

Summary

Sesamoid injuries in the sporting population can cause long-term disability. Fractures can be acute, stress, or chronic non-unions. The medial sesamoid is most commonly affected. Clinical examination and imaging will confirm the diagnosis and identify the site, fracture gap and development of complications such as non-union, fragmentation, osteoarthritis and necrosis. There is little information upon conservative management although, with an early diagnosis, prompt immobilisation is an appropriate initial step. Surgical options include stabilisation with or without grafting. The alternative is sesamoidectomy. Consideration should be given to addressing pre-disposing factors.

Keywords

Sesamoids – bipartite – fracture – surgery

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Sesamoid-Frakturen beim Athleten. Diagnose und Behandlung

Zusammenfassung

Verletzungen der Sesamoide können beim Sportler zu einer langzeitigen Funktionseinschränkung führen. Frakturen können Folgen einer akuten Verletzung, einer Stressbelastung oder chronischen Nonunion sein. Meistens ist das tibiale (mediale) Sesamoid betroffen. Sorgfältige klinische Untersuchung und gezielte Bilddiagnostik erlauben eine genaue Diagnosestellung und Beurteilung des Verletzungsortes, Breite des Frakturspaltes und mögliche Komplikationsmöglichkeiten wie fehlende Ausheilung, Fragmentierung, Arthrose und Nekrose. In der Literatur gibt es nur wenige Berichte über die konservative Behandlung; wird die Diagnose frühzeitig gestellt, dürfte sie aber eine ideale primäre Behandlungsmöglichkeit sein, wobei die Immobilisation im Vordergrund steht. Die operativen Behandlungsmöglichkeiten schließen die Osteosynthese mit oder

REVIEW

Hallucal Sesamoid Fractures in Athletes: Diagnosis and Treatment

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Introduction

Hallucal sesamoid pathology can be disabling and the cause of long-term pain. Although the sesamoids are subject to a range of disorders, fractures are a particular difficulty in terms of clinical management. Unusually the patient may present following acute injury but the usual scenario is for the insidious development of a stress fracture, which may have become a chronic non-union by the time of presentation. There is a paucity of literature relating to treatment and outcomes. The popular media often refer to the lack of medical knowledge in this area and a number of elite athletes have simply managed such fractures symptomatically during their sporting careers.

Materials and methods

This review article has been prepared following a thorough review of the literature using the MEDLINE/OVID database. Keywords including “Sesamoids”; “Bipartite”; “Fracture”; “Treatment”; “Surgery”; “Conservative”; “Imaging” were used in mixed combinations. This was

supplemented by manual searches of the bibliography of the key papers and the authors own clinical experience and contributions to the literature.

Anatomy

Sesamoids are bones embedded within tendons which act as pulleys to increase the mechanical advantage of the musculotendinous unit and hence forces generated. The hallucal sesamoids are located on the plantar aspect of the first metatarsal and enclosed in slips of the flexor hallucis brevis tendon (FHB).

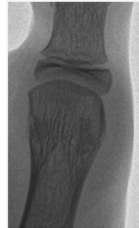
The arterial blood supply to the sesamoids is variable and the number of vessels entering each sesamoid varies between one (55%) and three (10%) [36]. The distal poles have the most precarious supply and has implications for healing following injury. Vessels are derived from three sources: sesamoid arteries entering from the proximal aspect usually via a single vessel; plantar, non-articular vessels entering the sesamoids; and small vessels entering through medial and lateral capsular attachments [12,37].

ohne Anlagerung von Knochenspongiosa ein. Die Alternative ist die Sesamoidektomie. Prädisponierende Begleitfaktoren wie Bewegungsstörungen und Fehlstellungen des ersten Strahles und kontrakter Triceps surae sollten dabei auch adressiert werden.

Schlüsselwörter

Sesamoide– Bipartita– Frakturen– Operative Behandlung

a. Sesamoid appearance in 8 year old
– both sesamoids beginning to ossify



b. Sesamoid appearance in 14 year old (same patient)
– both sesamoids fully developed



Figure 1
X-rays of developing sesamoids (left hallux).

Ossification of the sesamoids

The hallux sesamoids ossify at around 6–7 years old (Fig. 1). Often they form from multiple sites leading to partitioned sesamoids. Although the most common presentation is of a bipartite sesamoid, the number of ossicles and morphology of the resulting sesamoid can be variable and been described previously in the literature [24]. It is estimated that 7–30% of people possess bipartite sesamoids and 90% involve the tibial (medial) sesamoid. 80–90% of bipartite sesamoids are bilateral [21]. The fact that most patients with a bipartite sesamoid cannot remember an acute event in the past and that they are asymptomatic supports the assumption of an ossification disorder in the majority of cases. However, the frequency whereby an acute traumatic episode or chronic stress changes can lead to a bipartite sesamoid remains unclear.

Sesamoid function

Considerable forces are experienced by the first metatarsophalangeal complex (1st MTPJ), including the sesamoids, during activity. Up to 800% of body weight may be

experienced during high-loading jumps [44,31].

The hallux sesamoids have a number of functions:

- Increases the mechanical advantage of the FHB by increasing the moment arm of FHB from the MTPJ centre of rotation.
- Stabilises the 1st ray as part of the wider sesamoid complex.
- Protects 1st MTP plantar articular cartilage.
- Reduces friction of 1st MT head and acts as a platform to the joint floor as the 1st metatarsal head rolls and glides over the plantar plate.
- Distributes weight-bearing of 1st ray as the body force moves forward over the medial column.
- Protects the Flexor Hallucis Longus (FHL) tendon.
- Augments the Windlass Mechanism as part of the Plantar Aponeurosis-Plantar Plate continuum.

Which hallux sesamoid is most likely to fracture?

The authors reviewed 176 sesamoid fractures described in the literature [1,2,7–11,13,14,17,23,30,34,38,39,45]. 77% involved the tibial sesamoid and 23% the fibular sesamoid.

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