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Transmetatarsal Lateral Release in Hallux Valgus Surgery: Technical Tip

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Level of Evidence: V, Expert Opinion

Key Words: Hallux Valgus; Lateral Release; Approach; Transmetatarsal

INTRODUCTION

Lateral release of the hallux MP joint is a key element of hallux valgus surgery and can be combined with a variety of bone procedures: proximal metatarsal osteotomy,[3,6,8,9,13,15] distal metatarsal osteotomy,[17,20,23,24] metaphyseal-diaphyseal osteotomy,[1,2,14,19] and even in cuneo-metatarsal arthrodesis.[5,14] Silver[21] was the first to report the need to release the lateral soft tissues, in 1923. His procedure included the resection of the medial eminence, medial capsular plication and lateral capsulotomy with adductor tenotomy. Currently, many authors recommend performing the lateral release together with a metatarsal osteotomy in cases of joint incongruence with metatarsophalangeal subluxation.[3,14,15,17] In the case of slight deformities, lateral release and reconstruction of the soft tissue may be sufficient,[3,23] but on its own its capacity to correct the deformity is limited and an abnormally high intermetatarsal angle tends to persist.[13] Barouk[2] reported that very often metatarsal osteotomies alone do not achieve complete reduction of the deformity, and he recommended lateral metatarsophalangeal release in almost all cases.

SURGICAL TECHNIQUE

The procedure is performed under a peripheral anesthetic block (with popliteal and saphenous block or ankle block), or with spinal or general anesthesia. A tourniquet is applied just above the malleoli.

The medial incision is made through the medial capsule to avoid creating flaps of skin that might cause necrosis at the edges of the wound exposing the metatarsophalangeal joint. Dorsal and plantar Hohmann retractors are inserted extra-articularly to protect the vascular structures, and resection of the medial eminence at the level of the sagittal groove is performed.

A metaphyseal-diaphyseal scarf osteotomy is performed in the first metatarsal with a sagittal microsaw using standard technique, and the two bone fragments (dorsal and plantar) are mobilized and separated with the aid of Senn-Miller retractors. Through the opening of the osteotomy the articular surface of the lateral sesamoid, the sesamoid-metatarsal suspensory ligament and the intraarticular surface of the lateral capsule can be seen (Figures 1, 2).

The lateral sesamoid is released from the metatarsal head by sectioning the sesamoid metatarsal suspensory ligament, checking that the release is complete with the aid of a periosteal elevator inserted between the metatarsal head and the sesamoid (Figure 3).

A longitudinal incision is made along the edge of the lateral sesamoid, which releases the insertion of the conjoined tendon, and a window is made in the lateral surface of the articular capsule through which the metatarsal head may move when the correction of the intermetatarsal angle is performed (Figure 4).

If necessary, using curved hemostatic forceps the transverse intermetatarsal ligament can be identified between the heads of the first and second metatarsals and sectioned (Figure 5).

After performing the lateral release, the plantar fragment is shifted laterally to place the metatarsal head above the sesamoids. Finally the two bone fragments are fixed in place using two headless compression screws (Figure 6).

DISCUSSION

The aim of the distal soft tissue is to release the contracture of the lateral structures—the lateral capsule, the suspensory

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ligament of the lateral sesamoid, the adductor tendon and the sesamoid-metatarsal lateral ligament—in order to achieve correct reduction and alignment of the proximal phalanx over the head of the first metatarsal, and to reduce the likelihood of the recurrence of the deformity.[14] There are many lateral release techniques described, with different approaches and different released structures. It has been reported that this lateral release guarantees a more stable correction of the deformity, and more reliable results with a better correction of the hallux valgus, the intermetatarsal angle and the position of the sesamoids.[6,18,23] In an anatomical study, Owens and Thordarson[16] found that the flexor hallucis brevis tendon and the adductor hallucis tendon converge in the lateral side of the lateral sesamoid and continue as a conjoined tendon to the base of the proximal phalanx. They reported that sectioning the adductor tendon from its insertion on the lateral side of the sesamoid achieves satisfactory release in most specimens, but that care should be taken to avoid the release of the conjoined tendon from the base of the proximal phalanx as this releases the lateral flexor hallucis brevis, which may lead to iatrogenic hallux varus.

In the hallux valgus deformity, the sesamoids maintain their anatomical relation with the second metatarsal, and the metatarsal head is displaced medially.[12] The adductor tendon, which inserts in the lateral sesamoid and the base of the proximal phalanx, anchors these sesamoids. For this reason, some authors consider that its sectioning is only necessary in cases in which an adequate shifting of the metatarsal head is not achieved;[4] furthermore, when an osteotomy with shortening of the first metatarsal is performed, lateral release may not be necessary, since the shortening modifies the function of the metatarsophalangeal joint and reduces the tension of the soft tissue.[3,4] Barouk[2] performs the release before the metatarsal osteotomy, sectioning the suspensory ligament of the lateral sesamoid and the conjoined tendon

Fig. 1: Illustration demonstrating lateral release through the metatarsal osteotomy.

Fig. 2: Intraoperative photograph showing the metatarsal osteotomy distracted allowing visualization of the capsule and lateral sesamoid.

Fig. 3: Intraoperative photograph confirming release of the lateral sesamoid from the metatarsal head with a periostal elevator.

(PIB, phalangeal insertional band), thus shifting the lateral sesamoid towards the plantar side and placing the metatarsal head above the sesamoids. In our view, it is the lateral shifting of the head of the first metatarsal that restores the metatarso-sesamoid joint. To achieve this, in most cases it is necessary to create an opening in the lateral capsule allowing the complete displacement of the metatarsal head and its correct positioning above the sesamoids. Adductor tenotomy should only be performed when complete correction of the deformity is not achieved, or when the transverse intermetatarsal ligament cannot be sectioned due to its excessive retraction over the second metatarsal.

This lateral release can be performed using two approaches: the dorsal approach with an incision in the space between the first and second metatarsals, [2,3,13–15,23] or using the same medial longitudinal approach which will be used to work on the first metatarsal. In the latter case, the lateral structures can be approached via the metatarsophalangeal joints,[24] above the metatarsal head,[8] or between the metatarsal head and the sesamoids.[22]

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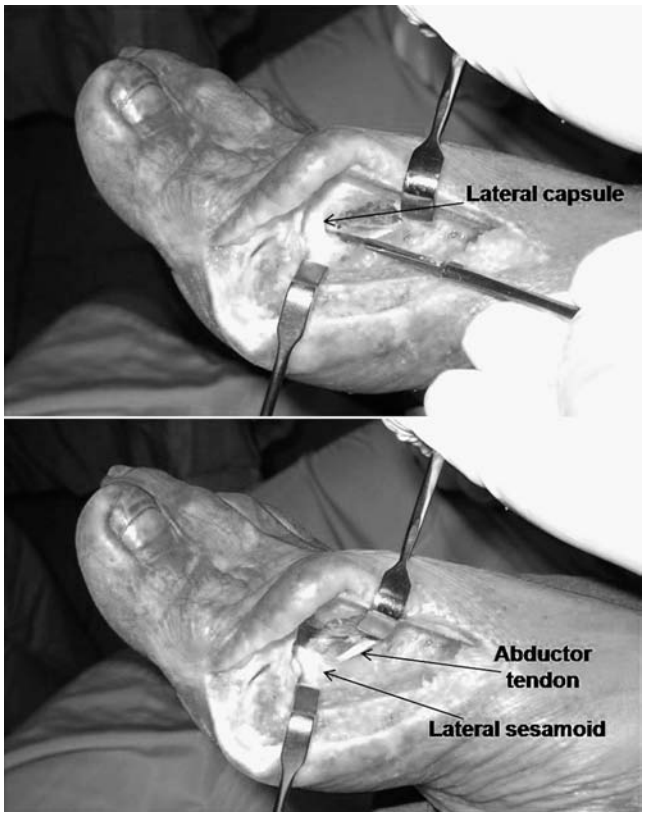

Fig. 4: Longitudinal section of lateral capsule through the metatarsal osteotomy.

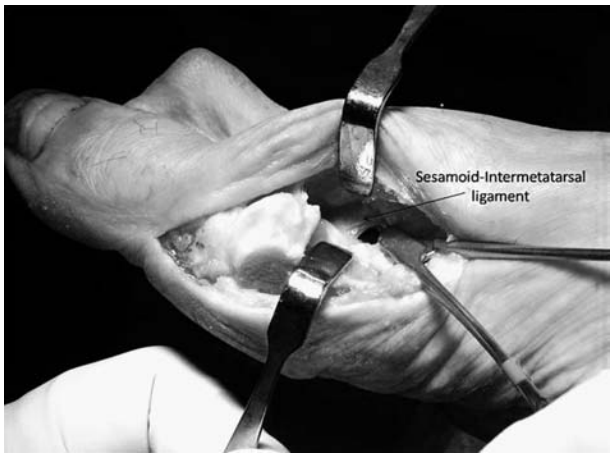

Fig. 5: Location and section of the sesamoid-intermetatarsal ligament, if necessary.

Waldecker[24] compared lateral release performed via a dorsal approach to a transarticular medial approach in combination with a chevron osteotomy, and found no differences between the two in terms of pain and edema. The dorsal incision allows a better view of the lateral soft tissue of the metatarso-phalangeal-sesamoid joint, but it requires the dissection of the soft tissue between the metatarsals[3,9,10] and care must be taken to avoid damaging the neurovascular structures (the medial branch of the deep peroneal nerve and the dorsal artery of the first metatarsal).[2,5,23]

Fig. 6: AP view showing correction of the hallux valgus deformity with correct position of the sesamoids.

The medial approach is preferable from the cosmetic point of view because it avoids a second dorsal incision which may also retract. However, it is more difficult to release the lateral structures via the medial incision because the metatarsal head and the rotation of the sesamoids obstruct the view of the lateral sesamoid and the suspensory ligament and lateral capsule.[8] A variety of surgical techniques have been designed to obtain a better view and to improve access to the lateral part of the metatarsophalangeal joint without performing a second skin incision and to obtain better cosmetic results. Stamatis et al.[22] introduce a curved arthroscopy blade between the metatarsal head and the medial sesamoid to perform transarticular release of the lateral complex. Because of its shape, this blade achieves a better sectioning of the lateral structures without requiring a clear view and is less likely to cause neurovascular damage or articular cartilage injury. Using a medial incision, a dorsal flap or a dorsal capsular dissection can be created[8,9,19] above the extensor tendons to gain access to the first interdigital space. This procedure presents a risk of skin necrosis. In recent years a series of experimental studies have applied arthroscopic techniques to achieve a better view and control of the structures sectioned, and to avoid neurovascular injury and the need for additional incisions.[7,11,20] Good results have been reported with a combination of percutaneous distal osteotomy and arthroscopic lateral release,[20] and performing this medial release via endoscopy[11] with direct visualization using a 2.7-mm arthroscope to section the intermetatarsal ligament, the adductor tendon of the hallux and the lateral capsule. However, both techniques require a high level of technical skill and wide experience in arthroscopy.

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SUMMARY

We advocate a distal metaphyseal-diaphyseal osteotomy to create transmetatarsal access through which to perform the lateral release. This access provides direct, intra-articular visualization of the lateral anatomic structures (lateral sesamoid, sesamoid-metatarsal suspensory ligament and lateral capsule), allowing satisfactory release and avoiding the need for an additional skin incision.

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