

## Clinical case

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## Septic arthritis of the first metatarsophalangeal joint: a case report

*Artritis séptica de la primera articulación metatarsofalángica: reporte de caso*

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**ABSTRACT. Introduction:** we describe the case of a 24-year-old male with an initial diagnosis of arthritis of the first metatarsophalangeal joint (MTP). In the magnetic resonance imaging (MRI) the abnormal findings were a bipartite medial sesamoid versus fracture of the medial sesamoid. During follow-up, the patient developed a fistula in the first MTP with a positive culture for methicillin-sensitive *Staphylococcus aureus* (MSSA), leading to the diagnosis of septic arthritis (SA) of the first MTP. Treatment involved surgical debridement and targeted antibiotic therapy, resulting in good outcomes and satisfactory progress. **Conclusion:** sesamoid bone pathology is rare, with fractures and sesamoiditis being the most common conditions. Acute or chronic infection –osteomyelitis– of sesamoids is extremely unusual, and aggressive treatment is required. Sample collection should be performed to initiate targeted antibiotic therapy for the causative pathogens, with *Staphylococcus aureus* and *Pseudomonas aeruginosa* being the most frequent. Subsequently, extensive surgical debridement should be performed, aiming to avoid complete sesamoidectomy due to its significant comorbidity.

**Keywords:** sesamoid, sesamoiditis, septic arthritis, osteomyelitis, first metatarsophalangeal joint.

**RESUMEN. Introducción:** describimos el caso de un varón de 24 años con diagnóstico inicial de artritis de la primera articulación metatarsofalángica (MTF). En la resonancia magnética (RM) los hallazgos anormales fueron un sesamoideo medial bipartito versus fractura del sesamoideo medial. Durante el seguimiento, el paciente desarrolló una fístula en la primera MTF con un cultivo positivo para *Staphylococcus aureus* sensible a meticilina (SASM), lo que llevó al diagnóstico de artritis séptica (AS) de la primera MTF. El tratamiento consistió en el desbridamiento quirúrgico y la terapia antibiótica dirigida, lo que dio lugar a buenos resultados y una evolución satisfactoria. **Conclusión:** la patología ósea sesamoidea es poco frecuente, siendo las fracturas y la sesamoiditis las afecciones más comunes. La infección aguda o crónica –osteomielitis– de los sesamoideos es extremadamente inusual y se requiere un tratamiento agresivo. Se debe realizar la recolección de muestras para iniciar la terapia antibiótica dirigida a los patógenos causantes, siendo *Staphylococcus aureus* y *Pseudomonas aeruginosa* los más frecuentes. Posteriormente, se debe realizar un desbridamiento quirúrgico extenso, con el objetivo de evitar la sesamoidectomía completa debido a su importante comorbilidad.

**Palabras clave:** sesamoideo, sesamoiditis, artritis séptica, osteomielitis, primera articulación metatarsofalángica.

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## Introduction

Pathological conditions affecting the sesamoid bones or the first MTP exhibit a wide range of variability, with infections being infrequent but demanding aggressive therapeutic approaches. SA cases are inadequately documented in literature, and osteomyelitis cases are uncommon, predominantly manifesting in diabetic patients or the pediatric population. Regardless of the timing

of presentation, a comprehensive treatment strategy comprising extended and targeted antibiotic therapy, coupled with surgical debridement and cleansing, potentially involving sesamoidectomy, is imperative.

## Case presentation

A 24-year-old male was evaluated in the clinic due to swelling and pain in the hallux of his right foot that had been ongoing for two weeks, unrelated to any trauma or overexertion. He had no relevant personal medical history. The patient had previously been assessed at another medical center with diagnosis of arthritis of the first MTP of unknown etiology. At the physical examination, there was significant swelling in the hallux of the right foot without warmth or redness in the area. It was painful throughout the active and passive range of motion, with no other significant findings. Plain radiographs and magnetic resonance imaging (MRI) were performed from the previous evaluation, which did not report pathological findings.

Given the suspicion of monoarthritis, the treatment consisted of pain control with oral anti-inflammatory medication and a reverse camber shoe was recommended.

After three weeks, in addition to swelling, the patient exhibited redness and warmth in the right hallux, with a significant increase in pain. An MRI was repeated, which indicated a bipartite medial sesamoid versus fracture of the medial sesamoid, with signs of joint effusion (*Figure 1*).

At five weeks from the onset of symptoms, the patient returned to the clinic with spontaneous fistulization of the hallux, accompanied by purulent drainage. Examination revealed erythema and redness in the area, with decreased swelling, and a fistulous tract on the medial and plantar aspect of the hallux actively discharging purulent material. Suspecting SA, a specimen for culture was taken, and the patient was admitted for further evaluation by fistulography. The fistulogram revealed a 1-2 cm fistulous tract extending from the plantar, medial, and proximal aspects of the hallux towards the medial sesamoid, without communication to the lateral sesamoid or other structures; small quantities of air in the form of bubbles were also found within the fistulous tract (*Figure 2*).

Due to the sesamoid infection, surgical intervention was performed, involving a plantar approach following the fistulous tract along with a medial approach. Deep culture specimens were taken, and debridement as well as Friedrich's procedure at the edges were performed until

achieving an appropriate wound bed with vitalized tissue and adequate bleeding (*Figure 3*).

The culture results were positive for MSSA. Consequently, the patient received three weeks of targeted intravenous antibiotic therapy, followed by an oral regimen, as well as partial weight-bearing on the affected extremity for 15 days until the wound closure.

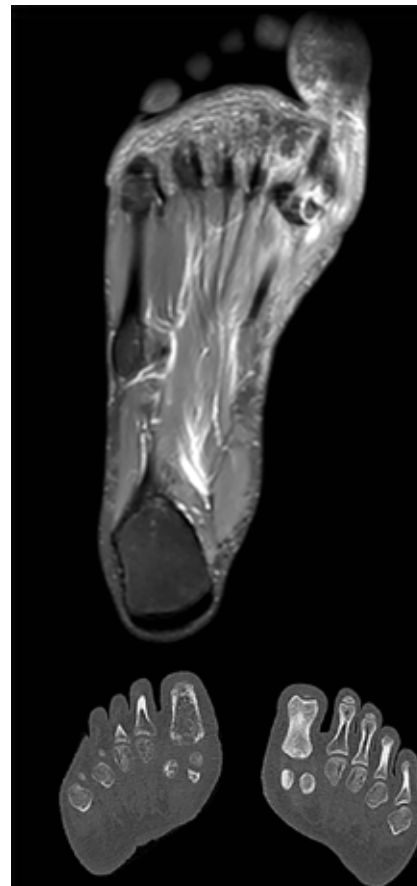
After six months of follow-up, the patient has shown good progress, with no surgical wound complications or recurrence of the infection.

## Discussion

Sesamoid bones are of vital importance for the functioning of the foot. They are embedded within the tendon of the short flexor of the hallux,<sup>1</sup> beneath the head of the first metatarsal (MTT), facilitating its sliding, flexion of the first toe, and supporting the body's load.<sup>1,2,3</sup>

Sesamoid bones ossify around 8 years of age in females and 12 years in males.<sup>4</sup> They may frequently develop bipartite morphology, with an incidence of 19-31% in the population,<sup>5,6</sup> occurring bilaterally in 90% of cases.<sup>1,7</sup>

Pathological conditions involving sesamoids are rare and diverse, including acute fractures (especially in the medial sesamoid) and stress fractures, ischemia—mainly in the peroneal sesamoid, due to their extraosseous and

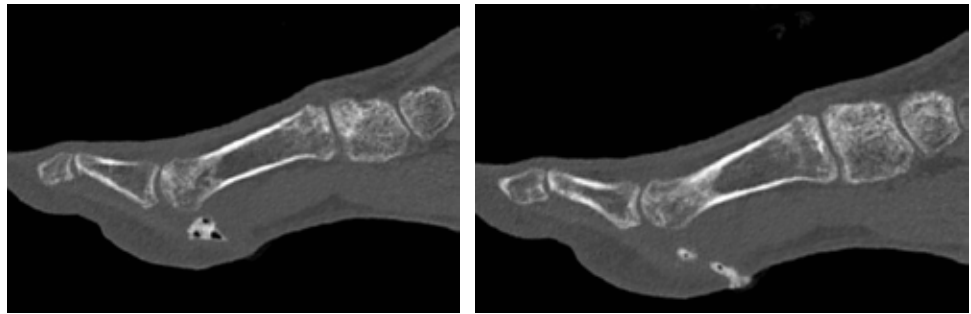


**Figure 1:**

Axial T1 and axial T2 fast spin-echo with fat saturation images show a transverse line through the medial sesamoid. The findings are compatible with medial hallux sesamoid fracture as well as bipartite sesamoid condition. The signal intensity changes represent joint effusion.

**Figure 2:**

Fistulogram showing a 1-2 cm fistulous tract extending from the plantar, medial, and proximal aspects of the hallux towards the medial sesamoid without communication to other structures. Small quantities of air in the form of bubbles were also found within the fistulous tract.

**Figure 3:**

Due to the sesamoid infection, surgical intervention was performed, involving a plantar approach following the fistulous tract along with a medial approach. Deep culture specimens were taken, and surgical debridement was performed until achieving an appropriate wound bed with vitalized tissue and adequate bleeding.

predominantly plantar vascularization<sup>1,8,9</sup> sesamoiditis, and acute or chronic infections (osteomyelitis), the latter being very infrequent.<sup>1,10</sup> The term sesamoiditis encompasses numerous conditions affecting sesamoids, including osteonecrosis, chondromalacia or mechanical overload.<sup>9</sup> Initial treatment involves conservative management based on analgesia with anti-inflammatory drugs and forefoot off-loading.<sup>1</sup>

Osteomyelitis of sesamoids occurs with the same incidence in both medial and lateral sesamoids, and it is a rare condition with only a few case reports in the literature.<sup>10,11</sup> It has two well-defined etiologies: hematogenous spread –the most common– and direct inoculation, either from a penetrating wound or adjacent local tissue infection. The main causative agent in paediatric and adolescent patients is *Staphylococcus aureus*<sup>10,12</sup> whilst *Pseudomonas aeruginosa*, an opportunistic pathogen, often affects immunocompromised patients e.g., those with a history of diabetes mellitus (DM).<sup>11</sup> The onset of the condition is typically subtle, with mild pain and swelling in the area, hence conservative management with antibiotics, immobilization, and off-loading is frequently the initial treatment. However, up to 83% ultimately require surgery to prevent infection progression.<sup>10</sup>

SA in the foot joints is extremely rare, accounting for 3-7% of SA cases.<sup>13</sup> The tibiotalar joint and the first MTP are the most affected.<sup>14</sup> Treatment should be based on prolonged antibiotic therapy,<sup>15,16</sup> as soon as specimens for bacterial culture are obtained, besides surgical lavage and aggressive debridement.<sup>17,18,19</sup> Open or arthroscopic approaches can be

used for lavage in order to evacuate purulent material.<sup>15</sup> In the case of an open approach, the choice depends on the affected sesamoid, taking into consideration skin tension lines as well as proper visualization of both anatomical structures, the sesamoid itself and the tendon of the short flexor of the hallux. The most commonly used approach for the medial sesamoid is the plantar-medial, in which the medial plantar nerve is mobilized along with the skin flap; while for the lateral sesamoid, a longitudinal plantar approach is employed.<sup>5</sup>

Whenever possible, preservation of the hallucal sesamoids or partial resection should be attempted due to the significant comorbidities associated with their excision.<sup>5,20,21,22</sup> These include hallux valgus, hallux varus, claw toes, stiffness, transfer metatarsalgia and neuromas.<sup>20,23,24,25</sup>

In our case report, the subtle onset of SA of the first MTP in a previously healthy patient besides the low incidence of infections in the forefoot, increased substantially the diagnostic challenge. However, further evaluation including laboratory studies, bacterial cultures and imaging tests, led to the final diagnosis. Once diagnosis was established, aggressive surgical debridement along with targeted antibiotic therapy were essential to achieve an adequate outcome. To date, patient has remained without infection and pathologic conditions of the hallucal sesamoid complex.

## Conclusion

Acute infection of the first MTP joint and sesamoid bones are an extremely rare condition with scarce literature

describing it. Osteomyelitis in this location, although also infrequent, can be associated with direct trauma or hematogenous dissemination, especially in the paediatric and adolescent population. While the clinical presentation may initially be subtle, clinical suspicion and etiological diagnosis are crucial for initiating optimal treatment promptly. Targeted antibiotic therapy, combined with surgical debridement, achieves remission in up to 83% of cases. In cases of chronic infection, partial or complete sesamoidectomy should be considered to ensure complete healing.

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