Osteonecrosis of the Sesamoid Bones: Two Case Reports

Sesamoid Kemik Osteonekrozu: İki Olgu Sunumu

Osteonecrosis of Sesamoid Bone

Ayhan Aşkın[1], Ece Güvendi[2], Aliye Tosun[1], Özgür Tosun[3]
[1]Department of Physical Medicine and Rehabilitation, Katip Çelebi University, Faculty of Medicine, Izmir,
[2]Physical Medicine and Rehabilitation Clinic, Dumlupınar University Evliya Çelebi Training and Research Hospital, Kütahya,
[3]Department of Radiology, Katip Çelebi University, Faculty of Medicine, Izmir, Turkey

Özet

Sesamoid kemik osteonekrozu, metatarsaljinin nadir bir nedenidir ve tanı konulması zor olabilir. Hastalık, klasik olarak, ayak travma öyküsü olan kadın hastalarda bildirilmektedir. En sık şikayet, ağrıdır. Ağrı, 1. metatarsal kemik üzerine ağırlık verildiğinde, yürüme siklusunun son fazında, halluks ekstansiyonu ile ortaya çıkar. Erken tanıda en faydalı inceleme yöntemi, osteonekrotik sürecin izlenebildiği manyetik rezonans görüntüleme (MRG)'dir. Öncelikli tedavi seçeneği, konservatif yaklaşım olmalıdır. Konservatif tedavilerin, yetersiz kaldığı durumlarda cerrahi tedavi düşünülebilir. Burada başarı ile tedavi ettiğimiz iki olguyu sunmayı amaçladık.

Anahtar Kelimeler

Sesamoid; Metatarsal Ağrı; Osteonekroz

Abstract

Osteonecrosis of the sesamoid bones is an uncommon cause of metatarsalgia and may be difficult to diagnose. The disease is classically reported in female patients with a history of foot trauma. The most frequent complaint is pain. Pain occurs with the extension of the hallux in the final phase of the gait cycle when weight is given on the first metatarsal bone. The most useful examination method in early diagnosis is MRI by which the osteonecrotic process can be monitored. The first treatment option should be a conservative approach. Where conservative treatments prove insufficient, surgical treatment can be considered. In this study, we aimed to present two cases we have successfully treated.

Keywords

Sesamoid; Metatarsal Pain; Osteonecrosis

DOI: 10.4328/JCAM.5051 Received: 30.04.2017 Accepted: 17.05.2017 Printed: 01.06.2017 J Clin Anal Med 2017;8(suppl 3): 209-12
Corresponding Author: Ayhan Aşkın, Department of Physical Medicine and Rehabilitation, Katip Celebi Uni. Ataturk Training and Research Hospital, Izmir, Turkey.
T.: +90 2322444444 F.: +90 2322431530 E-Mail: ayhanaskin@hotmail.com

Introduction

Metatarsalgia is a common complaint, frequently encountered in daily practice. Sesamoid bone pathologies are among the causes of metatarsalgia, but are rarely diagnosed [1]. They are small and may seem functionally unimportant, but their pathologies may result in severe pain and dysfunctions as they contribute to the weight-bearing function of the foot and the big toe [2]. These painful conditions may exhibit an acute post-traumatic or insidious onset and may be due to arthritis, infection, or ischemia [3,4]. Physical examination and imaging methods are useful in differential diagnosis. In this case report, our aim was to share our experience with two patients who applied with complaints of metatarsal pain and were diagnosed with osteonecrosis of the sesamoid bone and to review the literature as well.

Case Report 1

A thirty-year-old female patient was admitted to our outpatient clinic with mechanical pain on the plantar face of the right toe that had increased for 10 days. She stated that the pain was worse when weight was given on the big toe and did not decrease with rest. The patient found it hard to step on the right foot due to pain. She did not describe recent trauma. She did not have any additional characteristics in her medical history except a job that required standing for a long time during the day.

In physical examination, the passive and active range of motions of the first metatarsophalangeal (MTF) joint were normal but painful. There was no color change or swelling. The first metatarsal region was oversensitive in palpation. No sensory or motor deficit was found. Laboratory examination was normal. Upon detection of a heterogeneous image consistent with sesamoid bone localization in lateral and anterior-posterior roentgenograms of the foot, a computed tomography (CT) examination was conducted. Osteonecrosis in the medial sesamoid bone were detected (Figure 1). In subsequent magnetic resonance imaging (MRI), signal changes consistent with osteonecrosis were found (Figure 2).

Upon diagnosis of osteonecrosis, a right short-leg cast was applied. A treatment regimen including naproxen 750mg/day (10 days) and vitamin C 500mg/day (50 days) was started. Contrast bath therapy for the foot and ankle region, transcutaneous electrical nerve stimulation (TENS) (20 min/day), and exercises (range of motion exercises, progressive resistance exercises, balance coordination exercises) were added to the treatment regimen of the patient whose complaints diminished after twenty days of casting. The patient did not have any complaints after 2 months of follow-up.

Case Report 2

A thirty-two-year old female patient admitted to our outpatient clinic for pain in the right sole that had lasted for about one month. Pain significantly increased in the course of each day and was partially relieved with rest. The patient was hardly stepping on the right foot. Three months previously, she had suffered a right ankle anterior talofibular ligament injury due to an inversion sprain when walking, and had received rehabilitation for 3 months. She was evaluated two times by different



Figure 1. Reduced dimension, fragmentation, and increased sclerosis consistent with osteonecrosis are shown in the medial sesamoid bone in sagittal reformatted computed tomography image.



Figure 2. Decreased dimension and signal consistent with osteonecrosis are observed in the medial sesamoid bone (white arrow) in T1-weighted magnetic resonance imaging performed in sagittal (a) and coronal (b) planes. Lateral sesamoid bone (b) is of normal size and normal signal intensity (hollow arrow).



Figure 3. Decreased dimension and signal consistent are observed in the medial sesamoid bone in T1-weighted sequence (a) performed in the sagittal plane in magnetic resonance imaging (white arrow). Occasional hyperintense signals are observed in the osteonecrotic sesamoid bone in STIR sequence (b).

physicians, and took various medications for plantar fasciitis.

In her physical examination, extension of the right MTF joint was significantly limited and painful. The plantar surface of the joint was oversensitive to pressure. There was no increased temperature or swelling. The patient needed to step on the outer surface of the right foot due to pain while walking and had difficulty when walking uphill. Laboratory examinations and direct roentgenogram were normal. In CT examination of the foot performed due to potential fracture, fragmentation and increased sclerosis were detected in the medial sesamoid bone. In the subsequent MRI examination, decreased size and signal were observed in the medial sesamoid bone consistent with osteonecrosis (Figure 3).

The patient was diagnosed with osteonecrosis of the medial sesamoid bone and recommended treatment was meloxicam 15 mg/day, rest, orthopedic insole to prevent weight transfer to the metatarsal region, and contrast bath therapy. The patient's pain had significantly eased by the time of the control examination performed 1 month later and she was admitted to outpatient follow-up.

Discussion

The hallucal sesamoid complex is comprised of medial (tibial) and lateral (fibular) hallux sesamoids. These are functionally important structures. This complex absorbs a great portion of the weight in gait and supports plantar flexion force of the first MTF joint [5, 6].

One of the vascular sources in the circulation of sesamoid bones enters the bone from the proximal end of the insertion of the flexor hallucis brevis tendon and the other enters the bone through the plantar surface of both sesamoids. Another minor source reaches the bone from the distal plantar surface of both sesamoids. Hence, the distal ends of sesamoids have poor circulation support, and the number of these arterial branches affects both bone recovery and avascular necrosis incidence [3, 6]. The lateral sesamoid bone may shift to the first space during the weight-bearing stage and is exposed to less pressure. Thus some publications report that avascular necrosis appears more frequently in the medial sesamoid, while other resources argue that medial and lateral sesamoids are equally affected [3,7]. In both of our patients, there was medial sesamoid involvement.

Foot pathologies associated with sesamoids account for 9% of foot and ankle injuries [7]. Young adults, like the patients described in our case reports, and women are more frequently affected. The contributing factors are generally structural foot defects such as pes cavus and hallux valgus that increase micro trauma risk, and sports activities [8,9]. Repetitive stress, presence of cavus deformity, and exposure to excessive plantar flexion are also listed among the causes of sesamoid injury and avascular necrosis [3]. Post-traumatic sesamoid bone fracture is also a cause of osteonecrosis [10]. It is suggested that, in non-traumatic cases, spontaneous osteonecrosis develops secondary to microvascular events where arterial anastomoses are insufficient or arterial support is deformed [8]. Our second case had a history of trauma, but our first case was consistent with spontaneous non-traumatic osteonecrosis.

The most frequent symptom is pain. Pain occurs with the extension of the hallux in the final phase of the gait cycle when weight is given on the first metatarsal bone. It may have a sudden or insidious onset, and it may become chronic or intermittent. Supination may occur when walking. Pressure on the sesamoid bone, forced plantar, or dorsal flexion of the first toe may result in pain. Inflammatory findings may be noted in the region around the first MTF joint [3,7,10]. In both of our cases, pain was a major complaint as described in the literature.

In imaging studies, roentgenograms should be performed initially [11]. No pathological findings are noted in direct roentgenograms in the acute phase. In serial roentgenograms, radiological changes such as heterogeneous striated sclerosis between 6-12 months, flattening of the sesamoid bone, and demineralization may occur [3,10]. CT is useful as it shows heterogeneous bone structure and abnormal shape and fragmentation. These changes may be noted at the onset of the necrotic process [11]. Scintigraphic studies are useful in diagnosis as increased radionuclide uptake occurs at an earlier phase compared to radiological changes [10]. It should, however, be noted that there may be decreased uptake or no uptake in the early phase [8]. In our patients, findings likely to be consistent with osteonecrosis were detected in CT performed in order to rule out fracture, and definitive diagnosis was made with MRI. The most useful examination method in early diagnosis is MRI because the osteonecrotic process can be monitored [8]. It is also useful in distinguishing other lesions, such as arthritis, chondromalacia, osteochondritis, and stress fracture that might be caused by chronic stress on the hallux sesamoids [12]. Ultrasonography may be helpful for distinguishing pathologies like Morton's neuroma and intermetatarsal bursitis that may cause front leg pain [13]. Diagnostic local anesthetic injections to the MTF joint may be recommended to differentiate intraarticular and extraarticular pathologies. However, this method may prove insufficient in differentiating intrinsic sesamoid pathologies and adjacent soft tissue pathologies like tendinopathies [14].

The basic treatment approach is to reduce the weight on the foot and to use metatarsal or sesamoid pads and arch supports beneath the metatarsal head to relieve the pressure in the regions under pressure. Anti-inflammatory treatments like nonsteroidal anti-inflammatory drugs (NSAIDs), hydrotherapy, cold, ultrasound, and local injections are also useful. In severely symptomatic patients, continuous use of orthosis or a cast may be considered, as we recommended to our first patient [3,10]. Surgical treatment includes partial or total sesamoidectomies. In cases when careful surgical technique is used, deformities after excision of isolated sesamoids are not frequently noted, but when both sesamoids are excised, mechanic advantages of the flexor hallucis brevis muscle may be reduced, and big toe deformities may occur. To reduce complication risk, it is recommended that surgery should be the preferred treatment only when all conservative treatments are unsuccessful; load-bearing mechanism of the first MTF joint should be preserved to the extent possible [3,5].

In conclusion, sesamoid avascular necrosis is a diagnosis that should be considered in patients who apply with persistent foot pain. In differential diagnosis, serial direct roentgenograms, bone scintigraphy, CT, and MRI are useful in addition to patient history and physical examination. Where conservative treatments prove insufficient, surgical treatment can be considered.

Competing interests

The authors declare that they have no competing interests.

References

1. Keating S, Fisher D, Keating D. Avascular necrosis of an accessory sesamoid of the foot. A case report. J Am Podiatr Med Assoc 1987;77:612-5.
2. Richardson EG. Hallucal sesamoid pain: Causes and surgical treatment. J Am Acad Orthop Surg 1999;7:270-8.
3. Fleischli J, Cheleuitte E. Avascular necrosis of the hallucial sesamoids. J Foot Ankle Surg 1995;34:358-65.
4. Terzi R, Özer T, Güler T. Ayak Ağrısının Gözden Kaçan Bir Nedeni: Tibial Sesamoid Fraktürü. Turk J Osteoporos 2016;22:62-4.
5. Garrido IM, Bosch MN, González MS, Carsí VV. Osteochondritis of the hallux sesamoid bones. Foot Ankle Surg 2008;14:175-9.
6. Anwar R, Anjum SN, Nicholl JE. Sesamoids of the foot. Current Orthopaedics 2005;19:40–8.
7. Boike A, Schnirring-Judge M, McMillin S. Sesamoid disorders of the first metatarsophalangeal joint. Clin Podiatr Med Surg 2011;28:269-85.
8. Williams G, Kenyon P, Fischer B, Platt S. An atypical presentation of hallucial sesamoid avascular necrosis: A case report. J Foot Ankle Surg 2009;48:203-7.
9. Julsrud ME. Osteonecrosis of the tibial and fibular sesamoids in an aerobics instructor. J Foot Ankle Surg 1997;36:31-5.
10. Toussirot E, Jeunet L, Michel F, Kantelip B, Wendling D. Avascular necrosis of the hallucal sesamoids update with reference to two case-reports. Joint Bone Spine 2003;70:307-9.
11. Taylor JA, Sartoris DJ, Huang GS, Resnick DL. Painful conditions affecting the first metatarsal sesamoid bones. Radiographics 1993;13:817-30.
12. Mellado JM, Ramos A, Salvadó E, Camins A, Danús M, Saurí A. Accessory ossicles and sesamoid bones of the ankle and foot: Imaging findings, clinical significance and differential diagnosis. Eur Radiol 2003;13:164-77.
13. Nouh MR, Khalil AA. Forefoot: A basic integrated imaging perspective for radiologists. Clin Imaging 2014;38:397-409.
14. Pinto R, Freitas D, Massada M, Gonçalves I, Muras J. Hallux sesamoid osteonecrosis associated to ballet. Rev Port Ortop Traum 2010;18:429-37

How to cite this article:
Aşkın A, Güvendi E, Tosun A, Tosun Ö. Osteonecrosis of the Sesamoid Bones: Two Case Reports. J Clin Anal Med 2017;8(suppl 3): 209-12.