Open Reduction and Internal Screw Fixation with Calcaneal Bone Graft of Tibial Sesamoid Fracture of the Hallux

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ABSTRACT: The tibial sesamoid is an integral structure in the proper function of the first metatarsal phalangeal joint. Currently the most common treatment of a sesamoid fracture nonunion is total excision, but it has many shortcomings including the possible development of hallux valgus. We present an alternative method by reporting the results of a case using open reduction internal fixation and calcaneal autograft for the treatment of a nonunion tibial sesamoid fracture in an athlete.

PURPOSE: To present a case involving displaced nonunion fracture of tibial sesamoid treated with open reduction and internal screw fixation and the use of calcaneal autograft in a young athlete

CASE REPORT:16 year old female who presented to our clinic 4 months after suffering a turf toe injury of her right foot while playing competitive soccer. Patient was diagnosed with right foot tibial sesamoid fracture and was treated conservatively with below the knee casting and limited weight bearing. The fracture failed to heal at 4 months and patient continued to have pain and had to halt her sport. An MRI was ordered and the radiologist impression indicated a stress fracture or osteonecrosis of the right tibial sesamoid. On physical exam the patient was neuro-vascularly intact. She had pain with palpation of the tibial sesamoid and pain with plantarflexion of the first metarsalphalangeal joint. Radiographs obtained showed a transverse fracture line through the tibial sesamoid. The fibular sesamoid was intact.

PROCEDURE: Incision was made over the medial plantar aspect into the sesamoid fracture with care taken not to open the joint. Fracture fragment was debrided with curettes and fragments were re-approximated. Next, calcaneal autograft was obtained from the medial calcaneus using a 1/8th in Michele trephine needle and was packed into the fracture site. Then a 1.5mm titanium screw inserted distal medial to proximal lateral in standard lag fashion was used to stabilize fracture fragments.

RESULTS: Postoperatively patient was placed in non-weightbearing cast on her 1 week follow up visit. At 6 weeks post-op the patient was transitioned to weight bearing in a CAM boot and started physical therapy to improve 1st MTPJ range of motion. At 8 weeks the patient had improvement of pain and x-rays showed consolidation and position of hardware. Calcaneal bone graft site also healed uneventfully. The patient was allowed to transition to normal shoegear and return to her normal sporting activity. The patient had no recurrence of pain or hardware complications at 1 year follow-up.

FIGURE 1: AP view showing transverse fracture line of tibial sesamoid. Fibular sesamoid intact.

FIGURE 2: 8 weeks postoperative AP views showing intact 1.7mm titanium screw. Consolidation of fracture site.

DISCUSSION: The sesamoid complex is susceptible to fracture and other disorders because it transfers forces more than 3 times body weight during push-off. Initial treatment of nondisplaced or stress fracture of the sesamoid is conservative, however Approximately 30% of all sesamoid fractures eventually require surgery. The sequelae for partial or total excision of a hallucal sesamoid include concerns of the development of subsequent deformities such as hallux malleus, hallux valgus or varus and/or loss of hallux purchase.

Bichara and colleagues found a return to activity of 11.6 weeks and an incident of hallux valgus following sesamoidectomies in their cohort. Saxena in his study found a return to activity 7.5 weeks with sesamoidectomy however he too found incidents of hallux valgus with tibial sesamoid excision and hallux varus with fibular sesamoid excisions. Overall, 10-20% hallucal deviations have been reported following sesamoidectomy. Our patients were able to return to activity at 8 weeks while preserving the vital balance the sesamoid complex brings.

Although sesamoid excision is a viable option useful in alleviating painful nonunions of hallux sesamoid fractures, we believe preserving the functional anatomy will avoid possible long-term complications associated with sesamoid excisions. It is our opinion our technique of a compression screw and autograft is more desirable option, however, it should be noted future case series with long term follow will be needed to better identify the predictability of this procedure.

CONCLUSION: We presented a case that utilized open reduction and internal screw fixation and calcaneal autograft. We found our patient to have satisfactory results with shorter time to sport compared to what has been documented in literature with a sesamoidectomy. In addition to alleviating pain, the critical functional anatomy of the tibial sesamoid was preserved to avoid potential future complications. Future studies will be needed to evaluate the union rates and complications associated with this technique compared to partial or total excision for union fractures of hallux sesamoids.