

THE OVERLAPPING SECOND TOE: A PRELIMINARY INVESTIGATION

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Dorsal and/or medial dislocation of the second digit is a relatively common deformity associated with forefoot derangement. This deformity has been called overlapping second digit, crossover toe deformity, and chronic dislocation. For many foot surgeons this complex condition has become one of the most perplexing of all forefoot deformities.

There have been many theories proposed on the etiology of the insidious dislocation of the second metatarsophalangeal joint. Most feel that the proximal phalangeal base subluxes or dislocates dorsally due to chronic biomechanical forces. The pathomechanics of the ham-

mertoe or clawtoe deformity has been discussed by many authors. Glucocorticoid injection into the metatarsophalangeal joint is thought to be another initiating factor. Inflammation of the joint capsule as in rheumatoid arthritis allows secondary dislocation to occur.

The digit may also drift in the transverse plane giving the common appearance of the overlapping digit. Transverse plane deviation is due to aberrant pull of the flexor tendons that have migrated to the side of the metatarsophalangeal joint. Recurrence of the transverse plane deformity following dorsal approaches to the metatarsophalangeal joint are often seen. Phalangeal base resection,



Fig. 1. In order to surgically approach the plantar aspect of the lesser metatarsophalangeal joint a significant amount of plantar fat pad must be traversed. Minimal blunt dissection with a mosquito hemostat will allow identification of small crossing vessels. In this cadaver specimen a straight linear incision was made directly beneath the second metatarsal head. However, for surgical approach, a gently curved incision avoiding the area of direct weight bearing beneath the metatarsal heads is recommended.



Fig. 2. Note the thickness of the plantar fat pad in the ball of the foot. Excessive blunt dissection or straying within this organized padding structure may cause significant destruction and loss of its cushioning effect.

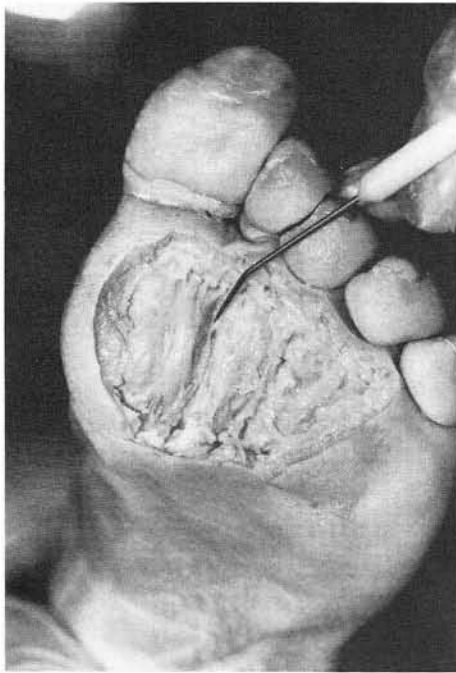


Fig. 3. The neurovascular structures which must be avoided are located between the metatarsal heads. Careful retraction of the nerves traversing into the digits is necessary if adhesion to capsular structures and related ligaments is to be avoided. In this figure the neurovascular bundle is seen in its usual location.

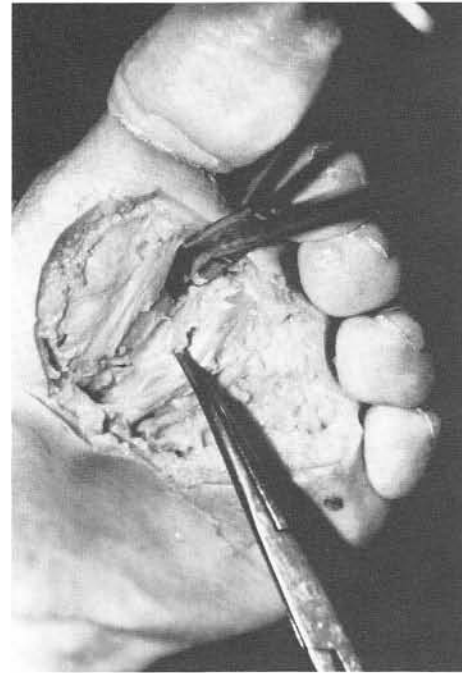


Fig. 4. The short and long flexors are ensheathed beneath the flexor plate by a relatively thick fascial tunnel. The lower hemostat holds the fascia that encloses the tendons. The deep transverse intermetatarsal ligament is seen just below the upper hemostat coursing between the first metatarsophalangeal joint and the flexor plate of the second metatarsal.

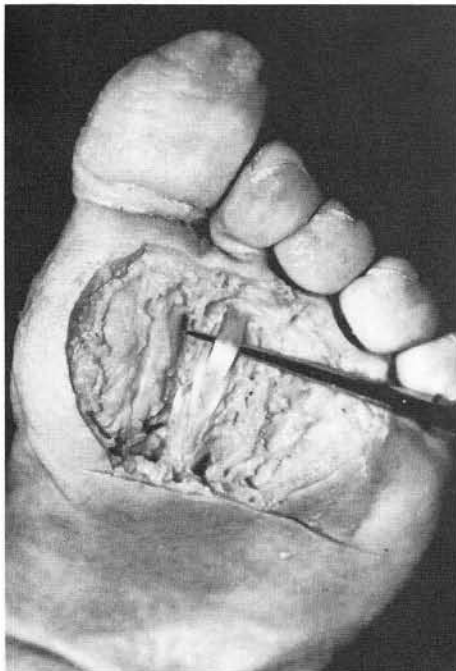


Fig. 5. The long flexor tendon is shown suspended by the instrument as it courses between the slips of the short flexor. The long flexor inserts into the distal phalanx and the short flexor tendon insert into the base of the middle phalanx.

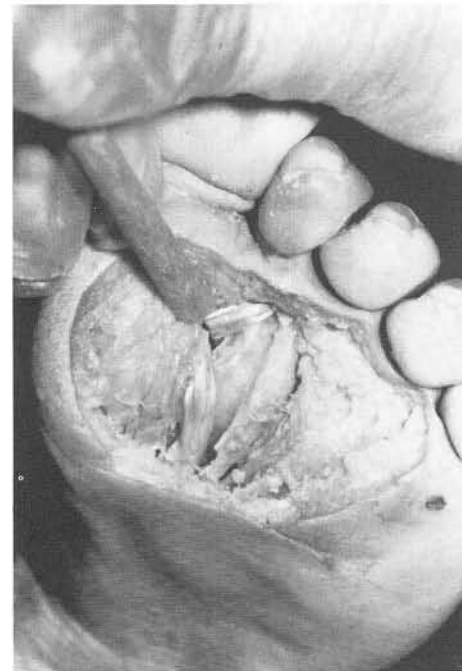


Fig. 6. With the flexor tendons retracted, the plantar plate of the second metatarsophalangeal joint is visualized.

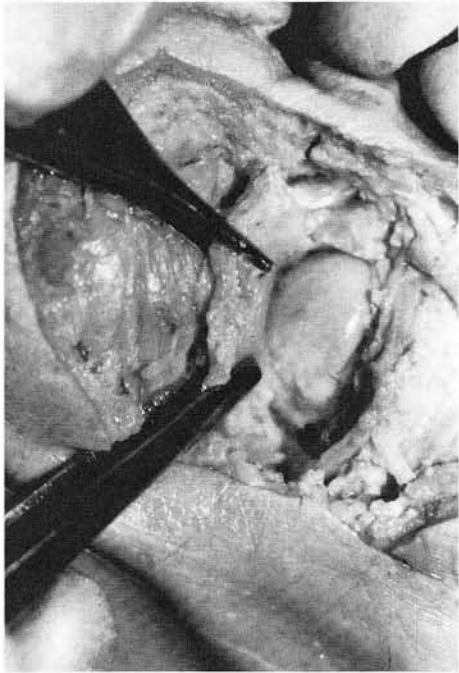


Fig. 7. The thickness of the plantar plate is appreciated in this photograph. The cartilaginous plantar surface of the second metatarsal head is exposed.

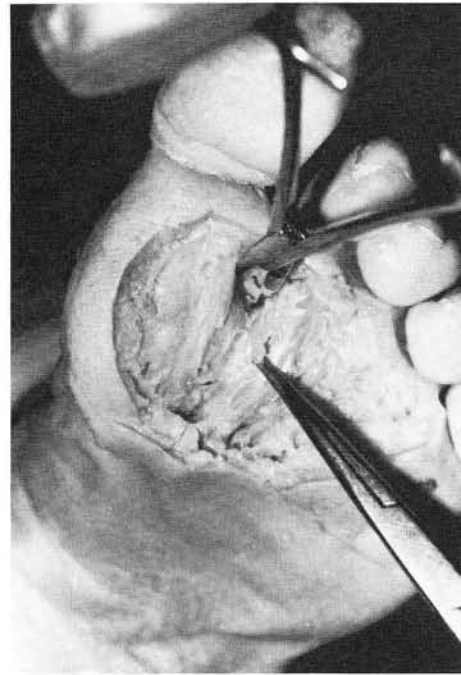


Fig. 8. The relationship of the plantar plate to the deep transverse intermetatarsal ligament is revealed. This photograph demonstrates how tension on the thick ligament from a medially splaying first metatarsophalangeal joint could result in dislodging of the flexor apparatus to the intermetatarsal space.

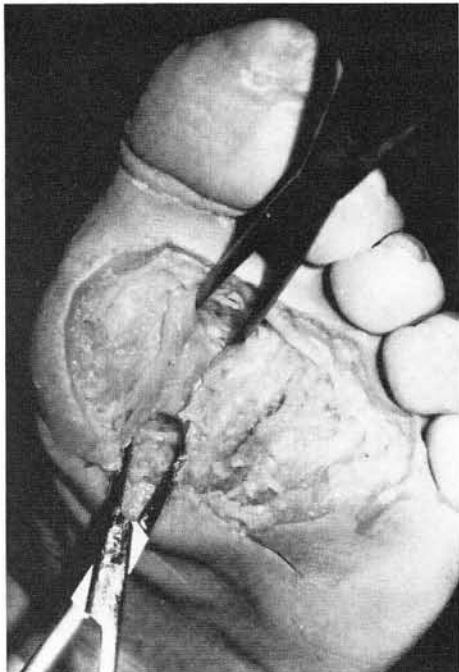


Fig. 9. This illustration of the release of the deep transverse intermetatarsal ligament from the first metatarsal and its transposition laterally may be a useful procedure in flexor tendon relocation. Note that capsulotomy along both the medial and lateral aspects of the second metatarsal head will be required to allow mobility of the substantial plantar plate.

flexor tendon transfer, proximal interphalangeal joint arthrodesis, and partial metatarsal head resection have all been proposed for treatment of this condition. However, none of these methods addresses the aberrant pull of the flexor tendons. Relocation of the flexor (plantar) plate is believed by some authors to be a crucial step in repair of the transverse plane deformity. A brief investigation into an approach to the anatomic derangement that exists in the overlapping second digit is presented.

References

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