

REPAIR OF THE OVERLAPPING SECOND TOE

Alan Banks, DPM

One of the more vexing problems that is seen and treated by foot and ankle surgeons is the overlapping second toe deformity. A number of different techniques have been described for this approach, many of which are successful in selected circumstances, but finding a universal approach has been somewhat elusive. The author would like to present a general algorithm for assessment of this particular condition as well as a staging process that may help in the selection of the best procedures. This will be based upon the premise that once the deformity is advanced, the flexor digitorum longus serves to maintain the deformity as well as resist correction.

TRADITIONAL APPROACH

A traditional approach to treatment of the overlapping second toe has been to perform an arthrodesis of the digit along with a metatarsophalangeal joint release. Usually surgeons were able to achieve improvement in the sagittal plane alignment of the second toe, although if the condition was more advanced, deformity often persisted in the transverse plane. The advent of the McGlamry elevator was helpful in providing the surgeon with the ability to release the flexor plate at the metatarsophalangeal level. Perhaps more importantly, with the development of this instrument surgeons began to appreciate the fact that the flexor structures play an integral part in the development and perpetuation of the deformity. However, universally good results were not sustained with this technique. In some instances, transverse plane deformity persisted. In other patients, scarring along the flexor plate resulted in lesser metatarsophalangeal joint limitus. Therefore, it became evident that while this could still be considered an integral part in the repair of this type of deformity, other measures would be required for more consistent results.

STAGES OF DEFORMITY

The author has devised an approach to this condition based upon identifying certain stages of deformity. Each successive stage indicates a progression of the condition, and the need to address different components of deformity when planning surgical correction.

Stage 1-Lesser MPJ Transverse Plane Derangement

Stage 1 derangement consists of mild medial deviation of the second toe. Generally, there is little sagittal plane elevation, although there may be a hammertoe deformity which exists concomitantly. In most patients, the long flexor tendon remains beneath the metatarsal head, and the initial deformity is mitigated by dysfunction or imbalance within the intrinsic musculature. Repair of deformity at this stage may consist of the following:

- Arthrodesis of the digit
- Release of the dorsal and medial capsular structures at the metatarsophalangeal joint
- Plication of the lateral capsular structures with a nonabsorbable suture.

This approach has previously been described and advocated by Ruch. It is reliable for early-stage deformity as noted. The lateral capsule is preserved as this generally makes it easier to use suture techniques to augment the lateral integrity of the joint and to restore alignment and balance. Temporary Kirschner-wire fixation can be employed across the metatarsophalangeal joint at the discretion of the surgeon, although this is not always required.

Stage 2-MPJ Transverse Plane Derangement

This represents an increase in the degree of deformity that is characterized by more moderate to advanced transverse plane displacement of the toe at the metatarsophalangeal joint. Usually this is accompanied by a significant degree of digital

contracture, but this is not a universal finding. It is at this stage that the long flexor tendon tends to become an active deforming influence due to its medial displacement. The tendon is no longer centralized beneath the metatarsophalangeal joint, but has shifted medially. Failure to restore the long flexor tendon to a more normal central position beneath the metatarsophalangeal joint will encourage subsequent transverse plane deviation in the postoperative interval. Repair of deformity at this stage may consist of the following:

Arthrodesis of the digit

Release of the dorsal and medial MPJ capsular structures with lateral capsular placcation

Additional measures to allow lateral relocation of the flexor tendon, including possible flexor tendon transfer, or release of the flexor sheath.

If flexor tendon transfer is performed, it is important to attempt to redirect the vector of force into the lateral aspect of the base of the proximal phalanx. In order to accomplish this, the surgeon may find it necessary to release some of the flexor sheath that maintains the tendon in a more medial position. This can be accomplished through the dorsal aspect of the metatarsophalgeal joint with a small Metzenbaum scissor. The scissor is introduced beneath the joint as the toe is distracted and plantarflexed, and the soft tissues lateral to the flexor tendon are released. The flexor tendon can then be redirected more lateral. More recently the author has not been performing the traditional flexor transfer, but simply anchoring the long flexor tendon into the capsular tissues at the base of the phalanx laterally with non absorbable suture following this release of the flexor sheath. Failure to release the sheath may preclude sufficient realignment of the long flexor tendon into its more normal position.

Stage 3-MPJ Transverse Plane Derangement

Stage 3 is characterized by distinct medial deviation of the second toe such that there is dorsomedial skin contracture that resists manual relocation of the digit. Generally this occurs in patients with long standing deformity and an overlapping second toe. Simple repair of the contracture involving the digit and release and repair of the joint as previously described will usually prove insufficient to provide for adequate correction in this circumstance. Additional considerations may include some type

of a dorsal skin plasty, or else resection of a sufficient amount of bone so as to eliminate the influence of this adaptive contracture of the skin. The preferred approach which has been employed by the author in older patients has consisted of the following:

Resection of the base of the proximal phalanx of the second toe

Resection of the long flexor tendon to the second toe

Syndactyly of the second and third toes

K-wire stabilization across the second metatarsophalangeal joint with the toe abducted

In previous years the author performed this type of repair without releasing the long flexor tendon, only to experience recurrence of deformity in some patients. The flexor tendon is simply displaced too far medially to allow normal alignment of the toe, even with the relaxation of the soft tissues that accompanies the base resection. Removal of a segment of the tendon, or tenotomy, will completely eliminate any active force on the medial aspect of the joint that may favor recurrence.

In younger patients, the author has attempted to avoid this approach and has alternately performed a partial second metatarsal head resection with release of the flexor sheath, but only in a few number of cases thus far. Older patients do not appear to have strong objections to undergoing syndactyly, and this has proven to be a reasonably reliable approach. Partial metatarsal head resection accomplishes the goal of relaxing tension on the joint structures and the flexor tendon. Generally speaking, a Kirschner-wire is employed for several weeks to maintain the alignment. Limited joint motion has been encountered in some patients postoperatively.

Stage 4-MPJ Transverse Plane Derangement

Stage 4 is characterized by medial displacement, not only at the second metatarsophalangeal joint, but also by one or more of the adjacent metatarsophalangeal joints. This is a far more difficult scenario because the flexor tendon to each of the involved digits is medially displaced. Base resection with syndactyly at multiple digital levels is probably not a very practical approach. In the past, the author has performed repair of the second metatarsophalangeal joint as previously discussed in stage three

deformities, with attempts to relocate the long flexor and repair of the lateral capsule involving the remaining affected lesser metatarsophalangeal joints. However, this has not proven to be completely reliable, and these patients may find that pan metatarsal head resection is a more reasonable long-term option.

ADDITIONAL CONSIDERATIONS

The Weil osteotomy, or some form of shortening osteotomy of the second metatarsal, is another interesting approach that has merit. The author has employed this in patients with stage 1 or 2 conditions where the primary complaint has been plantar second metatarsophalangeal joint pain. This is a reliable means of alleviating joint pain in many patients, although there may be some slight elevation of the digit, which is noted postoperatively. Generally the metatarsal is shortened about 2 to 3 mm. Once completed, the toe will rest in a more rectus position due to the reduced tension on the

capsular and flexor structures. Metatarsal osteotomy is usually combined with a dorsal and medial joint release and lateral plication as previously described.

The flexor plate has been a source of interest for surgeons in this type of deformity as well. The development of the McGlamry elevator was largely premised on the belief that the flexor plate itself displaced with the associated digital and metatarsophalangeal deformity. More likely, the flexor plate does not deviate, but it is the flexor tendon that is the culprit.

Some authors have described tears or a disruption in the flexor plate, and the loss of integrity of this structure has been felt to lead to elevation and instability of the toe. Repair of the flexor plate has been described as a means of addressing this problem. However, again, while the repair of the flexor plate may assist in the overall stability of the joint, if the flexor tendon remains medially displaced the long term success of this approach would appear to be in question.