

## ORIGINAL RESEARCH

# Clinical Evaluation of Septic Arthritis with Radiological Screening

<sup>1</sup>Dr Vanchhit Singh, <sup>2</sup>Dr Minal Hamza, <sup>3</sup>Dr Sunil Sanga, <sup>4</sup>Dr Harshika Singh

<sup>1</sup>Senior Resident, Department of Orthopaedics, Shyam Shah Medical College, Rewa, Madhya Pradesh, India

<sup>2</sup>Secondary DNB Resident, Department of Radiodiagnosis, Paras Hospital, Gurgaon, Haryana, India

<sup>3</sup>Associate Professor, Department of Radiodiagnosis, Adesh Medical College and Hospital, Shahbad, Haryana, India

<sup>4</sup>Senior Resident, Department of Radiodiagnosis, Motilal Medical College, Prayagraj, Uttar Pradesh, India

### Correspondence:

Dr Harshika Singh

Senior Resident, Department of Radiodiagnosis, Motilal Medical College, Prayagraj, Uttar Pradesh, India

**Email:** [hrsika2493@gmail.com](mailto:hrsika2493@gmail.com)

### ABSTRACT

**Introduction:** Inflammation of joints caused by pyogenic bacteria causes septic arthritis. This is an emergency that requires immediate diagnosis and treatment. Delay causes cartilage and joint destruction, leading to significant morbidity and mortality. The prevalence of patients with septic arthritis who present to the emergency department varies widely between studies. Immunocompromised patients and those with artificial joints have a higher incidence of septic arthritis. Because x-rays are widely available, they are commonly used for imaging joints. MRI provides more accurate information about joint and adjacent soft tissue involvement.

**Objectives:** The aim and objective of this study is to evaluate age, gender distribution, and involvement patterns in septic arthritis.

**Methods:** This is an observational study conducted after study approval in patients with clinicopathologically confirmed septic arthritis. A total of 25 patients with confirmed septic arthritis were evaluated by X-ray and MRI. These results were compared using appropriate statistical methods.

**Results:** Among the 25 cases of septic arthritis, the highest incidence was in the age group of 20-40 years (18 cases) and in the age group of 40-60 years (5 cases), 19 (76%) were male and 6 (24%) was a woman. The most common radiographic finding in septic arthritis was the presence of mild erosions, followed by joint effusion, joint space narrowing, and periarticular osteoporosis. All cases showed erosions, bone marrow edema, joint fusion, and contrast-enhanced synovial thickening on MRI. Soft tissue involvement was observed in 10 cases.

**Conclusions:** Imaging has an important role in the diagnosis of septic arthritis, reducing both mortality and morbidity. A plain radiograph is a basic primary care test. MRI is the imaging modality of choice due to its combination of specificity and sensitivity. The only limitations are high cost and time. Sensitivity for the diagnosis of septic arthritis was 100% for MRI and 70% for radiography.

**Keywords:** Septic Arthritis, Radiological, bone erosion

## **INTRODUCTION**

Septic arthritis is a medical condition and a common cause of patient disability.[1] If sepsis arthritis is not properly treated, it is a bacterial infection of a cavity that rapidly destroys the joints within a few days. It is important to diagnose in process of septic arthritis. This is because the diagnosis is delayed, and the cartilage and joints may be destroyed by the enzymes released by neutral, film cells, and bacteria. [2] The ratio of septic systemic arthritis is significantly different between research. However, in the literature, a group of 100,000 people recommends about 4 to 60 incidences.[3,4]

Furthermore, in deep joints such as the shoulders and waist, it may be difficult to evaluate the exudates of the joint clinically [5], which makes diagnosis even more difficult. Historically, the imaging findings of sepsis arthritis were regarded before the age of magnetic resonance. [6] For this reason, we tried to evaluate the soft tissue of MRI in sepsis arthritis, the film, and bones.

## **AIM AND OBJECTIVES**

The purpose of this study was to evaluate the age, gender distribution, and involvement patterns of septic arthritis.

## **MATERIALS AND METHODS**

This is an observational study conducted for one year in cases of septic systemic arthritis, which was verified in clinical pathological verification after approval from the Ethics Committee. A total of 25 patients with septic arthritis were identified using various imaging methods. In this study, the main data source was obtained from the orthopedic department. In all cases, history were taken and a physical examination were performed of the patients after taking the informed consent.

The inclusion criteria were clinical pathological verified septic arthritis.

The exclusion criteria were severe traumatic fractures, dislocation, subunits, and the accompanying joint disease.

The standard X-ray photograph of the case is collected on two squares vertically using the Siemens 500 MA device (Clinoscope H / Fluorovision model), the appearance of the PA / AP, and the horizontal appearance of the joint involved

X-ray protocol: 60-85kV, MAS: 2-6 MAS, FFD: 100-115 cm, cassette size: 18 cm x 24 cm and 24 cm x 30 cm.

Posterior-anterior view (PA) of the joint involved: The patient is either supine or seated on the X-ray table. The affected limb is positioned such as to centralize the region of interest and sandbags are placed to help maintain this position. The cassette is kept in close contact with the posterior aspect of the joint. The radiograph is taken with the central ray at 90 degrees to the long axis of the joint passing through the joint.

Lateral view of the joint involved: The patient lies on the side to be examined, with the joint positioned such that it is in the vertical plane and fixed with the help of a sandbag.

## **ASSESSMENT WITH MRI**

This study was performed with magnetic resonance imaging since it is considered the most sensitive and specific imaging method for muscular pathology. MRI was diagnostic with a Siemens Tim Avanto 1.5T scanner.

MRI protocol: The involved joint is placed on a circularly polarized organ coil [usually for orthopedic imaging {Dimension - 405mm × 270mm × 290mm (L × w × h)}] with proper cushion to prevent movement. Whenever the desired imaging study was studied, an IV

solution of GdDTPA-dimeglumine was applied as an iv bolus of 0.1 mmol/kg of body weight followed by saline flushing.

Magnetic resonance images were obtained in sagittal, coronal and axial planes for T1, T2 and PDFS images. We used a 256x256 matrix for all settings. Additional sequences (Seattle progressive/axial/coronal, 3D GRE pulse, FS layout) were performed as needed. T1F axial, sagittal, and coronal images were taken.

## RESULT

25 cases of septic arthritis were evaluated with plain radiographs and MRI, and the final diagnosis was based on these imaging results and follow-up surgical/arthroscopic results on the basis of inclusion criteria. Diagnosis, biochemical analysis, possibly histopathological examination was performed. Of the 25 cases of septic arthritis, the largest number of cases occurred in those between 20 and 40 years old (18 cases) range, followed by those between 40 and 60 years old (5 cases) and 2 cases of less than 20 years of age.

**Table 1: Age distribution of septic arthritis**

Age (years)	0-20	20-40	40-60	>60	Total
No. of Cases	2	18	5	0	25
Percentage	8	72	20	0	100

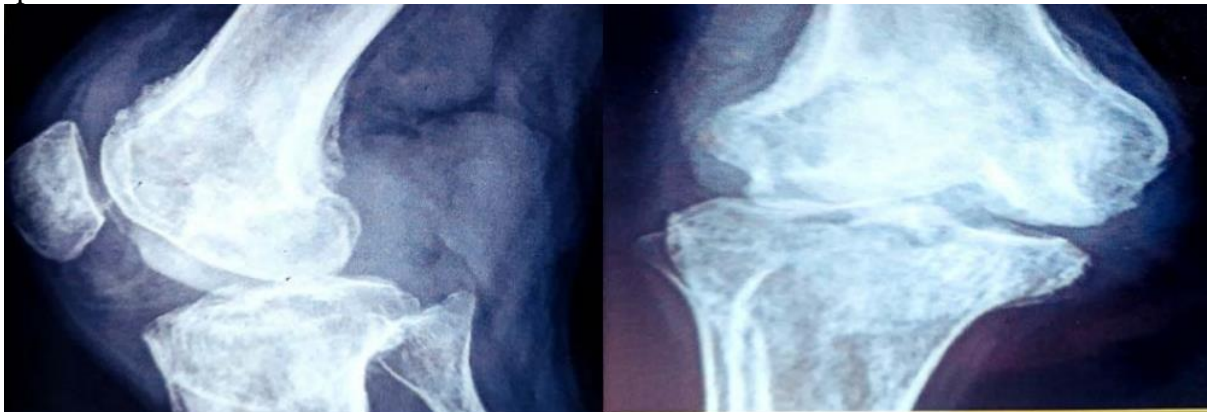
The gender distribution of the 25 cases of septic arthritis was 19 (74%) men and 6 (26%) women.

**Table 2: Gender distribution of septic arthritis**

Sex	Male	Female
No. of Cases	19	6
Percentage(%)	76	24

## RADIOGRAPHIC FEATURES

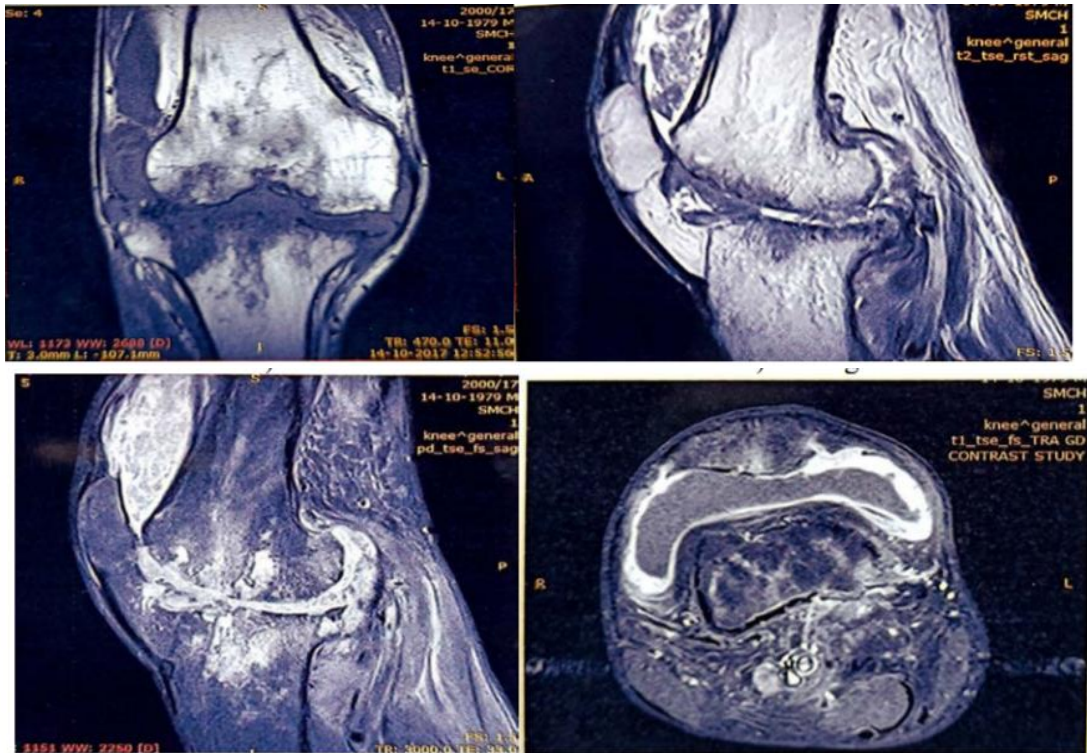
In our study, the most common radiographic finding of septic arthritis was the presence of marginal erosions which is followed by joint effusion and periarticular osteoporosis with joint space were seen narrow.



**Figure 1: Radiograph shows juxta-articular osteoporosis, joint space reduction, erosions and soft tissue swelling.**

## CHARACTERISTICS OF MRI

Bone marrow oedema, erosion, and increased synovial joint thickness were observed in all cases. Soft tissue involvement was seen in 11 cases.



**Figure 2: MRI shows erosions, joint effusion, synovial jointthickening showing post-contrast enhancement. PDFS suggest the bone marrow edema**

Sensitivity of the imaging method in the diagnosis of septic arthritis: The sensitivity of MRI was found to be 100% for the diagnosis of septic arthritis.

## DISCUSSION

The cases of septic arthritis were 25 in the study, it was observed in the males it is majorly affected than females. Accurate results and some patients in laboratory studies may be inexperienced [7]

The most common age group is 20-40 years. In developing countries like ours, tubercular arthritis is not uncommon and should always be considered in cases of chronic monoarthritis. Men were more commonly affected. Joint articulations were the most frequently involved in our studies. [8]

In the study of Ogunlusi JD et al [9], 34 of 39 patients had monoarticular septic arthritis. This was a male/female ratio of 2.4:1, and the most affected joint was the knee joint. According to studies by Salih S. [10] and Morgan et al. [11], the average age of patients with rheumatoid arthritis was 39.7 and 30, respectively. All patients involved in the study [10] were monoarticular. The knee joint was the most common joint. In both the studies a male preponderance was seen. Our study correlated to the above-mentioned studies. [12]. In this way, US high resolution may account for a more accurate diagnosis of synovial thickness.

On Plain radiography and CT, the most common features of septic arthritis in our study were the presence of erosions and joint effusion. Joint space narrowing and juxta-articular osteoporosis were also seen. Similar findings were also noted by Hadadi A et al in their study, where 20.7% of cases showed similar radiographic findings. Huang T et al reported that significant joint abnormalities in infective arthritis were joint space narrowing (5 cases), bone destruction (9 cases) and osteoporotic change (6 cases). Out of 51 cases, 45 were monoarticular and the knee joint was most commonly affected. [13]

MRI in patients with septic arthritis has been reported to be abnormal 24 hours after the onset of infection. In detecting septic arthritis, MRI sensitivity and features increased by 100%.

However, detailed data relating to the specific outcome of MRI in patients with septic arthritis are very low.

In our study, we observed MRI features such as synovitis, bone marrow oedema, erosions, and soft tissue involvement. In his study, Prasad S et al [14] in their study found that out of 24 patients, 18 showed synovitis, 10 showed bone marrow oedema, 4 showed erosions and 5 showed soft tissue involvement which were comparable to findings in our study. Graif M et al reported the MRI findings of septic arthritis in their study which included joint effusion (79%), synovial thickening (68%), synovial enhancement (94%), bone erosions (79%), bone marrow edema (74%) and bone marrow enhancement (67%) and soft tissue edema (63%). Choi JA et al [14] and Michael Karchevsky et al [15] also had similar findings of infective arthritis on MRI. The sensitivity of MRI in diagnosing septic arthritis in our study was 100%. Michael Karchevsky et al and other study [16-18] in their study concluded that the sensitivity and specificity were 100% and 77% respectively. Hopkins KL et al [19] also found the same percentage of sensitivity and specificity in their study.

## CONCLUSION

Septic arthritis is not uncommon in common drugs and rheumatology practice. Proper treatment is essential for accurate diagnosis and follow. Delays in the onset of septic arthritis can lead to serious complications and deaths in patients. Therefore, imaging plays an important role in reducing both death and disease in patients with monoarticular results. Simple radiography is the basic examination of basic care. The MRI is an imaging method of choice because of its specificity and sensitivity. The only limit is that it is expensive and timely. The purpose of this study was to review the radical results of septic arthritis and to do with the literature established. Possibly, our study has shown that the MRI is the ultimate imaging method to assess septic arthritis cases.

## REFERENCES

1. Schweitzer ME, Magbalon MJ, Fenlin JM, Frieman BG, Ehrlich S, Epstein RE. Effusion criteria and clinical importance of glenohumeral joint fluid: MR imaging evaluation. *Radiology* 1995;194:821–824.
2. Singson RD, Zalduondo FM. Value of unenhanced spin-echo MR imaging in distinguishing between synovitis and effusion of the knee. *AJR* 1992;159:569–571.
3. Morrison WB, Schweitzer ME, Bock GW. Diagnosis of osteomyelitis: utility of fat-suppressed contrast-enhanced MR imaging. *Radiology* 1993;189: 743–747.
4. Ogunlusi, J. D., Ogunlusi, O. O., Oginni, L. M. & Olowookere, J. A. Septic Arthritis in a Nigerian Tertiary Hospital. *Iowa Orthop. J.* 2006;26, 45–47. 5.
5. Al, -Saleh Salman, Al, -ArfajAbdurahman, Naddaf, H., Haddad, Q. & Memish, Z. Tuberculous Arthritis: A Review of 27 Cases. *Ann. Saudi Med.* 1998;18, 368–369.
6. Morgan, D. S., Fisher, D., Merianos, A. & Currie, B. J. An 18-year clinical review of septic arthritis from tropical Australia. *Epidemiol. Infect.* 1996;117, 423–428.
7. Hadadi, A., Rasoulinejad, M., Khashayar, P., Mosavi, M. & Morad, M. M. Osteoarticular tuberculosis in Tehran, Iran: a 2-year study. *Clin. Microbiol. Infect.* 2010;16, 1270–1273.
8. Huang, T.-Y. et al. Tuberculous arthritis- -a fourteen-year experience at a tertiary teaching hospital in Taiwan. *J. Microbiol. Immunol. Infect. Wei Mian Yu Gan Ran ZaZhi* 2007;40, 493–499.
9. Mnif, J. et al. [Ultrasonography in the diagnostic approach of septic arthritis]. *Rev. Chir. Orthop. ReparatriceAppar. Mot.* 1997;83, 148–155.
10. Draghi, F. et al. Joint effusion of the knee: potentialities and limitations of ltrasonography. *J. Ultrasound* 2015;18, 361–371.

11. Shiv, V. K., Jain, A. K., Taneja, K. & Bhargava, S. K. Sonography of hip joint in infective arthritis. *Can. Assoc. Radiol. J. J. Assoc. Can. Radiol.* 1990;41, 76–78.
12. Prasad, S. et al. Features of extra-spinal musculoskeletal tuberculosis: A retrospective study from a North Indian Tertiary Care Institute. *Indian J. Rheumatol.* 2017;12, 146.
13. Graif, M., Schweitzer, M. E., Deely, D. &Matteucci, T. The septic versus nonseptic inflamed joint: MRI characteristics. *Skeletal Radiol.* 1999;28, 616–620. 14.
14. Choi, J.-A. et al. Rheumatoid Arthritis and Tuberculous Arthritis: Differentiating MRI Features. *Am. J. Roentgenol.* 2009;193, 1347–1353.
15. Leach, T. J. &Farooki, S. Magnetic resonance imaging of septic arthritis. *Clin. Imaging* 2000;24, 236–242.
16. Cisternas, M. G. et al. Trends in Medical Care Expenditures of US Adults with Arthritis and Other Rheumatic Conditions 1997 to 2005. *J. Rheumatol.* 2009;36, 2531–2538.
17. Ledermann HP, Morrison WB, Schweitzer ME. MR image analysis of pedal osteomyelitis: distribution, patterns of spread, and frequency of associated ulceration and septic arthritis. *Radiology* 2002;223: 747–755.
18. Cotran RS. *Robbins pathologic basis of disease*, 6th ed. Philadelphia: W. B. Saunders, 1999:1246–1259
19. Fiocco U. Long term sonographic follow-up of rheumatoid and psoriatic proliferative knee joint synovitis. *Br J Rheumatol* 1996;35:155–163