PRACTICAL TECHNIQUES OF HALLUX VALGUS REPAIR

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The Austin bunionectomy along with its numerous modifications has proven to be a very versatile osteotomy for the correction of the moderate hallux valgus deformity. The long dorsal arm osteotomy with internal screw fixation has proven to be an extremely stable form of first metatarsal osteotomy. The intrinsic stability combined with the rigid internal compression fixation provides both patient and surgeon with the option of early ambulation and rehabilitation.

Some technical difficulties, however, are encountered by the podiatric physician in performing this osteotomy and accurately placing internal fixation. A modification in sequencing for internal fixation is presented in this paper. By altering the technique of osteotomy and fixation, the podiatric surgeon can obtain a more predictable osteotomy and have adequate exposure and bone stock for temporary as well as permanent internal fixation. The technique presented respects local soft tissue anatomy about the first metatarsophalangeal joint and permits an "extra-articular" positioning of the osteotomy. This approach will help to preserve periarticular capsule attachments and enhance recovery of post-operative motion.

The technique will be reviewed in a clinically illustrated format to help the physician appreciate the sequence of osteotomy position, design and internal fixation.

SURGICAL TECHNIQUE

The following illustrations and drawings will highlight the osteotomy technique and internal fixation. The purpose of the technique is to first obtain adequate soft tissue exposure. Soft tissue exposure is critical in selection of an appropriate osteotomy site. The osteotomy placement must be made with respect for local soft tissues. Adequate exposure for temporary and permanent fixation must be made possible with as little disruption of these vital soft tissues as possible. Once soft tissue exposure has been obtained, the hinge axis guide *is not* inserted at this time. In fact, the selection of the hinge axis guide insertion point is one of the final steps in the selection of the osteotomy site, position and orientation.

The sites for individual fixation screws are first identified on the dorsal surface of the first metatarsal. This is done by inserting two 0.062 wires from dorsal to plantar in the distal 1/3 of the first metatarsal. Kirschner-wire position with respect to surrounding soft tissues is then evaluated. At this point, the proximal dorsal exit point for the osteotomy is identified. The exit point is established well proximal to the proximal pin hole for screw placement. This will insure adequate bony exposure as well as adequate bone stock for insertion of the internal fixation device.

Attention is then directed inferiorly beginning just proximal to the plantar attachments of the capsular into the inferior aspect of the metatarsal. The plantar exits of the two 0.062 K-wires are identified with periosteal dissection of the inferior aspect of the first metatarsal. Once the two exit points have been identified, the osteotomy is extrapolated distally to identify the two point hinge axis placement. The hinge axis guide may now be inserted.

It should be readily noted that the position of the hinge axis guide and orientation of the osteotomy (approximately 60-65 degrees) must respect the soft tissues as well as temporary and permanent fixation. To arbitrarily pick the hinge axis site is to leave to chance adequate bone

stock for fixation as well as for preservation of local soft tissue anatomy. The angle of the osteotomy is dictated by the necessity of secure fixation and respect for soft tissue. By selecting the dorsal and plantar exit points first, then extrapolating the hinge axis, minimal chance for error in terms of osteotomy design placement will be noted.

Clinically Illustrated Surgical Technique

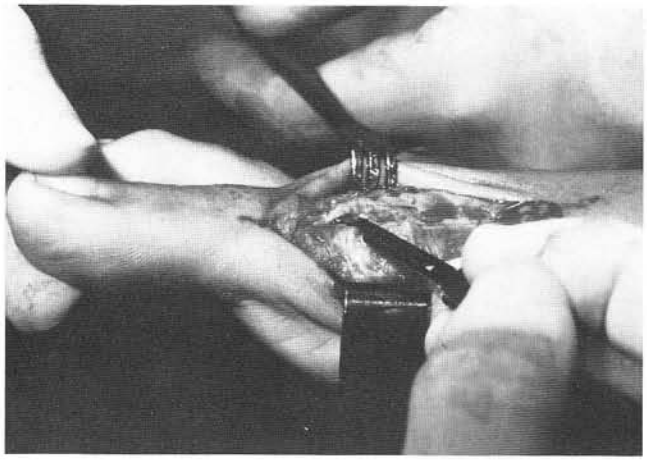

Fig. 1. Intra-articular dissection on the first metatarsophalangeal joint for exposure of the first metatarsal head.

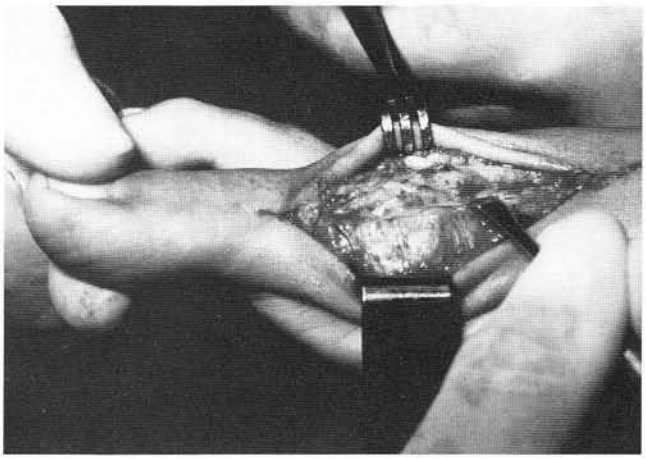

Fig. 2. Subperiosteal dissection proximal to the dorsal pouch to preserve the capsular insertions about the dorsal aspect of the first metatarsal.

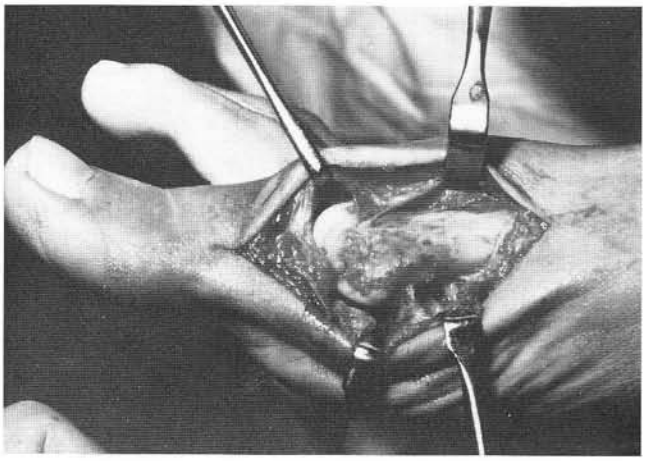

Fig. 3A. Intraoperative photo of final dissection of the first metatarsophalangeal joint prior to osteotomy execution.

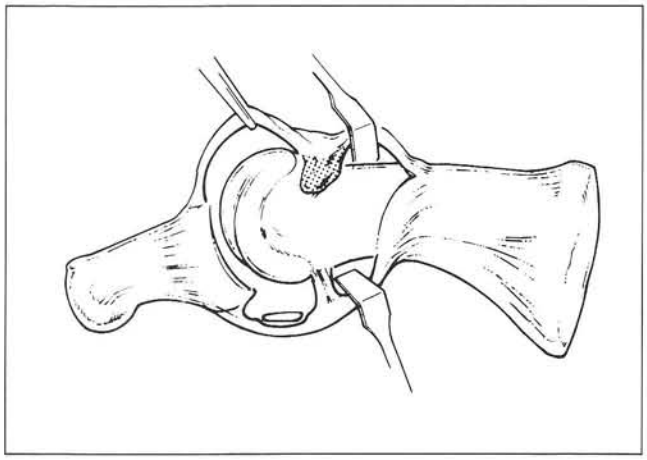

Fig. 3B. Illustration of final dissection. Note intra-articular exposure as well as preservation of the insertion of the dorsal pouch and plantar capsular structures. Proximal sub-periosteal dissection, dorsally and plantarly maintaining the insertion of the dorsal pouch and plantar capsule. Vascular supply to the first metatarsal head as well as preservation of periarticular relationships have been preserved.

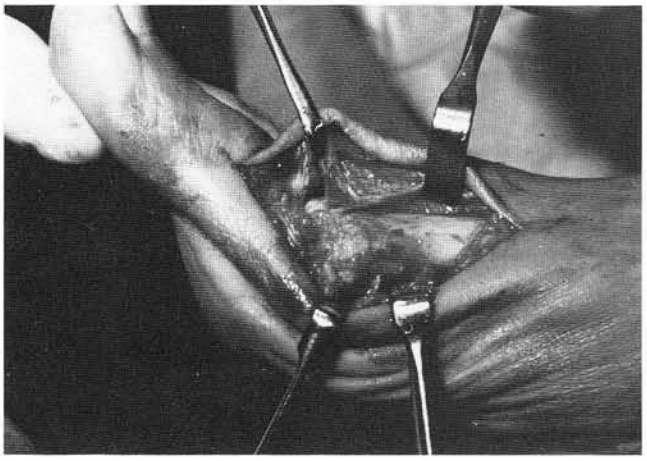

Fig. 4A. Dissection and exposure to demonstrate dorsiflexory range of motion of the first metatarsophalangeal joint, movement and alignments of soft tissues.

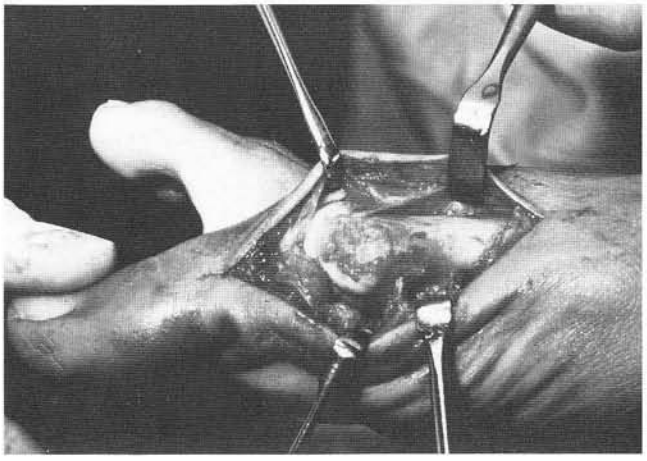

Fig. 4B. Plantarflexory range of motion of the first metatarsophalangeal joint to appreciate soft tissue realignments.

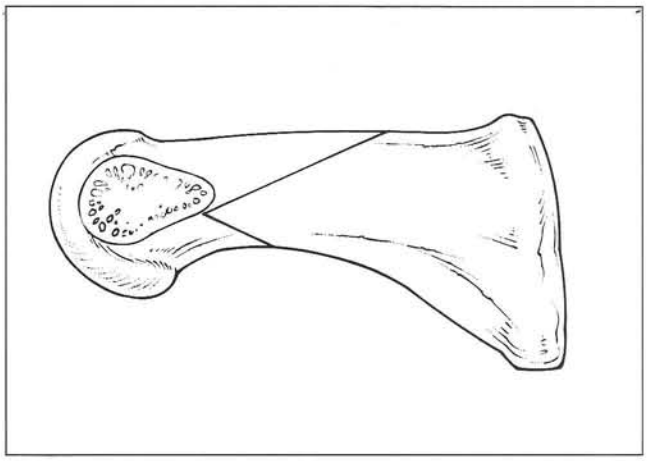

Fig. 5A. Arbitrary positioning of the osteotomy proximally and distally with respect to the hinge axis.

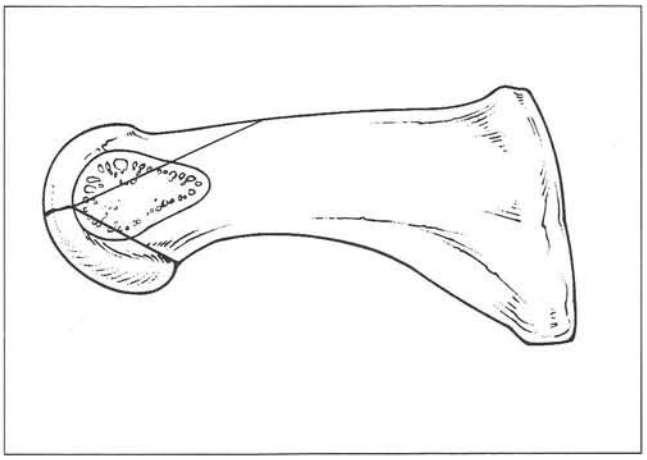

Fig. 5B. No correlation to soft tissue anatomy as well as internal fixation is noted. The position of the osteotomy is strictly arbitrarily selected.

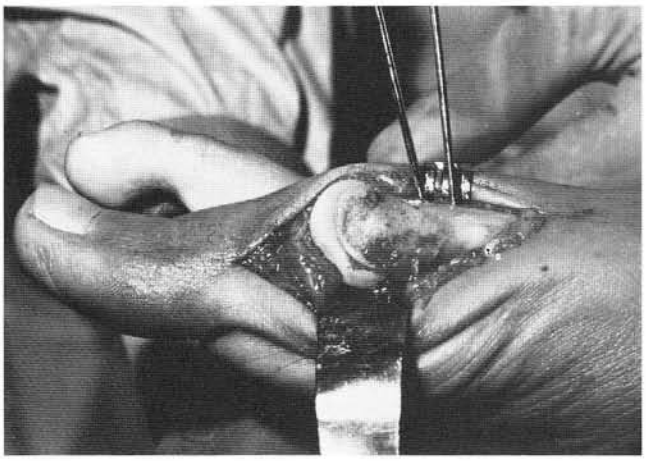

Fig. 6. Once exposure is completed, insertion of two 0.062 wires for identification of the exact position of the internal fixation screws prior to osteotomy site selection. Visualization is assessed at this time for placement and positioning of temporary as well as permanent internal fixation. Further dissection may be completed at this time to insure adequate visualization for execution of the osteotomy.

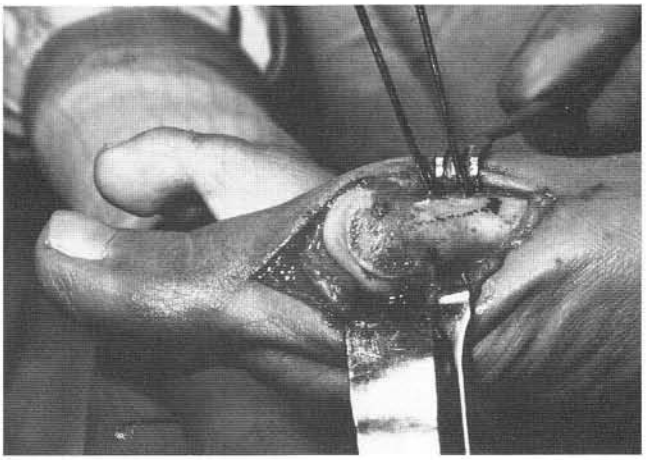

Fig. 7. Selection of dorsal and plantar osteotomy exit points. The dorsal exit point is identified approximately 2-3 mm proximal to the proximal fixation point. The inferior exit point is identified just proximal to the capsular attachments on the inferior aspect of the metatarsal within the periosteal dissection inferiorly.

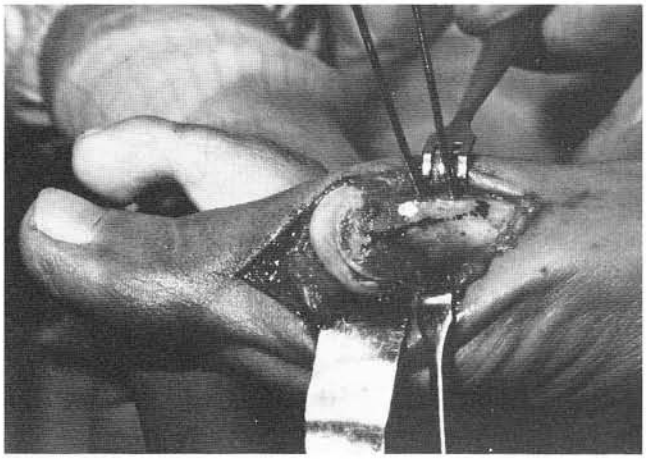

Fig. 8. Extrapolation of the osteotomy distally from the exit points forward to create an angle of approximately 60-65 degrees. The intersection of the distal extrapolation becomes the hinge axis point.

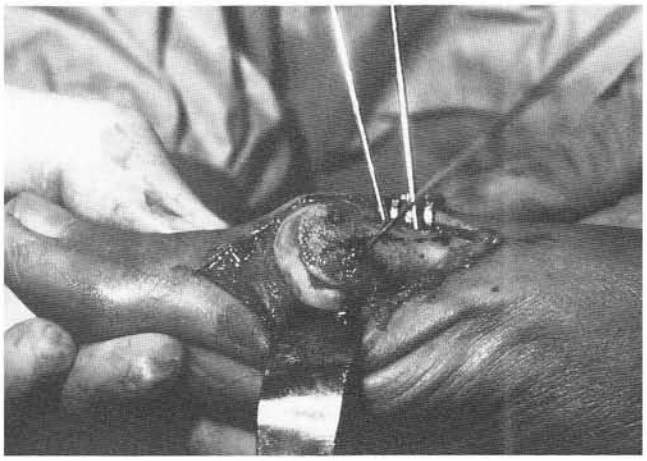

Fig. 9. Insertion of the hinge axis guide at the intersection of distally extrapolated arms of the osteotomy. The hinge axis guide may be deviated dorsally or plantarly from this point.

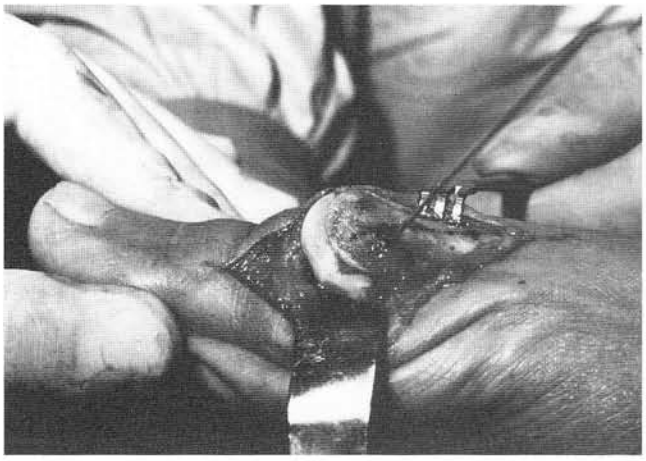

Fig. 10. Removal of the temporary location pins and maintenance of the hinge axis guide. The osteotomy is ready to be cut within the distal first metatarsal with adequate spacing for internal fixation and respect for local soft tissue anatomy.

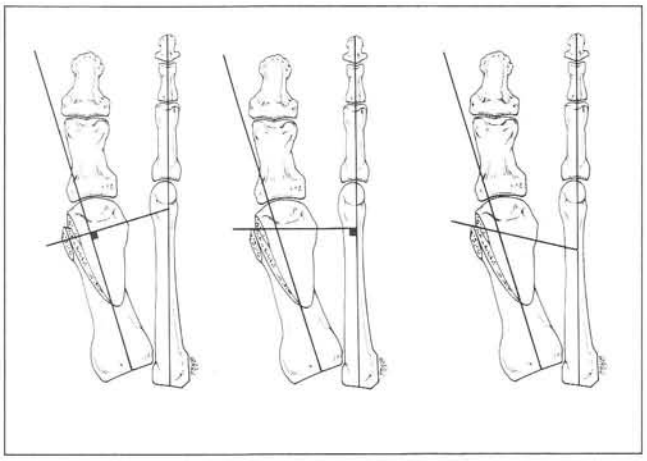

Fig. 11. The hinge axis guide may be deviated either distally or proximally to effect length of the first metatarsal. Any deviation may be extrapolated from the original hinge axis point and still maintain adequate length of the osteotomy for permanent internal fixation and respect for soft tissues.

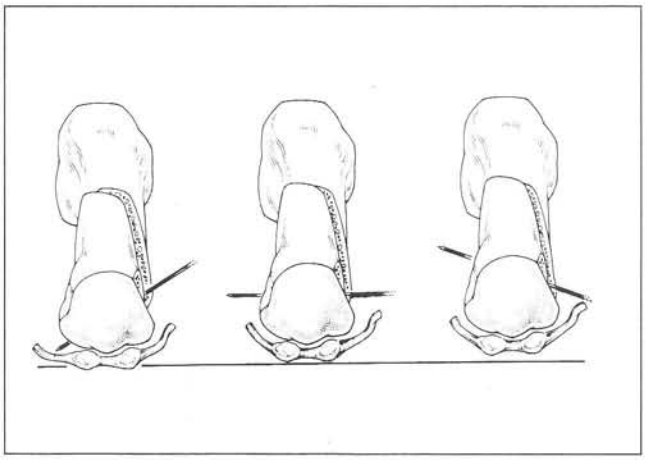

Fig. 12. The hinge axis guide may be deviated dorsally or plantarly from the original hinge axis point and still maintain respect for soft tissues and permanent internal fixation.

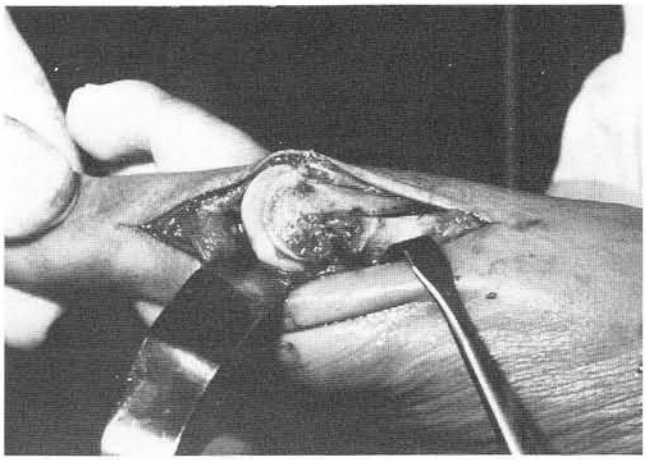

Fig. 13. The hinge axis guide is in place and the osteotomy has been completed in the distal first metatarsal. The dorsal arm of the osteotomy exits well behind the most proximal fixation hole. The dorsal drill holes can be visualized directly while the osteotomy is executed. Direct visualization of the fixation holes on the dorsal surface of the first metatarsal allows the surgeon to appreciate, on a moment by moment basis, the osteotomy with respect to his future location of internal fixation.

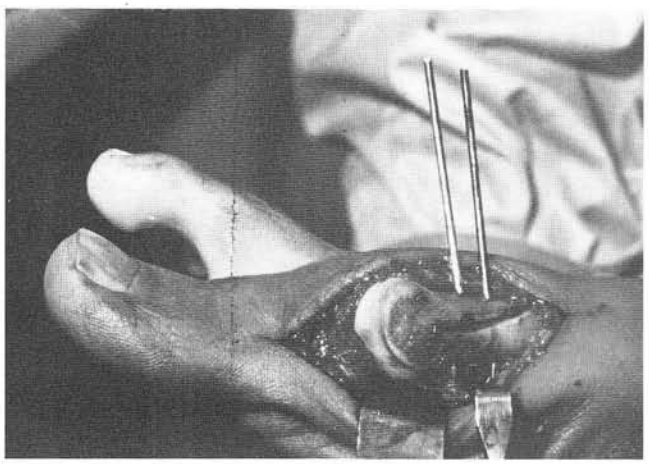

Fig. 14. Reinsertion of the temporary fixation to allow stability during insertion of the permanent fixation as well as evaluation of correction. The direction of placement of the temporary fixation is deviated plantar-medial in the frontal plane to compensate for osteotomy shift.

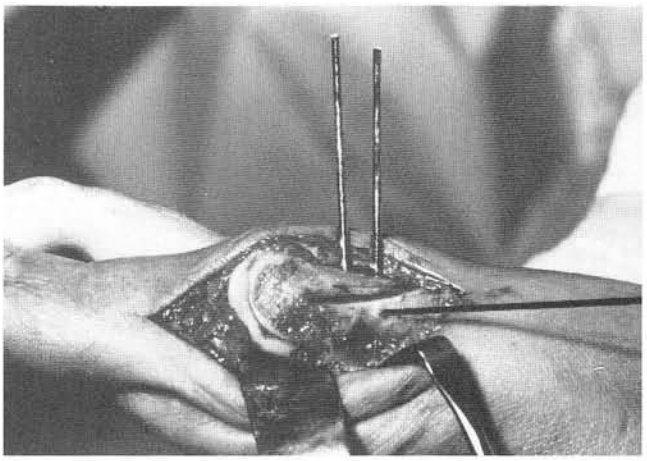

Fig. 15. A secondary point of temporary fixation is inserted from medial-dorsal-proximal to lateral-plantar-distal to permit removal of one of the original K-wires and still maintain two points of temporary fixation while insertion of the initial permanent screw fixation is performed.

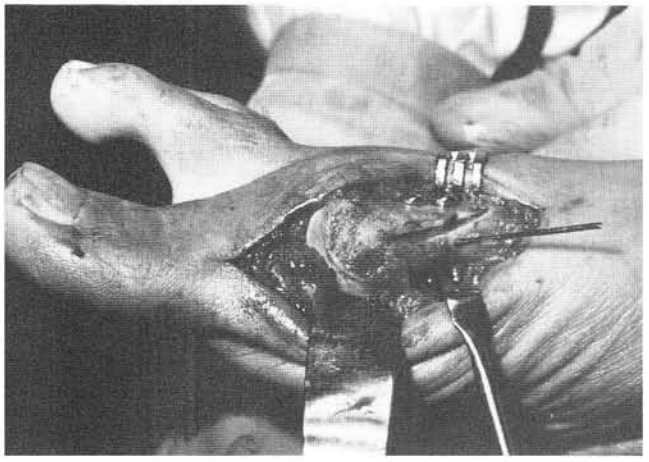

Fig. 16. Final insertion of the permanent screw is evaluated and adequacy of correction assessed. Maintenance and respect for soft tissues can be appreciated.

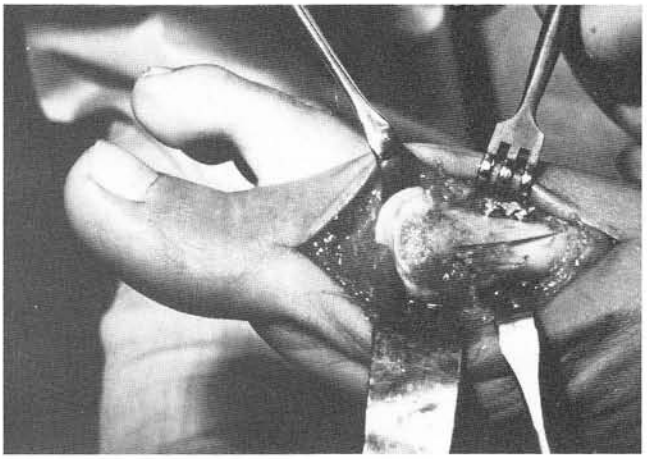

Fig. 17. Position of the osteotomy with respect to the internal fixation. Adequate respect for soft tissues and maintenance of insertion of the dorsal and plantar soft tissues has been achieved. Vascular supply of the distal first metatarsal has been insured by maintenance of the metaphyseal blood supply. Respect of soft tissue anatomy dorsally and plantarly will help retain the natural pouching effect and permit earlier recovery and ultimately greater postoperative range of motion. The osteotomy has been executed with respect to soft tissues and still allows adequate exposure for internal fixation.

CONCLUSION

This modification of osteotomy and fixation technique is highly recommended for those practitioners who are not familiar with long dorsal arm osteotomy. This more fool-proof method of osteotomy design with respect for soft tissue anatomy and internal fixation will help the novice surgeon minimize the chance for error. The more experienced practitioner may not necessarily require this modification in technique to assist in osteotomy placement and fixation. To maintain consistency of osteotomy angular placement as well as respect for soft tissue anatomy and internal fixation, it is hoped that this technique will help the practitioner become more consistent in his osteotomy design and placement.

RISK MANAGEMENT CONCERNS

This is a more fail-safe method of performing the osteotomy and fixation. This technique affords good fixation and hopefully improves the potential for healing, and lessens the chance for displacement.