

## TREATMENT OPTIONS FOR THE CONTRACTED SECOND METATARSOPHALANGEAL JOINT

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### INTRODUCTION

Contracture of the second metatarsophalangeal joint (MPJ) can be a difficult deformity to treat. One of the reasons for this difficulty is the relationship of this joint to the rest of the foot. The second MPJ is the bridge that ties in the remaining lesser MPJs to the first ray.

When a deformity occurs in the first MPJ, the second digit often is affected due to the compensation of the flexors or extensors to stabilize the foot. A similar situation also occurs when the foot is destabilized by disease such as rheumatoid arthritis and the second MPJ follows the remaining lesser MPJs due this time to the mechanical breakdown of the tissue of the joints themselves (Figure 1).

Within the second MPJ, two predominant planes of deformity occur. The sagittal plane deformity usually involves the remaining joints of the digit and in time can have transverse plane involvement, which is the other major plane of deformity of the second MPJ. When the deformities are separate, they are easier to treat than when they are combined (Figure 2).

The symptoms of this deformity will usually occur gradually, and in time can become almost debilitating. The contracture can also lead to soft tissue deformities such as ulcers due to the excessive pressure that can be placed on the distal or plantar surfaces of the digit. The etiology of the pain involves the plantar aspect of the MPJ due to the retrograde pressure from the digit on the metatarsal head. As the digit contracts over time the proximal and or distal interphalangeal joints become painful as they rub against the adjacent material from the shoe. This pressure also leads to hyperkeratosis and may lead to ulcer formation.

### TREATMENT OPTIONS

Conservative options for treatment are aimed at either relieving pressure coming from the shoe or at neutralizing the deforming forces that deform the joint and lead to the permanent contracture. Shoes with a large toe box and a cushioned insole work very well for patients who are neuropathic and may not be surgical candidates. Functional orthotics may reduce the flexible deformity and when



Figure 1. The lesser digits often will follow the deformity of the second metatarsophalangeal joint.



Figure 2. Digital contracture in both the sagittal and transverse planes.

combined with appropriate shoes, often will eliminate pain and the risk of soft tissue break down.

When conservative treatment fails and pain in the digit persists, or when soft tissue break down occurs, then it is time to surgically repair the deformity. A myriad of surgical options are available from digital arthrodesis to soft tissue release and even digital amputation in extreme cases. Many of the digital procedures address one aspect of the deformity and will fail in cases of multi-planar deformity. In some instances the procedure is effective in a stationary position but when the patient returns to full activity the new forces present will result in a new deformity that can be as problematic as the original one treated (Figure 3). The author has found that by taking into account the forces on the digit and considering the effect of the pathology on the tissues, a procedure can be done to minimize functional deformity on the digit.



Figure 3. Complete release of the second metatarsophalangeal joint.

## DIGITAL PROCEDURES

The second MPJ is often the most deformed, and a combination of procedures may need to be done to repair it. The foundation of the repair is the release of the soft tissue structures of the MPJ and the fusion of the proximal interphalangeal joint. The release of the joint capsule needs to be complete, because this will prevent the capsule from further influencing the position of the bone structures adjacent to it (Figure 4).

The fusion of the interphalangeal joint is done to stabilize the digit. Several effective methods can be used for this procedure (Figure 5). The author prefers the use of Kirschner wires (K-wires) that externally protrude from the toe and are left in place for 6 weeks.

When a procedure is done in the operating room and the digit is not fully reduced additional steps are then taken to complete the repair (Figure 6). When the digit is



Figure 4. Recurrent deformity of the digit due to lack of correction in all the planes of deformity.

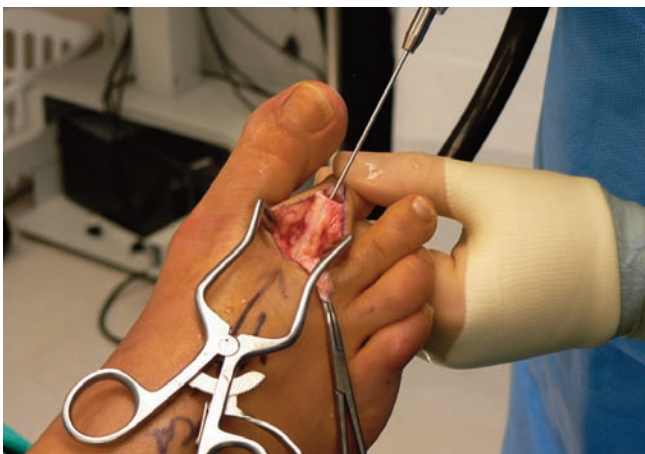


Figure 5. An arthrodesis of the digit is performed with a Kirschner wire.



Figure 6. After correction of the hammer toe with a metatarsophalangeal joint release and fixation across the proximal interphalangeal joint, deformity still persists.



Figure 7A. Preoperative radiograph showing transverse plane deformity of the second MPJ and an adjacent bunion.



Figure 7B. Correction of the transverse deformity with a partial resection of the phalangeal base and bunion correction.

still exhibiting deformity in the transverse plane, a partial phalangectomy on the side of the deformity will usually reduce this. Simply transecting the soft tissue is not sufficient and will result in a return of the deformity when the soft tissue is regenerated. Adjacent deformities such as a hammertoe or bunion also must be addressed in order for this procedure to work.

The corner of the proximal phalanx is removed with a rongeur and the entire thickness of the corner must be removed (Figure 7). The resection must include the plantar corner of the proximal phalanx to be effective. In situations where the deformity has not improved with the partial resection, most likely the plantar corner was left in place and is preventing the digit from completely reducing. When this procedure works the digit should be in good alignment in the transverse plane

When the MPJ contracture still persists in the transverse plane or the sagittal plane deformity will not completely reduce due to excessive plantar soft tissue build up then a complete base resection with a skin plasty can be done to correct the problem.

When a deformity has been present for an extended period of time, the soft tissue adapts to the deformity. In the case of a digit with a significant sagittal plane deformity, the soft tissue on the plantar aspect will stretch out and in time will be one of the factors that prevent full reduction even with fusion of the phalanges. The base resection and skin

plasty are performed after the previously-mentioned steps are completed.

The forefoot is loaded and if the digit does not reduce, the base of the proximal phalanx is resected. The amount of the resection is dependent on the amount of the correction that needs to be attained. It is important that the K-wire is not inserted across the MPJ as this will not allow for the base of the digit to be resected as well as it will be impossible to determine if additional correction is needed.

The incision site is then closed and a diamond- or oval-shaped skin section is removed from the inner space adjacent to the digit (Figure 8). Only the skin is removed and this should be done with great caution so that the neurovascular structures are not disrupted. The skin placement of the skin plasty can be modified to move the digit in the desired direction. The skin is then closed with 3-0 or 4-0 non-absorbable suture in a simple fashion. Usually only 3 sutures are needed. After completion of the procedure, the digit should be balanced in all planes (Figure 9). The suture is left in place until the K-wire is removed in 6 weeks.

The postoperative course is weight bearing in a rigid postoperative shoe for 6 weeks. The surgical site as well as the pin site needs to stay dry during this time. When the K-wire is removed at 6 weeks, the patient is to wear supportive athletic shoes for 2 to 4 weeks or until the swelling goes down enough to wear other shoes.



Figure 8A. Build up of soft tissue is present and is corrected by removing a skin wedge.



Figure 8B. The skin wedge is closed with 3 simple interrupted sutures.



Figure 9. After correction, the digit is in good alignment in all planes.

## CONCLUSION

The key to successful reduction of the second MPJ is to use the anatomy to eliminate the forces that keep the deformity in place. The partial base resection as well as the total base resection and skin plasty are designed to eliminate the forces across the joint that prevent adequate reduction. These procedures work well with the traditional digital arthrodesis with MPJ release to correct the moderate to severe hammer toe.