

IPJ SESAMOIDS OF THE HALLUX

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Keratomas of the plantar aspect of the foot are a frequent problem encountered by the podiatric physician. While most lesions are adjacent to one of the lesser metatarsals or sesamoids beneath the first metatarsal bone, such lesions may also occur at the plantar aspect of the interphalangeal joint of the great toe. These lesions are not infrequently associated with an interphalangeal joint sesamoid bone. The sesamoid bone is readily identified both clinically and radiographically (Fig. 1, 2). Not uncommonly, this chronic lesion is associated with an extension deformity at the interphalangeal joint and/or limitation to dorsiflexion at the first metatarsophalangeal joint. When the lesion does not respond adequately to conservative treatment, surgical extirpation of the sesamoid bone may be necessary. This may be performed as an isolated procedure or in conjunction with procedures to correct for other first ray deformity. There are three basic approaches: medial, plantar, and dorsal. The purpose of this paper is to briefly review each of the techniques

with emphasis on the advantages and disadvantages of each.

TECHNIQUE 1: MEDIAL APPROACH

The most commonly employed approach is through a medial incisional approach. This incision should be centered equidistant from the dorsomedial and plantar medial aspects of the great toe to avoid damage to the neurovascular structures which run longitudinally on the dorsomedial and plantar medial quadrants. An approach which is too plantar may result in irritation to the medial proper digital nerve and produce symptoms similar to that of the Joplin's neuroma.



Fig. 1. Clinical picture depicting typical plantar lesions due to large accessory sesamoid bone.



Fig. 2. Dorsoplantar radiograph of the great toe showing a well-defined sesamoid bone at the interphalangeal joint.

The incision is carried down to the level of the periosteum and capsular tissues. After careful palpation, the periosteum and capsular tissues are incised in a linear manner. Subcapsular and subperiosteal dissection are then completed, reflecting tissues inferiorly, readily exposing the plantar vault of the interphalangeal joint and the sesamoid bone.

This accessory bone is commonly found lying within the joint capsule or flexor pad directly beneath the articular surfaces (Fig. 3). It may be embedded firmly within the superior aspect of the tendon itself. Surgical excision of the bone is then accomplished, utilizing a small surgical blade (#67 or #64 Beaver blade) (Fig. 4). Emphasis must be placed on avoiding accidental transection of the flexor hallucis longus tendon, which is readily visualized. Dissection is facilitat-

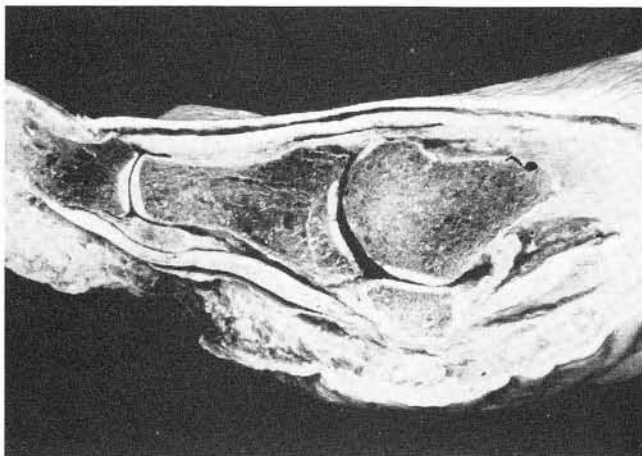


Fig. 3. Cross-section of a cadaver section showing interphalangeal joint bone superior to the flexor hallucis longus tendon and plantar to the joint itself.

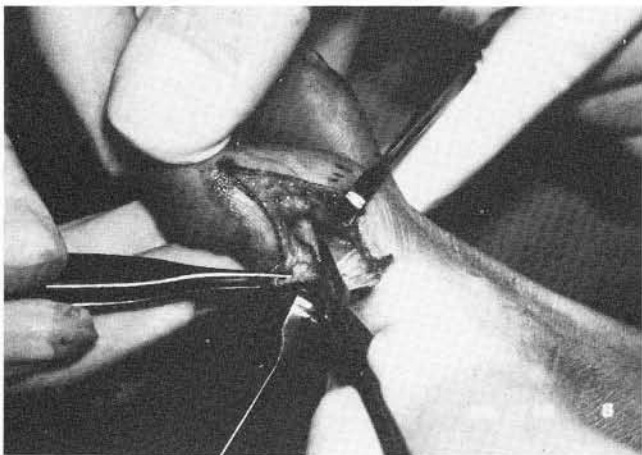


Fig. 4. Medial approach showing isolation of the sesamoid bone superior to the long flexor tendon.

ed by adequate exposure. The interphalangeal joint should be held in a slightly plantarflexed attitude and the tendon pulled inferiorly with the use of a small retractor such as a Ragnell or Senn. A Freer elevator may also prove beneficial in exploring the boundaries of the sesamoid bone. In some cases, there may be fibrous scar tissue surrounding the bone and the surgeon may elect to excise this as well.

The wound is then irrigated. After confirming that the long flexor tendon is intact, the medial capsular and periosteal tissues are reapproximated with a continuous running stitch of #3-0 synthetic absorbable suture of choice. The subcutaneous tissues are reapproximated with a running stitch of #4-0 synthetic absorbable suture and the skin with a nonabsorbable synthetic monofilament suture and method of choice.

TECHNIQUE 2: PLANTAR APPROACH

Although not frequently employed, the plantar incisional approach is also an excellent technique for removal of interphalangeal joint sesamoid bones. Although most surgeons avoid a plantar incision, this approach has proven to be a valuable technique which can produce a nonvisible, fine-line, non-painful scar when properly performed. A transverse incision is made directly within the most visible and obvious skin crease or fold determined by plantarflexion of the great toe. It is important that the incision is performed in a transverse manner following the plastic surgical principles of relaxed skin tension lines and skin creases. A longitudinal incisional approach on the plantar aspect of the great toe is not recommended and is likely to produce a painful scar contracture. If adequate exposure is not readily attained through the transverse incisional approach, the incision may be extended both distally and proximally at opposite ends. This will effectively create two flaps; one is reflected distally and the other proximally. Particular care must be taken to avoid damage to the plantar medial and plantar lateral neurovascular bundles, which may be encountered and will run adjacent to the longitudinal arms of the incision.

Dissection is carried down to the level of the flexor tendon, and the flaps are retracted proximally and distally. It is important to preserve attachments of the subcutaneous tissues to the

dermis to prevent skin necrosis or sloughing postoperatively.

Once the tendon and joint have been identified, the toe is moved through its range of motion and the sesamoid bone carefully palpated. The flexor hallucis longus tendon may be transected either transversely or, more commonly, split in a longitudinal manner. Either technique will provide excellent exposure and visualization of the sesamoid bone and allow its complete excision (Fig. 5).

The sesamoid bone is then meticulously excised *in toto*. If desired, the joint can be inspected from the plantar approach. Hypertrophic portions of bone from either the base of the distal phalanx or head of the proximal phalanx can be removed at this time and the bone remodeled with a small power burr.

The wound is irrigated with normal sterile saline. The long flexor tendon is then carefully reapproximated with #3-0 synthetic absorbable suture of choice. The flaps are then carefully repositioned and the subcutaneous tissues reapproximated with #4-0 synthetic absorbable suture. The skin is reapproximated with a series of sim-

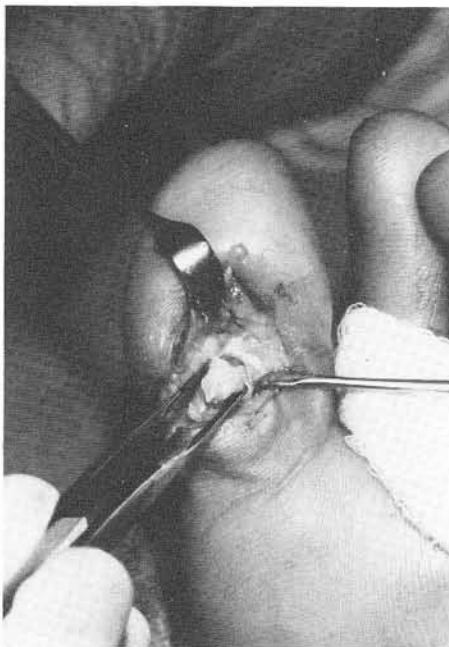


Fig. 5. Transverse incisional approach, plantar aspect of the interphalangeal joint with the flexor hallucis longus split in a longitudinal manner and retracted medially and laterally. This provides easy access to the large sesamoid bone.

ple interrupted sutures of #4-0 or #5-0 synthetic monofilament suture of choice.

TECHNIQUE 3: DORSAL APPROACH

The last technique is that of a dorsal skin incision approach. The incision can be performed in a variety of different fashions; longitudinal - centered over the interphalangeal joint, transverse - following the relaxed skin tension lines, or curvilinear - as described for the plantar approach (Fig. 6). Each of these approaches will provide adequate exposure of the entire interphalangeal joint similar to that of an arthroplasty or arthrodesis of the lesser digits. This approach is particularly advantageous in those individuals who have a severely painful lesion or a painful scar on the plantar aspect of the foot. Complete exposure of the sesamoid bone requires a transverse tenotomy and capsulotomy of the interphalangeal joint with release of both the medial and lateral collateral ligaments. The toe is then maximally plantarflexed, providing exposure to the superior aspect of the interphalangeal joint sesamoid bone. Its visualized surface will appear to have a cartilaginous cap similar to that of normal articular cartilage as it not infrequently articulates with the under side of the head of the proximal phalanx. Its appearance is similar to that of a sesamoid bone within the intrinsic musculature at the first metatarsophalangeal joint.

The sesamoid bone is excised utilizing a small blade (#64 or #67 Beaver blade). The sesamoid bone is "shelled out" utilizing meticu-



Fig. 6. A dorsal skin incision approach. The incision may be either longitudinal centered over the interphalangeal joint, or transverse, following the relaxed skin tension lines, or a curvilinear incision.

lous dissection technique. It is important to preserve integrity to the long flexor tendon. A set of small bone hooks may prove beneficial in pulling the distal phalanx plantarly and the proximal phalanx dorsally. After complete excision of the sesamoid bone, it is important to check for continuity of the long flexor tendon.

The wound is irrigated with normal sterile saline. At this time, the condyles of the proximal and distal phalanges are examined. Any hypertrophy or bony prominence may be removed and the remaining surfaces smoothed with a small power burr.

The wound is again irrigated with normal sterile saline. The toe is placed in its corrected position and the long extensor tendon reapproximated utilizing #3-0 synthetic absorbable suture by simple interrupted stitches or a horizontal mattress stitch. The subcutaneous tissues are then reapproximated with #4-0 synthetic absorbable suture of choice and the skin with either absorbable or nonabsorbable synthetic suture of choice. Most commonly, the author utilizes simple interrupted sutures unless a dorsal central longitudinal approach has been used, in which case a subcuticular or intradermal stitch is used.

A COMPARATIVE DISCUSSION

Each of the above approaches has advantages and disadvantages. Both the medial and plantar approaches produce scars which are generally not visible from a dorsal view and, therefore, are more cosmetically pleasing and acceptable to patients. While the author has found the medial incisional approach generally to be the simplest to execute, this ease is attributed to a greater familiarity and experience with the technique. Both the dorsal and plantar approaches have also proven extremely valuable and rather simple to perform. Perhaps, for many surgeons, fear is the greatest barrier which must be overcome.

The plantar approach offers the opportunity to excise any lesions which possess a central core or nucleus. In addition, removal of a semi-elliptical portion of skin may help correct for an extension deformity of the interphalangeal joint as well. Because the skin is quite thick on the plantar aspect of the great toe, it heals predictably well with minimal scar tissue.

Of the three, the dorsal incisional approaches (transverse, curvilinear or longitudinal) have proven to be the most challenging. In addition, it clearly requires complete transection of the dorsal, medial, and lateral capsular tissues and ligaments in order to allow complete plantar displacement of the distal phalanx and adequate exposure to the sesamoid bone. In cases where there has been a significant extension deformity at the interphalangeal joint, the extensor tendon is sutured in a lengthened attitude in order to discourage hyperextension postoperatively. The dorsal incisional approach is perhaps the most valuable when other procedures are being concomitantly performed on the proximal phalanx, the metatarsophalangeal joint or first metatarsal bone. This approach is also beneficial when simultaneous interphalangeal joint fusion is being performed.

Regardless of the surgical approach, if there is concern over stability of the interphalangeal joint following excision of the sesamoid bone and/or condylectomy, the joint may be stabilized temporarily with a 0.045, 0.054 or 0.062-inch Kirschner wire inserted utilizing the standard retrograde K-wire techniques. Stabilization of the great toe is also important when the long flexor tendon has been transected in a transverse manner.

SUMMARY

Painful lesions beneath the plantar aspect of the interphalangeal joint of the great toe are not an uncommon problem. They respond quite well to surgical removal of the accessory bone found to be lying superior or within the long flexor hallucis longus tendon. A variety of incisional approaches are available. Each carries with it potential advantages and disadvantages. Consideration should be given to the advantages and disadvantages of each of the approaches for any given patient. Finally, consideration should be given to other surgical procedures which may be necessary to correct other deformities present in the first ray (i.e., hallux extensus or hallux limitus). Failure to correct these deformities may result in a less than ideal surgical postoperative result.