Mini Locking Plate as “Medial Buttress” for Oblique Osteotomy for Hallux Valgus

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INTRODUCTION

Surgical treatment of a hallux valgus deformity necessitates an appropriately chosen procedure depending on the severity of the deformity. For deformities with an intermetatarsal angle (IMA) of more than 13 degrees, a proximal or a diaphyseal metatarsal osteotomy with a concomitant distal soft tissue procedure seems to be the most effective way to obtain adequate correction. A number of proximal and diaphyseal osteotomies have been utilized for correction, but there are issues regarding their inherent instability which may result in delayed union, dorsal malunion, or fixation failure with a loss of correction.

The Ludloff diaphyseal osteotomy is commonly used for the correction of severe hallux valgus deformity. Like other proximal osteotomies, the Ludloff osteotomy is inherently unstable. Osteotomy site motion may lead to the formation of callus at the osteotomy site and delayed union in 16% and 5% of the cases, respectively. Loss of correction or malunion requiring revision have also been observed with a reported incidence of 1.5% to 5%.

This led us to modify the fixation of the Ludloff osteotomy by adding a small locking plate on the medial side of the metatarsal as a “medial buttress” which has been used successfully by the authors for the last 2 years.

OPERATIVE TECHNIQUE

A lateral soft tissue release is initially performed through a dorsal incision over the first web space. After a laminar spreader is inserted between the first and second metatarsals, the sesamoid suspensory ligament is cut, followed by release of the two heads of the adductor tendon from the lateral edge of the fibular sesamoid. The phalangeal insertion band of the adductor tendon is released and the hallux is manipulated into varus. A second incision is made starting over the medial aspect of the first metatarsophalangeal joint and extending just proximal to the first metatarsocuneiform joint. A longitudinal capsulotomy is performed and the MTP joint and the metatarsal shaft are exposed keeping soft tissue detachment to a minimum. The site of the osteotomy which starts dorsally 2 mm distal to the metatarsocuneiform joint aiming distally at a 30-degree angle with respect to the axis of the metatarsal shaft is marked (Figure 1).

After completion of the dorsal two-thirds of the osteotomy, a 2.7-mm AO screw is inserted in a lag mode 10 mm distal to the dorsal osteotomy (Figure 2), but it is not fully tightened in order to allow completion of the plantar one-third of the osteotomy. After completion of the osteotomy, the distal (dorsal) fragment is rotated laterally around an axis formed by the 2.7-mm AO screw, and a Kirschner wire is inserted in the overhanging bone of the proximal (plantar) fragment to prevent re-displacement. Under fluoroscopy (Figure 3), the adequacy of correction is confirmed and the 2.7-mm AO screw is fully tightened to compress the osteotomy.

A second screw, which we prefer to be a double threaded cannulated headless screw (Barouk screw, DePuy, Warsaw, IN), is then inserted from plantar to dorsal...
Fig. 1: Intraoperative photograph of the foot after completion of the exposure. Note that the osteotomy has been marked on the shaft.

Fig. 2: After completion of the dorsal two thirds (indicated with the arrowheads) of the osteotomy a 2.7-mm AO screw is inserted in a lag mode from dorsal to plantar. The 2.7-mm drill bit demonstrates the appropriate orientation of the lag screw.

Fig. 3: Fluoroscopic view of the correction.

Fig. 4: After completion of the osteotomy, the plate is applied on the medial aspect of the metatarsal shaft. Note the dorsal (D) and the plantar (P) edge of the osteotomy.

DISCUSSION

The Ludloff osteotomy is inherently unstable due to its configuration.\textsuperscript{5} The need for increased rotation of the distal (dorsal) fragment for the correction of severe deformities with large intermetatarsal angles leaves less contact area between the two fragments thus reducing the ability to achieve adequate fixation and possible decreased healing potential, with a risk for delayed union. Several authors have proposed supplementary fixation with two Kirschner wires\textsuperscript{6} or more rigorous postoperative immobilization.\textsuperscript{8} We have found the use of a medial locking plate to be easily applied and successful clinically. It provides additional stability and prevents loss of reduction and recurrent deformity.

on the tensile side of the osteotomy, allowing excellent compression due to the differential pitch of the threads. The overhanging bone of the proximal (plantar) fragment is removed, leaving a flat medial surface on the metatarsal shaft. An four-hole 2.4-mm mini locking plate (AO, Synthes, Europe) is then applied on the medial surface with the most proximal and distal screws inserted in the plantar and dorsal fragments respectively (Figure 4). The procedure is completed performing a minimal exostectomy with 1 to 2 mm of bone removed, with the saw blade oriented parallel to the metatarsal shaft and medial capsulorrphy.
Fig. 5: A, Preoperative anteroposterior view of a severe HV deformity in a 65-year-old female. Note the large IMA of 25 degrees. B, Followup radiograph at 6 months. Note the excellent correction of the deformity and the complete absence of callus. C, Followup radiograph at 1 year. There is no loss of correction.

REFERENCES

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