

Septic Sacroiliitis in a Teenager – A Rare Complication of Acupuncture

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Authors' Contributions

Hing Lun Leong was responsible for writing the original draft. Timothy Shao Ern Tan and Shen Ren Yuan were involved in writing review and editing. Matthew William Lukies was involved in conceiving the article, writing review and editing. All authors reviewed the results and approved the final version of the manuscript.

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ABSTRACT

We present a case of septic sacroiliitis in a teenage girl, which developed as a rare complication of acupuncture therapy for back pain, likely attributed to inadequate skin preparation and sterilization. The patient underwent contrast enhanced magnetic resonance imaging of the sacroiliac joints and pelvis, which demonstrated features consistent with acute unilateral right sacroiliitis, complicated by rim-enhancing joint effusion and small periarticular collections. Aspiration under ultrasound guidance yielded gram positive bacteria. Following completion of 6 weeks' duration of intravenous cloxacillin, the patient's symptoms resolved at the latest follow up. To the best of our knowledge, this is the first reported case of septic sacroiliitis resulting from acupuncture therapy in a paediatric patient, which highlights the important role of imaging in prompt diagnosis and in guiding treatment.

CASE REPORT

BACKGROUND

Septic sacroiliitis is a rare but serious condition in the paediatric population. Whilst acupuncture is generally safe, inadequate aseptic technique can lead to infectious complications. To our knowledge, this is the first reported case of paediatric septic sacroiliitis following acupuncture. Diagnosis may be delayed due to the sacroiliac joint's deep location and limited vascular supply. This case highlights the crucial role of imaging, particularly MRI, in facilitating early detection, distinguishing infectious from inflammatory aetiologies, and guiding management. It also underscores the importance of stringent infection control in acupuncture practice to prevent such complications.

INTRODUCTION

A previously well 16-year-old female presented to the paediatric emergency department with a one-week history of progressively worsening right hip pain, associated with

difficulty in weightbearing, limitation of movement and fever with chills. Prior to the onset of symptoms, she had reported having undergone a few sessions of acupuncture for chronic back pain. There was no past medical history of diabetes, immune-related disorders or blunt trauma.

On physical examination, an antalgic gait was demonstrated with limited range of movement of the right hip. No other joints were involved, and there were no extra-articular manifestations. Initial laboratory investigations revealed an elevated white cell count of $12 \times 10^9/L$ and C-reactive protein of 262 mg/L. Further evaluation with radiographs of the pelvis and sacroiliac joints at time of presentation showed mild right sacroiliac joint space narrowing with surrounding mild subchondral sclerosis (Figure 1). She subsequently underwent contrast enhanced magnetic resonance imaging (MRI) of the sacroiliac joints (Figure 2), which revealed features of acute right sacroiliitis with rim-enhancing joint effusion and small periarticular collections.

After MRI, she underwent ultrasound guided aspiration of the sacroiliac joint (Figure 3). Both blood and sacroiliac joint aspirate cultures grew penicillin-resistant *Staphylococcus aureus*. She was treated with antimicrobial therapy consisting of IV Cloxacillin for one week, that was subsequently oralized and continued for a further 5 weeks after discharge. At the latest follow-up, she had made a good functional recovery with resolution of symptoms.

DISCUSSION

Aetiology and demographics

Sacroiliitis is inflammation of the sacroiliac joint which articulates the ilium to the sacrum. In children, aetiology may include autoimmune spondyloarthropathy or infection. Septic or pyogenic sacroiliitis is uncommon in children and is estimated to account for around 1-2% of paediatric osteoarticular infections [1].

Acupuncture, which is a Traditional Chinese Medicine technique sought for a wide range of clinical issues, has shown continuous growth in clinical research worldwide [2]. Although serious adverse events are rare, acupuncture is not without risks. Minor complications may include bruising and bleeding, with more rare but serious adverse events including pneumothorax, cardiac puncture or injury to spinal nerves [3]. There are several case reports of acupuncture-associated septic arthritis, involving spine or knee joints [4,5]. To the best of the authors' knowledge, pyogenic sacroiliitis from acupuncture has not previously been reported in the paediatric population.

In Traditional Chinese Medicine, back pain is thought to result from blockage or excess of vital energy or Qi in the body, which normally flows along pathways known as meridians. To restore health, needles are inserted into the specific points along meridians to restore flow through these pathways. When adapted for use in western medicine, the same points are used, however the mechanism of pain relief although not entirely understood is thought to possibly involve the Gate Theory of pain or release of endorphins [6]. In the management of lower back pain, needles are inserted into the urinary bladder channel, which is equivalent to the quadratus lumborum muscle [7,8].

Acupuncture needles are shorter than conventional hollow procedural needles such as phlebotomy needles, ranging from 10 to 100 mm in length. The most common points for lower back pain include BL23, BL24 and BL25, for which 40 mm needles of 0.25 mm diameter are typically used. Sessions involve the patient lying supine with the placement of around 5 to 20 needles into identified acupuncture points, where they will remain for around 20 to 30 minutes at a time. Several sessions may occur over several weeks or more [7].

A systematic literature review conducted by Adams et al. [3] into adverse events during paediatric acupuncture demonstrated the risk of major adverse events to be very low. When major adverse events did occur, inadequate aseptic technique or poor knowledge of anatomy are cited as contributing factors; both can be mitigated with adequate training.

The pathogenesis of pyogenic arthritis is postulated to be through haematogenous spread or direct extension from local infection. The most commonly reported organisms for pyogenic sacroiliitis are *Staphylococcus aureus* and *Pseudomonas aeruginosa*, candidates both frequently associated with bacteraemia [9].

To the best of our knowledge, there are only two prior document case reports of pyogenic sacroiliitis from acupuncture in the literature, with both cases occurring in adults and reporting a similar onset of timing of 7-10 days [10] [11]. Millwala et al. have suggested that a haematogenous mechanism is most likely, as direct inoculation of a skin organism into the joint space would result in a more rapid onset of symptoms [10].

We postulate that a similar mechanism had occurred in our case when acupuncture needles were inserted into or around the sacroiliac joint as part of the treatment for back pain. This would have likely resulted in haematogenous dissemination of *Staphylococcus aureus* from the skin into the nearby sacroiliac joint.

Clinical and imaging findings

Clinical symptoms of pyogenic sacroiliitis are often non-specific, particularly in infants, but may include back pain or limited range of movement in older children as seen in our patient. As such, clinical suspicion with supporting imaging features remains crucial in reaching a timely diagnosis [12,13].

Radiographs are known to be unreliable for detection of joint infection in sacroiliitis, with reported diagnostic accuracy in children being less than 33% [1]. MRI remains the imaging investigation of choice, although many features of pyogenic sacroiliitis overlap with inflammatory sacroiliitis. This can result in a diagnostic dilemma due to stark differences in management.

The most reliable marker of active sacroiliitis is bone marrow oedema. In pyogenic sacroiliitis, bone marrow oedema is generally more intense and there is often more intra-articular fluid present. Synovitis and capsulitis may also be seen. There is often involvement of the peri-articular soft tissues, with the presence of peri-articular fluid collections highly specific for pyogenic sacroiliitis [12]. Such features in combination with the clinical history made it possible to reach the diagnosis in our case and distinguish from other inflammatory spondyloarthropathies (Tables 1,2).

Treatment and prognosis

Image guided joint aspiration may still be required in pyogenic sacroiliitis. This can be for both its therapeutic effects and to identify an organism to guide antimicrobial therapy, particularly if blood cultures are inconclusive. This can be performed under ultrasound or CT guidance.

With prompt treatment the prognosis following pyogenic sacroiliitis is excellent. Delayed treatment can result in joint destruction, permanent disability or disseminated infection resulting in a poor outcome.

Differential diagnosis

The main differential diagnosis for sacroiliitis in a paediatric patient is an inflammatory spondyloarthropathy, with many of the imaging features overlapping. In addition to bone marrow oedema, features supportive of an inflammatory spondyloarthropathy include subchondral fat-deposition, synovitis, capsulitis and enthesitis. The presence of structural changes including subchondral sclerosis, erosions, joint space narrowing or ankylosis are indicative of later stages of inflammatory spondyloarthropathy. These are often more readily appreciated on CT [12]. Unlike infective sacroiliitis, inflammatory spondyloarthropathy should obey the anatomic boundaries and peri-articular extension is not expected.

TEACHING POINT

We report a rare case of pyogenic sacroiliitis after acupuncture in a paediatric patient, likely from haematogenous spread into the joint during needle insertion, probably attributed to inadequate pre procedural sterilisation. The presence of peri-articular fluid collections on MRI allowed the diagnosis of pyogenic sacroiliitis to be distinguished from other inflammatory spondyloarthropathies.

QUESTIONS

Question 1: Which of the following is true regarding pyogenic sacroiliitis?

- A) Usually bilateral
- B) Most common joint to be infected in the paediatric population
- C) Inflammatory markers are not useful
- D) Has a poor outcome regardless of treatment
- E) Staphylococcus aureus is a commonly associated organism (applies)

Correct Answer: E

Explanation: Staphylococcus aureus is the most common organism in pyogenic sacroiliitis. It tends to be unilateral and sacroiliac joint involvement is uncommon, constituting 1-2% of all paediatric osteoarticular infections. Inflammatory markers including white cell count and CRP are expected to be raised. If treated promptly, pyogenic sacroiliitis has a good outcome. [The most commonly reported organisms for pyogenic sacroiliitis are Staphylococcus aureus and Pseudomonas aeruginosa, candidates both frequently associated with bacteraemia.]

Question 2: What is the most likely cause of septic sacroiliitis during acupuncture?

- A) Autoimmune spondyloarthropathy
- B) Blunt trauma to the sacroiliac joint
- C) Inadequate skin preparation and sterilization during acupuncture (applies)
- D) Bruising and haematoma
- E) Restoring the flow of Qi

Correct Answer: C

Explanation: Septic sacroiliitis likely results from inadequate skin preparation and sterilization during acupuncture

therapy, which allows for the introduction of bacteria into the sacroiliac joint via haematogenous spread. A) is the main differential in paediatric patients presenting with sacroiliac joint inflammation. B) is incorrect as reported cases in the literature do not support this due to the onset of timing. D) is another possible complication of acupuncture. E) refers to the mechanism acupuncture is thought to relieve backpain in Traditional Chinese Medicine. [This would have likely resulted in haematogenous dissemination of Staphylococcus aureus from the skin into the nearby sacroiliac joint]

Question 3: Which of the following is the most appropriate imaging investigation for diagnosing suspected pyogenic sacroiliitis?

- A) Plain radiograph
- B) Ultrasound
- C) Magnetic Resonance Imaging (MRI) (applies)
- D) Computed Tomography (CT)
- E) Bone scan

Correct Answer: C

Explanation: MRI is the most sensitive and specific imaging modality for diagnosing pyogenic sacroiliitis due its superior soft tissue resolution. Moreover, it is highly sensitive to early marrow changes. Options A, B, D and E can potentially detect pyogenic sacroiliitis, although they often lack sensitivity and/or specificity. [MRI remains the imaging investigation of choice, although many features of pyogenic sacroiliitis overlap with inflammatory sacroiliitis]

Question 4: Which of the following regarding acupuncture is true?

- A) Acupuncture is a risk-free procedure with no serious complications.
- B) It involves the rapid insertion and removal of needles
- C) Treating back pain requires needle insertion into the urinary bladder
- D) Its pain relief mechanism may be explained via gate theory (applies)
- E) Acupuncture needles are usually larger than conventional hollow procedural needles

Correct Answer: D

Explanation: The Gate Theory of pain is one postulated method by which acupuncture is thought to provide pain relief. A) although very low risk, complications can occur B) needles are usually left in for a period of 20-30 minutes at a time. D) insertion of needles is into the urinary bladder channel which is equivalent to the quadratus lumborum muscle in anatomical terms E) the opposite is true. [When adapted for use in western medicine, the same points are used, however the mechanism of pain relief although not entirely understood is thought to possibly involve the Gate Theory of pain or release of endorphins]

Question 5: What key MRI feature helps distinguish pyogenic from autoimmune sacroiliitis?

- A) Peri-articular fluid collections (applies)
- B) Bone marrow oedema

- C) Synovitis
- D) Joint erosions
- E) Subchondral sclerosis

Correct Answer: A

Explanation: Peri-articular soft tissue involvement and fluid collections are highly specific for pyogenic sacroiliitis. Options B, C, D, E may be seen in both. [There is often involvement of the peri-articular soft tissues, with the presence of peri-articular fluid collections highly specific for pyogenic sacroiliitis]

REFERENCES

1. Cohen SA, Biko DM, Kaplan SL, Barrera CA, Russo ME, Nguyen JC. MRI Findings of Infectious Sacroiliitis in Children: Are There Age-Dependent Differences? *AJR Am J Roentgenol.* 2020; 214(4): 923-929. PMID: 32045310.
2. Paley CA, Johnson MI. Acupuncture for the Relief of Chronic Pain: A Synthesis of Systematic Reviews. *Medicina (Kaunas).* 2019; 56(1): 6. PMID: 31878346.
3. Adams D, Cheng F, Jou H, Aung S, Yasui Y, Vohra S. The safety of pediatric acupuncture: a systematic review. *Pediatrics.* 2011; 128(6): e1575-1587. PMID: 22106073.
4. Xu S, Wang L, Cooper E, Zhang M, et al. Adverse events of acupuncture: a systematic review of case reports. *Evid Based Complement Alternat Med.* 2013; 2013:2013:581203. PMID: 23573135.
5. Daivajna S, Jones A, O'Malley M, Mehdian H. Unilateral septic arthritis of a lumbar facet joint secondary to acupuncture treatment--a case report. *Acupunct Med.* 2004; 22(3): 152-155. PMID: 15551942.
6. Lin JG, Kotha P, Chen YH. Understandings of acupuncture application and mechanisms. *Am J Transl Res.* 2022; 14(3): 1469-1481. PMID: 35422904.
7. Sudhakaran P. Acupuncture for Low-Back Pain. *Med Acupunct.* 2021; 33(3): 219-225. PMID: 34239663.
8. Van Hal M, Dydyk AM, Green MS. Acupuncture. [Updated 2023 Jul 24]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK532287/>
9. Tokuyama Y, Yamada H, Shinozuka K, Yunoki T, Ohtsuru S. Pyogenic sacroiliitis caused by *Salmonella schwarzengrund* in a young healthy woman: a case report and literature review. *Int J Emerg Med.* 2023; 16(1): 21. PMID: 36941606.
10. Millwala F, Chen S, Tsaltskan V, Simon G. Acupuncture and postpartum pyogenic sacroiliitis: a case report. *J Med Case Rep.* 2015; PMID: 26358565.
11. Tseng YC, Yang YS, Wu YC, et al. Infectious sacroiliitis caused by *Staphylococcus aureus* following acupuncture: a case report. *Acupunct Med.* 2014; 32(1): 77-80. PMID: 24135310.
12. Tsoi C, Griffith JF, Lee RKL, Wong PCH, Tam LS. Imaging of sacroiliitis: Current status, limitations and pitfalls. *Quant Imaging Med Surg.* 2019; 9(2): 318-335. PMID: 30976556.
13. Lavi E, Gileles-Hillel A, Simanovsky N, Averbuch D, Wexler ID, Berkun Y. Pyogenic sacroiliitis in children: don't forget the very young. *Eur J Pediatr.* 2019; 178(4): 575-579. PMID: 30734096.

FIGURES

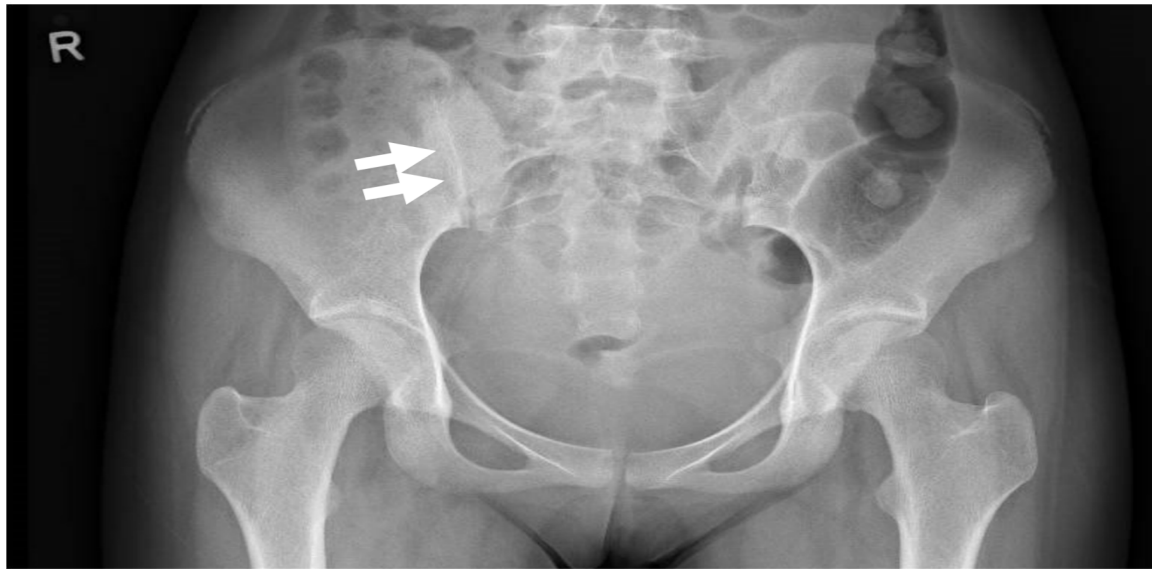


Figure 1: 16 year old female with right pyogenic sacroiliitis
Anteroposterior pelvic radiograph shows mild joint space narrowing of the right sacroiliac joint with surrounding mild subchondral sclerosis (white arrows).

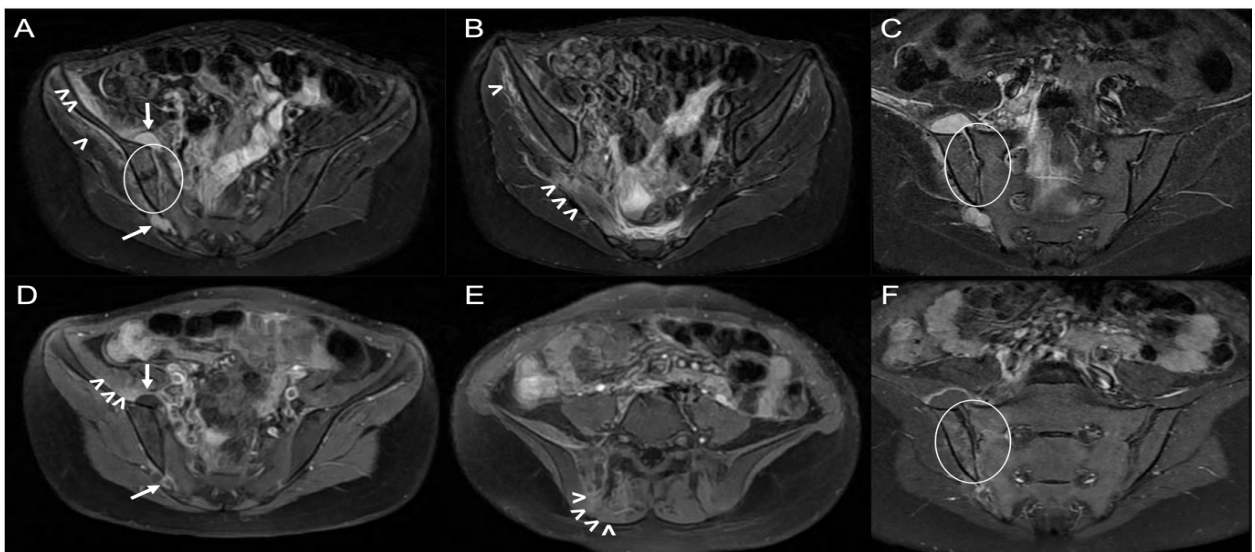


Figure 2: 16 year old female with right pyogenic sacroiliitis
Selected axial (A, B) and Coronal (C) T2-weighted STIR followed by axial (D, E) and coronal (F) post-IV Gadolinium contrast enhanced T1-weighted fat saturated images of the patient's sacroiliac joints demonstrate patchy marrow oedema with enhancement of the right sacroiliac joint containing T2w hyperintense fluid (white circles in images A, C and D), consistent with sacroiliitis. Right sacroiliac joint fluid is present, extending anteriorly and posterior with associated rim-enhancement and small loculated collections seen, suspicious for infected effusion (e.g. white arrows in images A and D). Patchy intramuscular enhancement and oedema of the right sided iliopsoas, piriformis and gluteal muscles as well as bilateral quadratus lumborum muscles (arrow heads in A, B, D, E) were also noted (not completely shown on this figure) probably due to myositis. The left sacroiliac joint appears unremarkable. Small volume pelvic free fluid is noted (B).

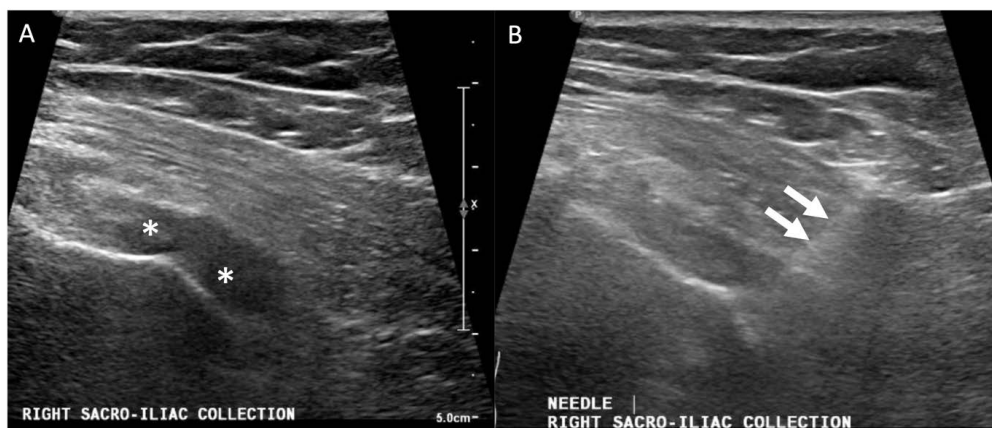


Figure 3: 16 year old female with right pyogenic sacroiliitis
 Ultrasound guided needle aspiration of the right sacroiliac collections. (A) Targeted preliminary ultrasound of the right sacroiliac joint demonstrates anterior and posterior loculated collections with internal debris (*) seen. (B) Under aseptic technique and ultrasound guidance, a 5 Fr Yuch centesis needle (white arrows) was passed into the larger posterior collection of the right sacro-iliac joint. 4 mL of pus was aspirated and collected for analysis.

Aetiology	Joint infection with the most common organism being <i>Staphylococcus aureus</i> .
Incidence	Uncommon. Accounts for around 1-2% of cases of all osteomyelitis
Gender Ratio	No gender predilection
Age predilection	Children and young adults
Risk factors	Intravenous drug users, immunosuppressed, pregnancy, primary infections of skin, bone or urinary tract
Treatment	Antibiotic therapy, drainage of collections, surgical debridement
Prognosis	Excellent if treated promptly. Untreated can result in joint destruction and disseminated infection with poor outcome
Findings on imaging	X-ray and CT: May be normal in early stages. Endplate sclerosis and irregularity. Cortical erosions. Ankylosis in chronic stages. MRI: Bone marrow oedema, abscess formation, soft tissue involvement

Table 1: Summary table of pyogenic sacroiliitis

Disease	Pyogenic sacroiliitis	Spondyloarthropathy sacroiliitis
Distribution	Unilateral sacroiliac joint	Typically bilateral and symmetrical sacroiliac joint involvement, although early disease may be unilateral. May involve other joints.
Clinical	Fever, low back pain, leucocytosis and elevated CRP	Insidious onset of chronic low back pain, extra-articular manifestations (biochemical and genetic features vary depending on type)
X-ray and CT	- May be normal in early stages. - Endplate sclerosis and irregularity - Cortical erosions.	- May be normal in early stages. - Endplate sclerosis and irregularity - Cortical erosions - Joint space widening or narrowing - Ankylosis in chronic stages.
MRI	- Marked bone marrow oedema (hyperintense STIR signal) - Synovitis; thickened synovium with avid contrast enhancement - Capsulitis; joint effusion with thickened bulging enhancing joint capsule - Extra-articular soft tissue involvement (hyperintense STIR signal with contrast enhancement) - Abscess formation (rim-enhancing fluid collections).	Acute inflammatory lesions: - Bone marrow oedema (hyperintense STIR signal) - Cortical bone erosions (best seen on T1w) - Synovitis; thickened synovium with avid contrast enhancement - Capsulitis; joint effusion with thickened bulging enhancing joint capsule - Enthesitis; ligamentous oedema on STIR Chronic inflammatory lesions: - Subchondral sclerosis (hypointense on T1 and T2-weighted images) - Fat-deposition (hyperintense on T1 and T2-weighted images) - Ankylosis

Table 2: Differential diagnosis table for pyogenic sacroiliitis versus spondyloarthropathy sacroiliitis.

KEYWORDS

Septic Sacroiliitis; Effusion; Sacroiliac Joint; Acupuncture; Magnetic Resonance Imaging; Joint Aspiration

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