

## IT'S JUST A FIFTH TOE

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Various deformities of the fifth toe are clumped into a diagnostic category of hammertoe. We are taught early on in our stages of surgical training that arthrodesis procedures are preferred for hammertoe repair of the central toes and arthroplasty for the fifth toe. For hammertoe repair of the third and fourth toes, decision-making is generally straightforward. The main decisions that need to be made are to include arthrodesis versus arthroplasty and whether or not to use any hardware. The second toe can be challenging if one is dealing with a dislocated toe, crossover toe, and/or other transverse plane deformity. Although the second toe and its challenges are not in the scope of this article, the point I am trying to make is that of the lateral 3 toes, the fifth toe is quite complicated and has many factors that one needs to assess prior to performing the textbook procedure -- an arthroplasty.

The main complaint associated with a hammertoe of the fifth toe is usually a painful hyperkeratotic lesion. These can occur in a periungual location, at the level of the proximal interphalangeal joint dorsally and/or dorsolaterally, the lateral side of the middle phalanx, and/or in the web space (Figures 1-4). The location of the lesion plays an integral role in selecting the procedure(s) that need to be accomplished in order to get a satisfactory outcome of reduced pain and lesion resolution.

Underestimating the complexity of the fifth toe is common. It may be due to the fact that we have all been

brainwashed with the formula: hammertoe fifth digit = arthroplasty. For the majority of the cases, the formula works. However, we are not in the business of getting a good result most of the time, it needs to be every time. Another common reason for lack of attention to detail on a fifth toe is because frequently the fifth toe surgery is a small part of a larger reconstruction case of the foot. The fifth toe is typically the last procedure that is done. For example, a patient needing a forefoot reconstruction receives an Austin bunionectomy, tailor's bunionectomy, and all the toes. Most foot surgeons would repair the bunions first, then the toes in the order of 2-5. The last thing that is done is the fifth toe, so there may be an element of physical and mental fatigue for a long case, as well as "it is just a fifth toe" mentality. Moreover, the fifth toe surgery may be an "oh by the way, while you are in there" surgery.

The common types of hammertoe deformities affecting the fifth toe include adductovarus deformity, claw toe, overlapping toe, and clindodactyly. Very few of these cases would do well with just a simple arthroplasty. When examining the fifth toe, as with all hammertoe deformities, it is important to assess for flexibility of the toe and where the contractures are located. In the fifth toe, there may be contractures at the metatarsophalangeal joint in addition to the interphalangeal joint(s).

From a surgical standpoint, we can address a number of anatomic structures to obtain correction of the



Figure 1. An interdigital corn is usually caused by bone irritation of the fifth proximal phalangeal head and the lateral base of the fourth proximal phalanx. In addition to performing an arthroplasty of the fifth PIPJ, additional procedures need to be done on the fourth toe to remove the lateral condyle of the fourth proximal phalangeal base and occasionally shave the lateral condyle of the metatarsal head.



Figure 2. Note the adductovarus deformity of the fifth toe. This patient has a dorsolateral corn.



Figure 3. Example of an overlapping fifth toe deformity. This deformity is the most difficult condition of the fifth toe to surgically correct and has elements of adductovarus deformity, sagittal plane deformity, and contractures of soft tissue including skin, capsule, and tendon. When correcting this deformity, one needs to lengthen the skin dorsally, remove redundant skin plantarly, lengthen the extensor tendon, release the dorsal MTPJ capsule, perform a PIPJ arthroplasty, and possibly perform a flexor to extensor tendon transfer. There are times when the surgery will need to be staged.



Figure 5. A plantar skin plasty is performed to augment dorsal skin lengthening by removing redundant plantar skin.

deformity. These structures include skin, tendon, capsule, and bone. Even though one may perform an arthroplasty to remove the bony prominence, there may need to be other adjunctive procedures in order to resolve the deformity of the toe. An arthroplasty alone typically cannot address other factors that are playing a role in pain and dysfunction of the toe.

The location of the hyperkeratotic lesion typically tells the story. For a lesion that is directly on the dorsal side of the proximal interphalangeal joint (PIPJ), this is associated with a sagittal plane deformity. Typically this is seen in patients with a high arch or with extensor substitution. When the lesion is on the dorsolateral side of the PIPJ, then there is



Figure 4. Clinical example of a lateral periungual hyperkeratosis (Lister's corn). When there is no other concomitant conditions affecting the toe, then a simple double semi-elliptical skin excision is made to remove the hyperkeratosis and underlying condyle.

an adductovarus or frontal plane deformity that needs to be addressed. If there is extension of the hyperkeratosis to the lateral side of the middle phalanx region, then additional bone work may need to be done to address the middle phalanx. Often, large spindle-shaped middle phalanges are the cause. In this case, a lateral hemiphalangectomy may need to be performed. Finally, if there is a periungual hyperkeratosis (Lister's) corn, there is typically an enlarged condyle of the base of the distal phalanx. More often than not, these patients have a more rigid toe due to the lack of DIPJ with synphalangism of the distal and middle phalanges. For simplicity sake, I will review the possible procedures that can be done with each target tissue to address a hammertoe deformity of the fifth toe.

**Skin:** The skin incision can be modified to derotate the digit or the skin can be lengthened to address long-standing contractures. In addition, plantar skin incisions can be made to remove redundant/excess skin. These techniques are referred to as skin plasty (Figure 5).

**Tendon:** A tendon can be cut, lengthened, or transferred.

**Capsule:** The capsule can be cut. The capsule can be modified/alterd, which is called capsulorrhaphy.

**Bone:** It is rare that a fifth toe is fused. One needs some flexibility in the toe to accommodate the intimate nature of the toe with the shoe. The notable exception would be in cases of patients with neuromuscular disease where the stability of an arthrodesis may be preferred. In most cases, some sort of arthroplasty will be done. In addition, hemiphalangectomies may be done in addition to a standard PIPJ arthroplasty or as a stand-alone procedure. In the case of a periungual hyperkeratosis (Lister's Corn), a simple condylectomy/exosectomy may additionally be done.

The most common mistake when evaluating a hammertoe of the fifth digit is not recognizing dorsal



Figure 6A. A 38-year-old female presented with pain on the dorsal aspect of the fifth toe. Preoperatively she has a dorsally elevated toe when the Kelikian push-up test is performed.



Figure 6B. She required an arthroplasty of the PIPJ with extensor tendon lengthening, dorsal MTPJ capsulotomy, and V-Y skin plasty to lengthen the skin contracture.



Figure 7A. A 60-year-old female presented with a painful corn on the dorsolateral aspect of the fifth toe. Note the sagittal and frontal plane deformities leading to the dorsolateral corn.

contracture and/or adductovarus position of the toe. It is important to perform a Kelikian push up test before, during, and after the procedure(s) to assess for complete resolution of these deformities. If not addressed, and a simple PIPJ arthroplasty is performed, there will likely be failure.

A dorsally elevated and rotated fifth toe can be a challenge to treat. When evaluating the fifth toe, I look at frontal plane rotation; degree of proximal interphalangeal joint contracture and most importantly whether or not the fifth toe is “riding high” with respect to the other lesser toes (Figures 6-8). Assuming that you are dealing with a typical PIPJ contracture hammertoe, the standard step-wise approach to the fifth toe should be as follows.

1. If there is a frontal plane deformity (i.e., adductovarus deformity), then skin plasty is performed to derotate the toe. If not, then use a linear mid-line incision over the PIPJ.
2. If the toe is riding high after the arthroplasty is done, then proceed to do a metatarsophalangeal joint (MTPJ) release by doing an extensor hood recession and dorsal MTPJ capsulotomy.
3. If the toe is still riding high, then proceed to extend your skin incision and convert it to a V-Y skin plasty.



Figure 7B. Note the correction of the sagittal and frontal plane deformities following an arthroplasty of the PIPJ, derotation of skin plasty and V-Y skin lengthening.

4. If the toe is still riding high, then consider a plantar wedge resection of skin to remove redundant plantar skin tissue.
5. If the toe is still riding high, then the very last maneuver is going to be a flexor to extensor tendon transfer, which I find is very rarely needed (with the exception of a congenital overlapping fifth toe).

In conclusion, a lot of decisions need to be made for additional surgical procedures that accompany an arthroplasty. In particular assess for sagittal and frontal plane deformities while the foot is loaded. Recheck the position after each surgical maneuver. We have all experienced a failure of the fifth hammertoe repair and this primer can help you avoid the common pitfalls of not addressing the soft tissue deformities that often get overlooked.





Figure 7C. With the foot loaded, the fifth toe is riding high. She required in addition to an arthroplasty of the PIPJ, a double skin plasty (derotation of the toe and skin lengthening), extensor tendon lengthening, and a dorsal metatarsophalangeal joint capsulotomy).



Figure 7D. Note her final postoperative photo at 1 year reveals maintenance of the correction in both planes.



Figure 8A. A 78-year-old female presented with pain on the dorsal aspect of the fifth toe. She had a prior arthroplasty of the fifth toe performed as well as a total matrixectomy of the nail for pain “on her nail.” After the matrixectomy was performed, the pain and shoe irritation did not resolve. Note that her fifth toe is dorsally elevated as one sees shadow under the fifth toe. From a surgical standpoint, she required only soft tissue work.



Figure 8B. A skin plasty to lengthen her skin in addition to an extensor tendon lengthening and dorsal MTPJ capsulotomy was performed. She had a purchasing toe after the procedure and the nail bed irritation ultimately resolved.