Basilar Metatarsal Osteotomy with Distal Soft-Tissue Realignment for Hallux Valgus

Carol Frey, M.D.

Summary: Different hallux valgus deformities require different types of surgical correction. Incongruent metatarsophalangeal joints, greater hallux valgus angles (generally >30°), and metatarsus primus varus (>12°) are indications for a basilar metatarsal osteotomy with distal soft-tissue realignment. With proper technique and selection of patients, 85–90% good or excellent results can be expected. Key Words: Hallux valgus deformities—Incongruent metatarsophalangeal joints—Basilar metatarsal osteotomy—Distal soft-tissue realignment.

Not all bunion deformities are the same and this is reflected in surgical decision-making (6, 7B, 8, 9). Silver (15) described a repair of hallux valgus that included a medial exostectomy, lateral capsular and adductor tendon release, and medial capsular reefing. The procedure has been modified (1, 5, 9, 12) and is appropriately referred to as a distal soft-tissue release. Experience has shown that the distal soft-tissue release alone is usually not sufficient to correct the hallux valgus deformity, especially if the intermetatarsal angle is >15° (7A, 7B). A proximal metatarsal osteotomy is commonly added to correct the intermetatarsal angle, making the combined procedure more versatile.

INDICATIONS

The most common indication for this procedure is a hallux valgus deformity with a subluxed (incongruent) metatarsaphalangeal joint. Generally, the hallux valgus angle is >30° and the intermetatarsal angle is >12° (7A, 7B). No specific upper limits have been set for this procedure, but some deformities are so great that full reconstruction is not possible (hallux valgus >50° and an intermetatarsal angle of >25°) (7A, 7B). Furthermore, if rigidity is noted between the first and second metatarsals, which can inhibit the full correction of the hallux valgus deformity, the distal soft-tissue release should definitely be combined with a proximal metatarsal osteotomy at the time of surgery.

Contraindications to this procedure include a congruent metatarsophalangeal joint, significant first metatarsal phalangeal joint arthritis, vascular compromise, infection, and spasticity. Advanced age is not a contraindication. In the young patient, the osteotomy must be placed distal to the epiphyseal plate. The entire procedure is made up of three major parts.

TECHNIQUE

A distal soft-tissue release with a basilar metatarsal osteotomy may be performed in an outpatient setting with an ankle block anesthesia (Fig. 1). A surgical prep to just below the knee is recommended. The patient is placed in the supine position, and an ankle tourniquet may be applied. The following technique is similar to the technique described by Mann (7A, 7B, 8–11).

Soft-tissue release

The procedure is performed through an incision in the dorsal web space. Staying in the midline and using blunt dissection, the subcutaneous tissue and soft tissues of the interspace are dissected and retracted. A Weitlaner retractor or a small lamina spreader may be placed between the first and second metatarsal heads to aid visualization. The adductor tendon is noted and carefully released from its insertional sites on the lateral aspect of the proximal phalanx, the lateral cap-
The adductor hallucis tendon is released from its insertion sites on the lateral aspect of the proximal phalanx, the lateral capsule, and the lateral sesamoid. B: The transverse metatarsal ligament is released. C: The medial eminence of the first metatarsal head is resected 1 mm medial to the sagittal groove. D: An attempt is made to reduce the 1–2 intermetatarsal angle. E: The first metatarsal osteotomy is performed with a crescent-shaped blade. F: The capsule is closed. [Modified from Mann (7A).]

Two sutures are placed in the first web space to include the first and second metatarsal and the adductor tendon. This brings the adductor tendon up into the wound so it can eventually scar down with the lateral capsular structures. These sutures are not tied until after the osteotomy is completed.

Medial reconstruction

This aspect of the operative technique is initiated with a 4–5 cm longitudinal medial incision from the base of the proximal phalanx to 1 cm proximal to the first metatarsal head. Care should be taken to avoid damage to the dorsal and plantar medial cutaneous nerves. Without undermining the skin, the incision is carried down through the bursae and the joint capsule onto the metatarsal head. The medial eminence of the metatarsal head is exposed by creating plantar and dorsal capsular flaps. Small Hohman retractors are used to protect the flexor and extensor hallucis ten-
dons. The medial eminence is resected in line with the medial border of the foot and ~1 mm medial to the sagittal groove (Fig. 1C). The edges are then made smooth with a small hand or microreciprocating rasp.

At this point, the surgeon may test to see whether the intermetatarsal 1–2 angle can be corrected by pushing the first metatarsal in a lateral direction. If the first metatarsal springs back into a varus position, then a basilar first metatarsal osteotomy should be added to the procedure (Fig. 1D). This procedure is usually necessary in 90–95% of cases.

**Basilar first metatarsal osteotomy**

The basilar osteotomy is performed through a longitudinal incision, which begins at the first metatarsocuneiform articulation and runs distally. The extensor hallucis longus tendon is retracted to either side. The metatarsocuneiform joint is pinpointed with an 18-gauge needle, and the placement of the osteotomy is ~1 cm distal to the joint. If a screw is to be used for fixation, it should be ~1 cm distal to the osteotomy site, and the initial glide hole is made before performing the osteotomy. The glide hole is made along the long axis of the metatarsal at a 45° angle. A countersink is useful to ensure that the screw head is not prominent.

A crescent-shaped saw blade is used to perform the osteotomy, with the concavity toward the heel. It is important that the plane of the cut is halfway between being perpendicular to the bone shaft and the plantar surface of the foot. Once the cut is begun, care should be taken that it is complete on the lateral and medial sides. A freer elevator can then be used to check that soft tissues have been released around the osteotomy site so that the first metatarsal can be displaced.

The first metatarsal is then reduced by placing a curved hemostat around the lateral aspect of the base of the first metatarsal and displacing it medially. The distal fragment is moved by compressing the first metatarsal head toward the second metatarsal head, thus narrowing the intermetatarsal 1–2 angle. With the surgeon holding the reduced position, one or two K-wires are placed to hold the osteotomy in a connected position completing the drill hole for the screw. The hole is tapped and the screw is placed. This screw is usually a 26 mm long A. O. cancellous screw, but measurement with a depth gauge is recommended if length is uncertain. The screw is placed and tightened carefully so that the 1-cm bone bridge is not broken (Fig. 1E).

Occasionally the screw does not hold the reduction, and alternate fixation is necessary. In this case two cross-threaded Steinmann pins or multiple K-wires may be used. These should be cut off below the skin.

**Closure**

The two sutures in the first web space are tied down tightly, carefully avoiding neurovascular structures. The skin of the first web space is closed with 5–0 nylon sutures using a vertical mattress stitch.

The medial capsule is tightened by resecting an oval-shaped piece of tissue followed by pants-over-vest closure of the capsule. If further tightening is necessary, a box suture is placed using 2–0 Ethibond, as shown in Fig. 1F. The medial skin may then be closed with 5–0 nylon sutures using a vertical mattress stitch.

**POSTOPERATIVE CARE**

Initially, the patient is given a soft compression dressing composed of gauze between the toes, Kling, soft roll, a bias roll, and one-half-inch adhesive tape. This dressing is changed after 1 week and replaced with a lighter bunion dressing, which continues to maintain the great toe in a neutral position. This dressing is changed at weekly intervals for at least 6 weeks, allowing the osteotomy and the soft tissues time to heal.

The patient is initially instructed not to place weight on the affected leg and to elevate it for the first 5–7 days, until the initial inflammatory phase has passed. The patient is then allowed to heel walk, as tolerated, in a postop shoe with the bunion dressing. The sutures are removed at 2 weeks.

Healing is usually adequate enough to allow gentle active range of motion exercises of the first metatarsophalangeal joint to begin at 3 weeks. After 6–8 weeks, more aggressive range-of-motion exercises may be instituted. Radiographs are taken in the office at the first postoperative visit and at 6–8 weeks postsurgery. The osteotomy site is usually clinically healed at 6–8 weeks, but radiographic healing may not occur for 3–6 months (Fig. 2).

If selection of patients is made correctly, it is expected that surgery will have an ~85–90% chance of a good to excellent result. Most patients will be wearing a large soft shoe at 6 weeks but should not expect to fit into a fashion shoe for 3–6 months after surgery. As with other bunion procedures, patients should expect some postoperative swelling for ≤6 months after surgery.

**COMPLICATIONS**

Complications include hallux varus, malalignment of the hallux, recurrence of deformity, shortening of the toe, nonunion, malunion, arthrofibrosis, and pe-
Peripheral nerve entrapment (4, 7B, 11). Malalignment of the hallux after bunion surgery can be the result of several factors, including failure of soft-tissue correction, complications with the proximal metatarsal osteotomy, and failure of postoperative dressings (7B, 9). Failure to correct the entire deformity may occur if the contracted lateral structures are not adequately released, the sesamoids are not mobilized, the medial joint capsule is not adequately plicated, or the intermetatarsal angle is not corrected.

Failure may also occur if an excessive amount of the medial metatarsal head is resected, the medial joint capsule is over plicated, or the lateral structures are too aggressively released. These errors may result in a hallux varus deformity.

Problems associated with a proximal metatarsal osteotomy include nonunion, malunion, and shortening. Occasionally, the osteotomy is produced or stabilized in such a way that it is dorsally displaced. This results in decreased weight bearing of the first metatarsal, and a transfer lesion may occur. The metatarsal may be pushed too far laterally, producing an unstable metatarsophalangeal joint and hallux varus. Nonunion occurs very rarely (Fig. 3).

Arthrofibrosis of the first metatarsophalangeal joint is seen more commonly when a distal metatarsal osteotomy is performed but may occur with any bunion surgery. It is important to begin gentle, active range-of-motion exercises as soon as the soft tissue and bone will allow.

REFERENCES