

## THE ADDUCTOR TENDON TRANSFER

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Transfer of the adductor hallucis tendon in hallux valgus surgery is a valuable addition in accomplishing complete reduction of the bunion deformity. As early as 1928, McBride recognized this concept when he described the adductor tendon transfer as part of his bunion repair. He transferred the tendon from the proximal phalanx of the hallux into the lateral aspect of the first metatarsal head. In 1950, Joplin described transferring the adductor tendon through the metatarsal head from lateral to medial for reduction of the intermetatarsal angle. McGlamry, in 1971, transferred the tendon over the metatarsal head and sutured it into the medial capsule. This technique can effectively de-rotate the sesamoid apparatus back under the metatarsal head, while reducing the intermetatarsal angle.

A complete plantar-lateral release of the first metatarsophalangeal (MTP) joint is paramount to successful reduction of the hallux valgus deformity. The primary function of the transfer is relocation of the sesamoid apparatus within the sesamoidal grooves of the metatarsal head (Fig. 1). The transfer

can also assist in reduction of the intermetatarsal angle, derotation of the hallux, and reinforcement of the medial capsular flap.

## DISSECTION OF THE INTERSPACE

The adductor hallucis tendon is located within the third layer of plantar muscles. There are two separate heads proximally which come together to form a conjoined tendon that inserts distally into the fibular sesamoid and the lateral base of the proximal phalanx. During first interspace dissection, the adductor tendon is essentially the "target tissue." This is the first structure identified and released.

Once the adductor tendon is visualized, the joint line is located by gently distracting the hallux and watching for an indentation along the lateral capsule. A stab incision is then made dorsal to the tendon, and carried distally onto the proximal phalanx. It is important to dissect the conjoined tendon's insertion cleanly from the lateral aspect of the proximal phalanx, in order to provide sufficient tendon for transfer. Dissection of the tendon is then carried proximally in order to release its attachment to the fibular sesamoid. After complete release, the tendon is tagged with a suture for later use. Additional sequential release of the fibular-sesamoidal ligament, lateral head of the flexor hallucis brevis, and occasionally excision of the fibular sesamoid will facilitate a complete plantar-lateral release of the first metatarsophalangeal joint. (Figs. 2A - 2F).

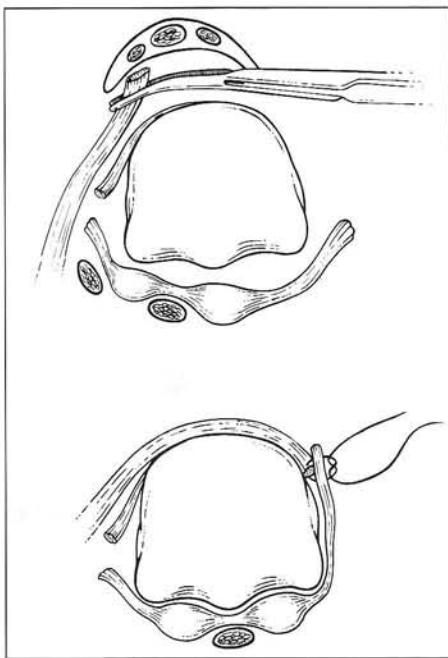


Figure 1. The adductor tendon transferred under the extensor tendon to the medial capsule effectively de-rotates the sesamoid apparatus.

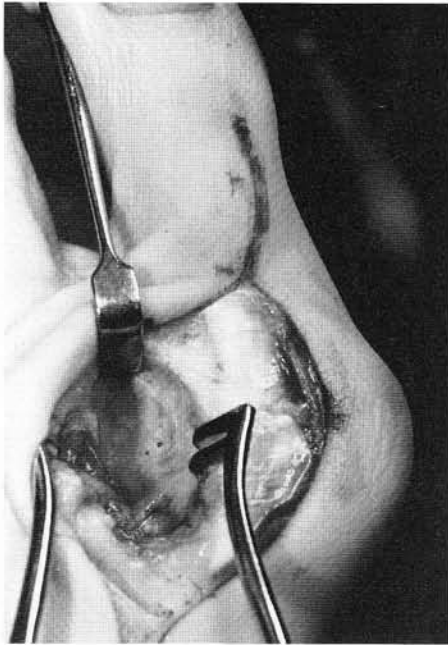


Figure 2A. Initial dissection into the interspace showing the adductor tendon along the lateral aspect of the MPJ.

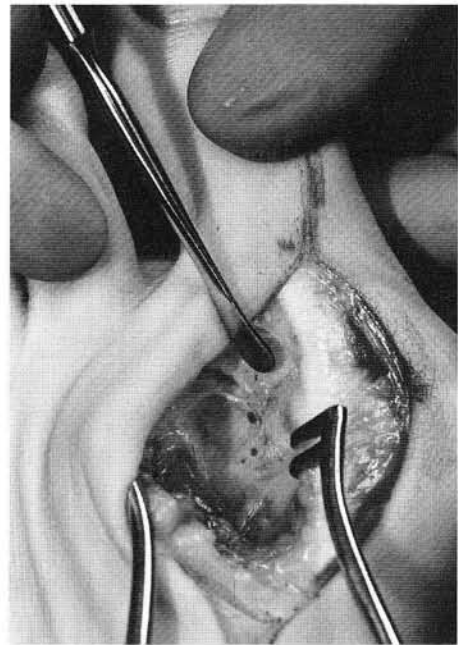


Figure 2B. Distraction of the MPJ demonstrating the indentation along the lateral joint capsule.

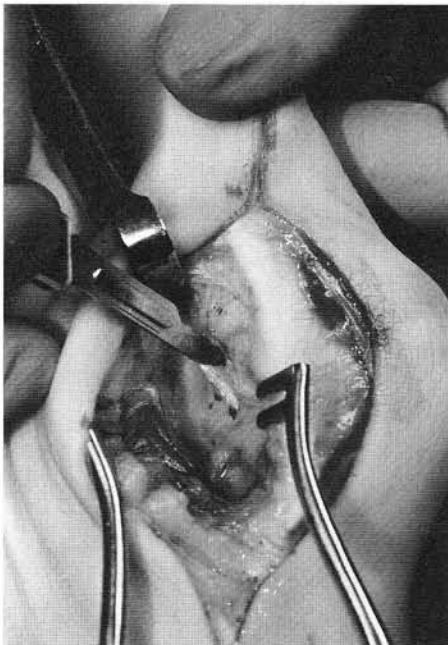


Figure 2C. Initial puncture into the lateral MTP joint above the adductor tendon.

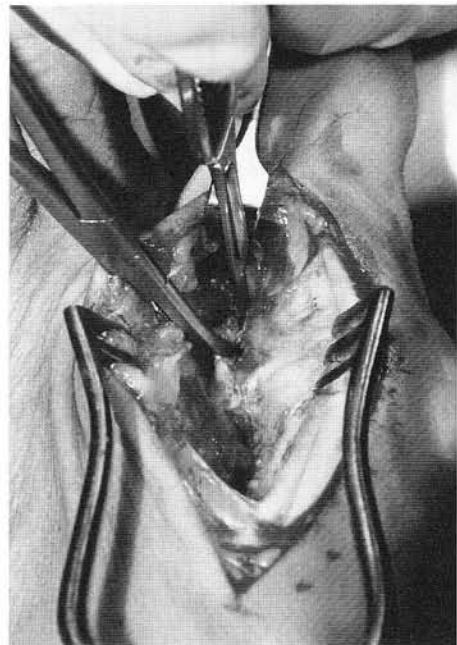


Figure 2D. With the tendon grasped in the hemostat, the insertion is dissected off the base of the proximal phalanx.

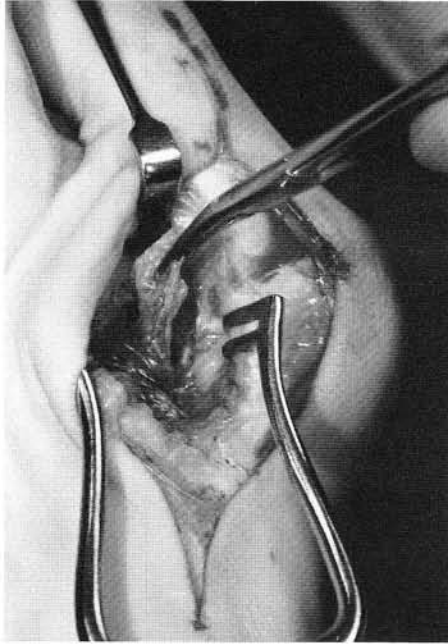


Figure 2E. The adductor tendon released from its insertion.

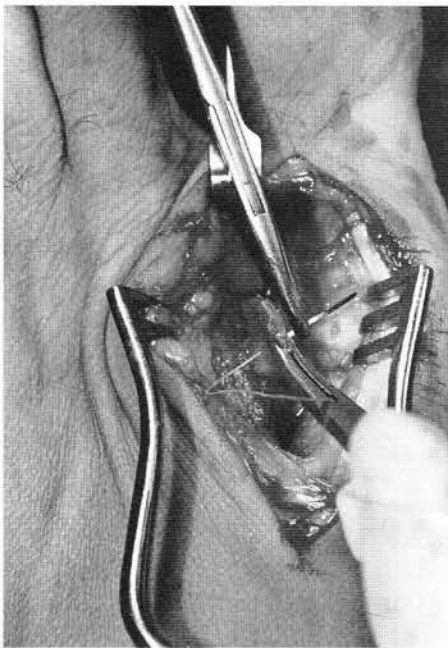


Figure 2F. Suture is utilized to tag the tendon for possible later transfer.

### VERSATILITY OF THE TENDON TRANSFER

The adductor tendon transfer can be an effective adjunct to the muscle-tendon balancing of the first metatarsophalangeal joint in mild, moderate, and

severe hallux valgus repair. In mild, flexible deformities, transfer of the adductor tendon after resection of the medial exostosis may enhance the soft tissue correction.

In moderate deformities requiring a distal osteotomy, effects of the lateral release are carefully evaluated after the osteotomy is securely fixated. Prior to closure of the medial capsule, the position of the tibial sesamoid can be determined while holding the hallux in a rectus position. By gently pulling upwards on the medial capsule, the medial edge of the tibial sesamoid can be visualized. It is often helpful to palpate the edge of the tibial sesamoid with a freer elevator, because the white glistening appearance of the medial collateral ligament may resemble the sesamoid (Fig. 3). If the sesamoid is still dislocated laterally under the metatarsal head, consideration of an adductor transfer should be entertained.

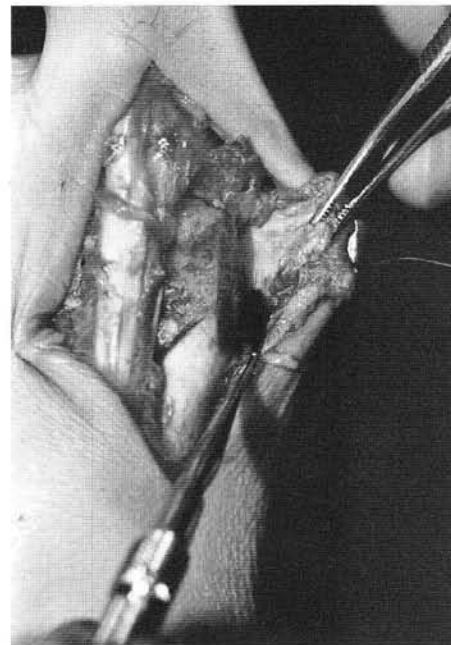


Figure 3: Evaluation of the sesamoid position under the metatarsal head prior to capsular closure. A freer elevator is utilized to palpate the medial border of the tibial sesamoid. If the sesamoid is still deviated laterally, an adductor tendon transfer should be considered.

In a base wedge procedure of the first metatarsal, an intraoperative radiograph or fluoroscan is often obtained after initial closure of the osteotomy site. The hallux should be supported in a rectus position during this process. The sesamoid position is then assessed from the dorso-plantar radiograph. If the first metatarsal position is satis-

factory, yet the sesamoids are still deviated into the interspace, then an adductor transfer should again be considered (Figs. 4A, 4B).



Figure 4A. Intra-operative radiograph of a base wedge osteotomy before fixation is applied. With the hallux held in a rectus position, the sesamoid position can also be evaluated.



Figure 4B. Postoperative radiograph after adductor tendon transfer into the medial capsule.

## TECHNIQUE

The adductor tendon is transferred through a subperiosteal channel below the long extensor tendon into the medial capsule of the first metatarsal. The transfer is usually secured with 2-0 or 3-0 absorbable suture with a horizontal mattress stitch. This will now serve as a dynamic force to de-rotate the sesamoid apparatus underneath the metatarsal head (Figs. 5A-5D). After the transfer, care should be taken to evaluate the first metatarsophalangeal joint range of motion, and the final first metatarsal position to avoid overzealous correction.

While the transfer can be very effective, it must be used judiciously. The potential for producing a medial joint imbalance with this transfer, in conjunction with an overly-aggressive lateral release needs to be evaluated. Moreover, an adductor transfer after removal of the fibular sesamoid is not recommended due to the potential for creating a medial imbalance. This can result in medial subluxation of the tibial sesamoid with subsequent hallux varus.

McBride described reattachment of the adductor tendon into the lateral metatarsal head. It must be appreciated that although this may serve to further reduce the intermetatarsal angle, there will be minimal to no effect on the soft tissue de-rotation of the sesamoid apparatus. Nevertheless, a deformity with a moderately flexible component may benefit from this transfer. The attachment of the tendon should be performed with the first metatarsal held in the desired position. When the transfer was first described, the tendon was attached through drill holes into the lateral side of the metatarsal, or sutured tightly to the lateral periosteum. Due to the introduction of soft tissue anchor devices, these provide another option for soft tissue reattachment. There are anchor sizes under 2.0 mm which are very compatible for use in the smaller bones of the foot. The transfer has also been described through the first metatarsal head from lateral to medial, and then sutured into either the medial capsule or the medial periosteum. Again this does not result in de-rotation of the sesamoid apparatus.

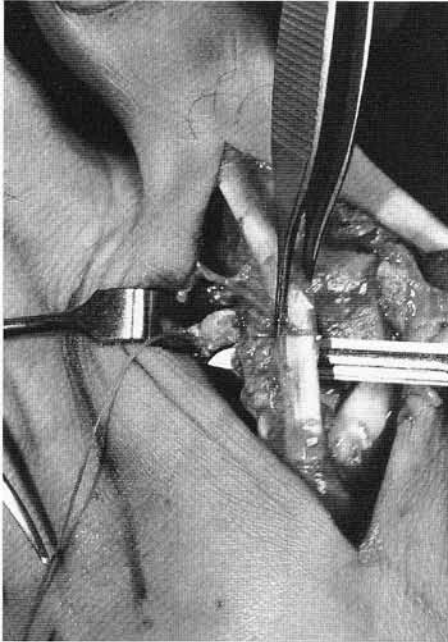


Figure 5A. A subperiosteal tunnel is created under the extensor tendon to the lateral interspace.

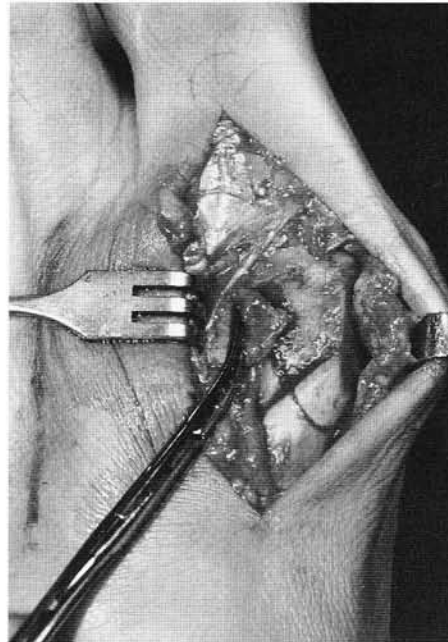


Figure 5B. The adductor tendon is delivered *under the long extensor tendon* for attachment to the medial capsule.

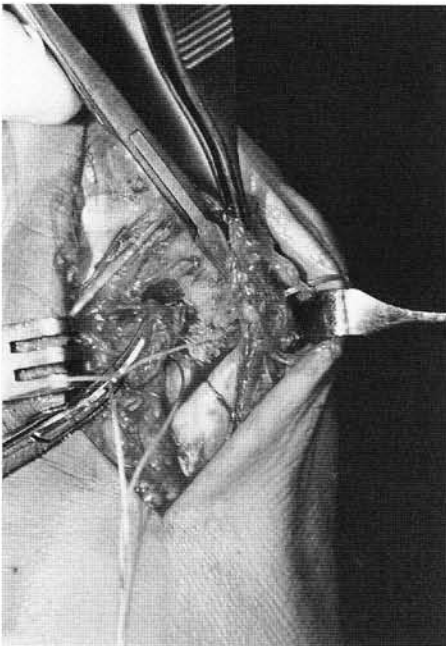


Figure 5C. 2-0 absorbable suture is utilized in a horizontal mattress fashion to secure the tendon to the medial ligaments within the capsule.

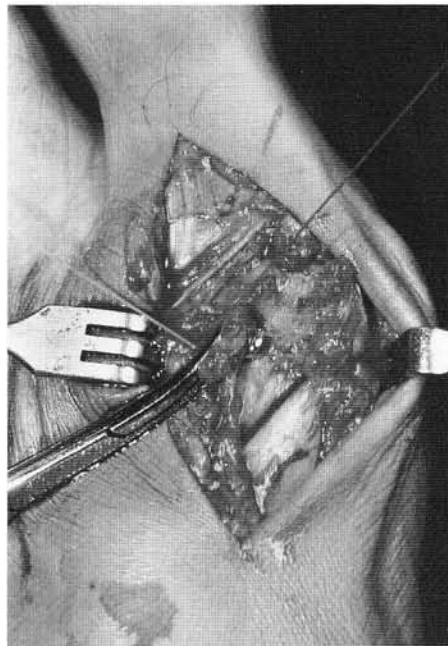


Figure 5D. Tightening of the tendon to the medial capsule. This should effectively de-rotate the sesamoid apparatus back underneath the metatarsal head.

**SUMMARY**

The adductor tendon transfer can serve as a valuable surgical technique in the complete repair of the hallux valgus deformity. However, the procedure must be carefully considered and used with discretion. When performed properly, this procedure will function dynamically to help provide muscle-tendon balancing of the first metatarsophalangeal joint.

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