staphylococci. (Methicillin sensitive>>Coagulase negative >> Streptococcus
- The most frequently isolated gram-negative bacillus was Pseudomonas aeruginosa.
- Non-brucellar and non-tuberculous infectious sacroiliitis (ISI) is a rare disease.

Right-sided sacroiliitis persisting 1 month after diagnosis.

- Magnetic imaging resonance scan showing persistent hypersignal of the right sacroiliac joint 3 months after diagnosis.

A 27 year old female patient on her 34th week of gestation admitted to hospital with chief complaints of pain in the lower back since 3 months and pain radiating to both lower limbs. No history of fever,

weakness, numbness or trauma. On examination the patient was conscious, oriented and febrile. Tenderness over lumbar spine was present. On general examination all the values were normal. On

laboratory investigation the ESR was highly elevated (120mmhr), the haemoglobin was slightly reduced (10.2gm%). The LDH level was 109 U/L, which is lower than the normal level. In serology, the CRP level was high, 39.60mg/l. Doppler parameters are in normal limits. SJ joint screening shows diffuse T1 hypointense/ STIR hyperintense marrow edema noted across left SI joint with a large erosion in the sacrum. Diffuse cortical thinning of the iliac aspect of left SI joint also noted. A tiny 1cm collection is noted adjacent to the joint .

Diagnosis.....?????

Infective Sacroiliitis in a Pregnant Woman

- Rare sacroiliitis should be considered in patients with radiating lower back pain even if no predisposing factors are found.
- The serious complications can result from delaying diagnosis and lack of therapy.
- Complications of infectious sacroiliitis include not only destruction of bones and joints but also maternal and neonatal septicaemia.

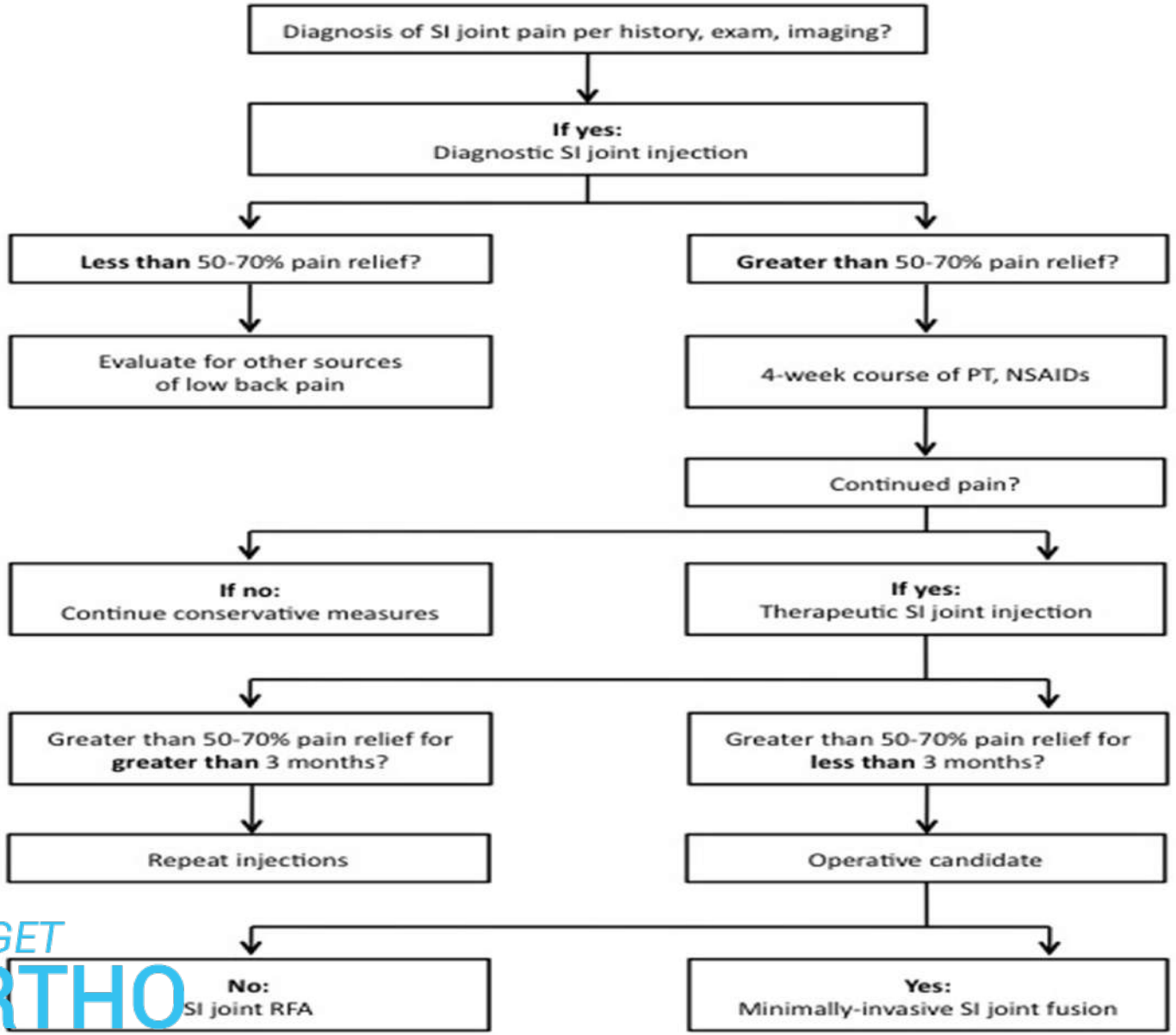
TREATMENT

- Starting antibiotic therapy according to the antibiogram:
- Cefuroxime 3 × 750 mg i.v. (used for ten weeks in total) and Ciprofloxacin i.v. 2 × 200 mg (for four weeks in total).
- Then, clindamycin 3 × 300 mg i.v. (for eight weeks in total) and after the patient has being discharged from the hospital clindamycin 3 × 300 mg p.o. (for other eight weeks).

Proposed Criteria for Diagnosis of SIJ Dysfunction

- The International Association for the Study of Pain (IASP) proposed criteria for diagnosis of sacroiliac joint dysfunction.
- Diagnosis is described as pain in the area of the sacroiliac joint (approximately 3 cm x 10 cm inferior to the ipsilateral posterior superior iliac spine, reproducible with provocative maneuvers, and must be relieved with local anesthetic injection into the SIJ or the lateral branch nerves.

SACROILIAC JOINT DYSFUNCTION ALGORITHM FOR THE INTERVENTIONALIST



SACROILITIS MANAGEMENT

- 1. SI joint pain is treated conservatively before further invasive options such as surgery are considered.
- Management of pain with activity modification, physiotherapy, manual manipulation, topical medication such as lidocaine and diclofenac, and oral medication, usually non-steroidal anti-inflammatory drugs
- Treatment goals for spondyloarthritis not only include management of symptoms but also treatment of underlying dysfunction

MANAGEMENT

1.Chiropractic manipulation and Physical therapy	**Altered gait mechanics and spinal misalignment.**
2.. Pelvic belts	**To stabilize the SI joints and reduce sagittal rotation or excess ligament strain, especially in pregnant women with weakened SI joints**
3. Shoe inserts/ Orthotic Insoles	**Patients with limb-length discrepancy to help equally distribute load management of the SI joints.**

Interventional management

(1) Prolotherapy	**Injections into areas of the SI joint where strength and repair may be compromised with dextrose and platelet-rich plasma**
(2) Extraarticular/intraarticular Injections	**Corticosteroid injections provide antiinfammatory properties Fluoroscopy and CT-guided injections are the most precise, but Ultrasound is more accessible in clinical practice.**
3. Radiofrequency Denervation	**❖ Radio waves are used to generate an electric current in order to heat and ablate nerve fibers and ultimately reduce pain sensation ❖ Unipolar RF lesioning of the dorsal rami lateral branch nerves innervating the SI joint**
4.Pulsed radiofrequency	**❖ Modulation of a c-Fos pathway by alternating electric felds generated by PRF ❖ Alteration of the transcription factor ATF3, which ultimately impacts cellular stress in C and Aδ pain fbers**

Surgical intervention

- Sacroiliac arthrodesis (SI joint fusion) has been the established surgical method for recalcitrant cases of pain arising from SIJD.
- Persistent moderate to severe pain, Functional impairment, and Failed a minimum of 6 months of intensive non-operative care.
- Two primary approaches of SI joint fusion are open arthrodesis and the minimally invasive percutaneous sacroiliac arthrodesis

Open Approach

- In the open approach, the joint is accessed anteriorly or posteriorly, cartilage is removed, a bone graft is placed, and plate-screw constructs are added for stability

Minimally Invasive Approach

- Minimally Invasive Approach follows a similar sequence, but the notable diferences are in the
- Smaller incision size and the use of radiographic Imaging for joint visualization

Biological therapies for Spondyloarthritis

- *Tumor necrosis factor α inhibitors*

✔ *E*tanercept,

✔ Infliximab,

✔ Adalimumab,

✔ Golimumab

✔ Certolizumab pegol

All TNFα inhibitors are administered subcutaneously EXCEPT Infliximab which is administered intravenously and has an induction regimen at 0, 2 and 6 weeks followed by a maintenance regimen for every 6–8 weeks.

Initiating anti-TNFα therapy

- TNFα inhibitors are usually administrated after the failure of traditional disease-modifying antirheumatic drugs (DMARDs).
- In patients with peripheral PsA, administration of at least one DMARD (e.g. sulfasalzine, leflunomide, MTX or cyclosporine) for more than 3 months is useful; more than 2 months with a standard target dose.

When to start anti-TNF therapy.

Axial SpA	**Persistently high disease activity (BASDAI > 4)** **Failure of at least two NSAIDs**
Peripheral SpA	Failure of intra-articular steroid injection Failure of DMARDs
Poor prognostic factor risk	High CRP/ESR Bone edema at MRI
Psoriatic arthritis	Moderate or severe form in case of failure to respond to at least one DMARD
Enthesitis/dactylitis	In severe cases or after failure of traditional therapy

Anti IL-17A

- Anti IL-17A therapy is approved to treat a non-radiographic axial SpA (no changes on x-ray) and ankylosing spondylitis (changes on x-ray).

- It works by neutralising the activity of a protein in the body called IL-17A.

- IL-17A is a key protein in the skin inflammation in psoriasis.
- Research has shown that people with axial SpA have very high levels of IL-17A in their body and that it plays a very important role in causing the inflammation associated with axial SpA.

Anti IL-17A

- Secukinumab (Cosentyx)- a fully human IgG1κ monoclonal antibody.
  - Self administered by an injection pen device
  - The treatment starts with 5 weekly doses and then moves to once monthly.

- Ixekizumab (Taltz)- humanized IgG4 monoclonal antibody.
  - Self-administered by injection pen device.
  - Monthly dosing.

- Bimekizumab-monoclonal humanized IgG1 antibody that neutralizes both IL-17A and IL-17F.
- Netakumab-recombinant humanized IgG1 IL-17A monoclonal antibody with modified CDR-regions and Fc-fragment

IL-23 Inhibitors

- Risankizumab-a humanized, IgG1 monoclonal antibody that selectively targets the p19 subunit of IL-23 in patients with definite AS refractory to ≥ 2 NSAIDs
- Ustekinumab- a human monoclonal antibody targeting the p40 subunit found in both IL-12 and IL-23
- Guselkumab- a human monoclonal IgG1λ antibody that selectively binds to the p19 subunit of IL-23

TO BE CONTINUED.....

FOR ANY QUERIES-

Mail on shikhasportsmed@gmail.com

TARGETORTHO WHATSAPP GROUP