

Case report

GREAT TOE PAIN IN A COMPETITIVE TENNIS ATHLETE

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Received: 29 August 2003 / Accepted: 03 November 2003 / Published (online): 01 December 2003

ABSTRACT

As a variably occurring sesamoid, the hallucal interphalangeal sesamoid can significantly alter the biomechanics of the great toe. With modifications to the way the great toe functions, there are pathologies that inevitably arise. These pathologies can be quite serious and debilitating. While clinicians may take a conservative approach to treatment and focus on alleviating the symptoms, the physically active patient who desires to return to competitive participation may benefit most by having the source of the pathology removed altogether. The following is a report of an athlete who returned to competition six weeks after surgical excision of the anomalous hallucal interphalangeal sesamoid.

KEY WORDS: Hallucal interphalangeal sesamoid, toe injury, subhallux sesamoid

INTRODUCTION

Along with the metatarsophalangeal sesamoids, there are other irregularly occurring ossicles that have been identified within the foot. Included among these various inconsistent bones is the hallucal interphalangeal sesamoid. Although seemingly benign, the presence of an interphalangeal sesamoid can often result in changes to the biomechanical function of the interphalangeal and metatarsophalangeal joints of the great toe (Roukis and Hurless, 1996). Associated with these biomechanical changes are several, potentially debilitating clinical pathologies that range from the relatively minor, yet painful, hyperkeratotic plantar lesion to the rare irreducible interphalangeal joint dislocation (Leung and Wong, 2002). Treatment for this condition will typically depend on the level of activity that the patient desires to return to. The following is a report of a tennis player who was able to return to participation six weeks after surgical excision of this aberrant osseous structure.

CASE REPORT

History

A 19-year-old male collegiate tennis player complained of right great toe pain one month into

the fall tennis season. The athlete specified that he had felt similar pain and discomfort five to six months earlier. At that time he was diagnosed with metatarsophalangeal sesamoiditis and was required to discontinue all physical activities and undergo rehabilitation. While it was documented in his pre-season physical that he had been diagnosed with metatarsophalangeal sesamoiditis, when this athlete reported for the fall tennis season he was free of all symptoms and was thus permitted to resume all sport-related activities. Unfortunately, several weeks into the new tennis season, the athlete again began feeling severe pain localized to the plantar surface of the great toe. As with the previous episode, the pain was so intense that the athlete was no longer able to participate in his sport.

Physical Exam

The patient presented with an antalgic gait that was acquired secondary to his pain. Physical examination revealed extreme tenderness with palpation of the plantar surface of the proximal phalanx and discomfort with palpation of the interphalangeal joint. Active and passive range of motion measurements were symmetrical with the normal contralateral foot. Resisted great toe flexion caused pain at the plantar aspect of the joint. Additionally, a large callus was located near the painful area.

Imaging Studies and Diagnosis

Plain radiographs revealed (albeit faintly) a small bone-like fragment below the head of the proximal phalanx of the great toe near the interphalangeal joint. An MRI scan confirmed the presence of a hallucal interphalangeal sesamoid (Figure 1), as well as inflammation of the flexor hallucis longus tendon.

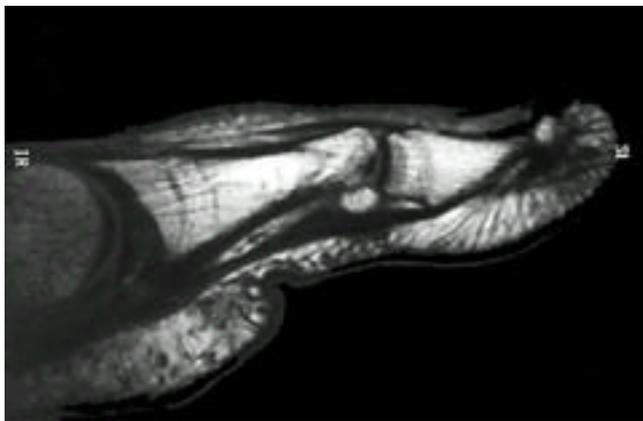


Figure 1. MRI scan revealed a hallucal interphalangeal sesamoid below the head of proximal phalanx.

Treatment

A cortisone injection coupled with reduced playing time, orthotics and modified footwear all failed to relieve the symptoms. Given the athlete's strong desire to resume activity, and the expected intensity of competition for this athlete, surgical intervention was indicated. Operative treatment consisted of removal of the hallucal interphalangeal sesamoid and debridement of the surrounding scarred soft-tissue.

In order to allow the inflammation and pain associated with surgery to subside, a gradual return to activity was advised. Postoperatively, the athlete was required to remain non-weight bearing for at least one week. Elevation of the involved extremity was encouraged and several days after the surgical procedure the athlete was required to perform ankle pumps to assist with fluid (swelling) uptake. After a week of non-weight bearing, the stitches were removed and the athlete was placed into a postoperative, hard-soled shoe for an additional two weeks. During this time, the athlete progressed from partial weight bearing to full weight bearing. As the athlete progressed to full weight bearing, the rehabilitation program was modified to include exercises designed to help regain range of motion of the great toe and improve strength of both the intrinsic and extrinsic muscles of the foot. Some of the activities used to improve range of motion and increase toe/foot/ankle strength included towel curls, marble pick-up, isometric contractions and Theraband exercises. Once the athlete achieved full

range of motion and was able to wear athletic shoes, the focus of the rehabilitation protocol was revised to include gait training and activities that served to restore proprioception. To improve proprioception, the athlete performed numerous balance-training activities including balancing on a wobble board and balancing on a trampoline while a ball was repeatedly tossed back and forth to the athlete. When walking was pain-free, the athlete progressed to slow, controlled running on a treadmill, which then progressed to running on grass and finally to running on the hard surface of a tennis court. Once the athlete was able to run on the surface of a tennis court, agility drills and sport-specific activities were incorporated into the rehabilitation protocol.

Additionally, throughout the rehabilitation process, the athlete worked diligently to maintain cardiovascular fitness. During those times of non-weight bearing and partial weight bearing, the athlete rode a stationary bike and pedaled an upper body ergometer.

The athlete gradually returned to match play (doubles tennis) about 6 weeks after his surgery when it was deemed that he was pain free, had full motion and functional strength with the injured toe/foot, and was able to complete sport-specific activities. Although there was some mild swelling near the interphalangeal joint after each competition, and the athlete complained of some residual pain with activity, he was able to complete the remainder of the tennis season. Eight months post-operatively the athlete reported being completely asymptomatic and planned on playing in the upcoming season.

DISCUSSION

As with other irregularly occurring sesamoids, the hallucal interphalangeal sesamoid has been sparsely chronicled in the medical literature. This paucity of literature and the lack of awareness or the lack of knowledge that it yields have surely contributed to missed or delayed diagnoses. Confounding the diagnosis of this medical condition even further is the fact that tissue differentiation of this particular sesamoid is markedly inconsistent. That is, the hallucal interphalangeal sesamoid may be entirely ossified in some individuals, while in others, the structure may be no more than a nodule of loosely packed fibrocartilage that is almost indistinguishable from the surrounding soft tissues (Roukis and Hurless, 1996). Studies that were completed many years ago to establish the frequency of the hallucal interphalangeal sesamoid have already indicated that verifying the presence of this so-called bony irregularity via radiographs can be problematic (Bizzarro, 1921; Masaki, 1984; Valinsky et al., 1989; Yanklowitz and Jaworek, 1989). In general,

radiographic investigations have consistently revealed a slightly lower incidence of the interphalangeal sesamoid as compared with macroscopic or anatomical investigations. Specifically, the aforementioned studies have revealed the radiographic incidence of the hallucal interphalangeal sesamoid as ranging between 4.3 - 93.0%, whereas the macroscopic frequency has been described as ranging between 50.6 - 95.5% (Bizzarro, 1921; Masaki, 1984; Valinsky et al., 1989; Yanklowitz and Jaworek, 1989). It is best, therefore, that the diagnosis (or differential diagnosis) of this condition not be rooted solely on the findings of plain radiographs. Instead, physicians should rely on their clinical experience and assessment skills.

As might be expected, the presence of a hallucal interphalangeal sesamoid results in alterations to the biomechanics of the great toe. It is believed that an interphalangeal sesamoid leads to a decrease in the range of motion available at the first metatarsophalangeal joint and limits closed kinetic chain plantar flexion of the first metatarsal (Roukis and Hurless, 1996). With restricted plantar flexion of the first metatarsal, the hallux loses some of its ability to dorsiflex (Root et al., 1977). Consequently, the interphalangeal joint of the hallux will hyperextend to compensate for the decreased range of motion at the first metatarsophalangeal joint (Root et al., 1977; Valinsky et al., 1989). In addition, as a result of these biomechanical changes, there is an increase in pressure exerted in the area located beneath the interphalangeal joint (Root et al., 1977). In many cases, this change in pressure gives rise to the formation of a painful hyperkeratotic lesion on the plantar aspect of the foot (Valinsky et al., 1989). This particular response is so predictable that several authors have indicated that hyperextension of the interphalangeal joint in combination with the formation of a plantar hyperkeratotic lesion is essentially diagnostic of a hallucal interphalangeal sesamoid (Genakos, 1993; Roukis and Hurless, 1996; Valinsky et al., 1989).

Perhaps the most serious pathology that can result as a consequence of an interphalangeal sesamoid is an irreducible dislocated interphalangeal joint (Leung and Wong, 2002). Evidently, in the case of a dislocated interphalangeal joint, it is possible for the interphalangeal sesamoid to become interposed within the joint space, effectively blocking the reduction of that joint.

Treatment for a hallucal interphalangeal sesamoid will almost certainly depend on the philosophy of the attending physician and the activity level of the patient. One option is to be conservative and direct treatment towards alleviating the inflammation and relieving the pressure of the

hallucal interphalangeal sesamoid. Conservative treatment typically consists of rest, shaving of any hyperkeratotic lesion that may be present, and/or fitting of the patient with a pad just proximal to the tender area to avoid exerting excessive pressure in that region (Coughlin, 1993). In the case of unsuccessful conservative treatment, or in the case of a patient that either desires or needs to be active and/or mobile (as was the case with this tennis player), surgical excision may be a more appropriate treatment option. With the decision to proceed with sesamoidectomy, the physician must then choose the most appropriate surgical approach from a number that have been described in the literature. In general, removal provides permanent relief of symptoms. However, in view of the fact that there are other factors such as hallux limitus and hallux rigidus that may also be the cause of pathology at the hallucal interphalangeal joint, the treating physician must rule out all other etiologies before reaching a decision to perform a sesamoidectomy (Roukis and Hurless, 1996; Valinsky et al., 1989). Only in this way can the physician be assured of removing the source of pathology, and thus, of eliminating the symptomatology.

CONCLUSION

While the hallucal interphalangeal sesamoid may not always be found in the foot, when it is present, it can give rise to pathologies that are either relatively benign or to conditions that are quite serious. Although conservative treatment of this condition may offer the patient relief, there are times when surgical removal is truly the best remedy.

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