

INTRA-ARTICULAR FRACTURE FOLLOWING AUSTIN OSTEOTOMY

Raymond G. Cavaliere, DPM

For years, surgeons have enjoyed the relative ease and significant stability of the Austin osteotomy. Today, the Austin osteotomy is the most widely-used technique for correction of the hallux abducto valgus deformity. A considerable amount of material has been written regarding the preoperative criteria, the limitations and the long term functional results of the Austin. The approach, both soft tissue and osseous, has been defined and modified depending on the fixation chosen.

There are many potential complications of the Austin osteotomy including under-correction, over-correction, intra-operative fracture of the dorsal wing, avascular necrosis of the bone, loss of internal fixation stability, malunion, delayed union, infection, and hallux limitus. One exceedingly rare and potentially devastating complication is intra-articular fracture of the capital fragment of the metatarsal. Although quite plausible, this complication is rarely encountered and has not been reported in the literature.

RADIOGRAPHIC FINDINGS

In the asymptomatic patient, a radiographic sign signifying intra-articular fracture is early shortening of the first metatarsal. This sign would signify collapse of the first metatarsal head. (Figure 1) In addition, loss of first metatarsophalangeal joint (MPJ) symmetry would be observed with dislocation of the capital fragment. Dorsal dislocation of the superior metatarsal head fragment is seen, especially where the plantar wing is rigidly stabilized with a fixation device.



Figure 1. Postoperative view (8 days) following an Austin bunionectomy. Note the shortening of the first ray segment, loss of joint congruity, and intra-articular fracture of the metatarsal head with dorsal displacement of the superior fragment.

ETIOLOGY

One possible reason for an intra-articular fracture is direct trauma to the first MPJ resulting in impaction of the proximal metatarsal segment into the capital fragment of the metatarsal head. This trauma could occur if the patient stubbed their great toe in the immediate postoperative phase. (Figure 2)

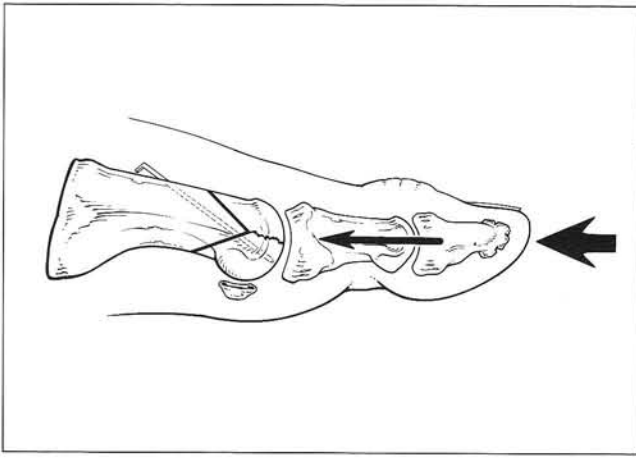


Figure 2. Direct trauma creating impaction of the joint may lead to an intra-articular fracture of the metatarsal head.

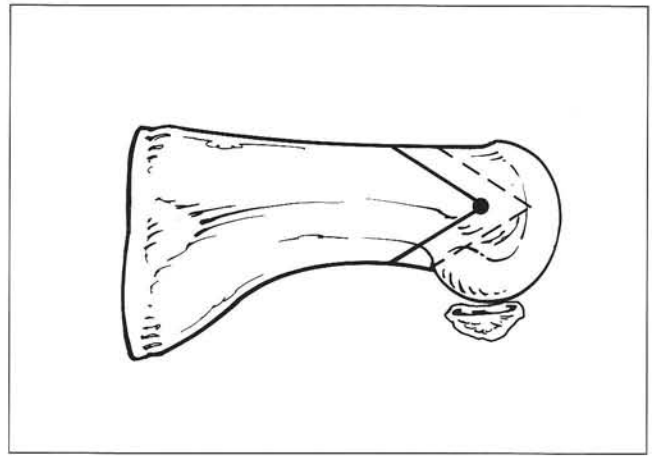


Figure 3. Normal location of the Austin osteotomy compared to an osteotomy placed too close to the articular surface of the metatarsal head, increasing the likelihood for fracture of the capital fragment.

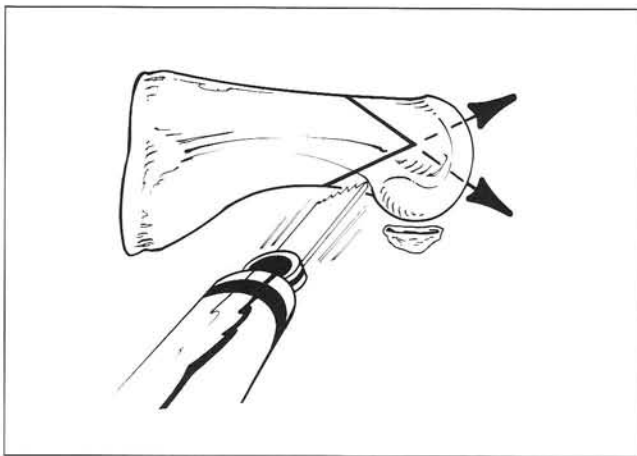


Figure 4. Saw cuts extending beyond the apex point may create direct violation of the articular surface, or create stress risers that lead to intra-articular fracture of the metatarsal head. The use of an apical axis guide wire may reduce the incidence of intraoperative complication.

In the absence of associated trauma, poor or inaccurate surgical technique may be a primary factor. This situation may include an apex which is placed too distally (Figure 3) with not enough substantial bone substance to prevent fracture of the capital fragment at the apex, followed by separation of the dorsal and plantar wings of the capital fragment. Excursion of the saw blade past the apex while performing the osteotomy may lead to an intra-articular fracture as well. (Figure 4)

Other factors may include poor bone substance with osteoporotic bone, cystic formation within the metatarsal head, and other degenerative changes of bone substance which provide less than ideal integrity of opposing segments of bone for stable fixation.

Poor surgical exposure can also lead to complications of osteotomy technique and fixation by not allowing the surgeon to completely visualize the shape and contour of the metatarsal head and related structures. Inappropriate osteotomy length or direction may then easily lead to violation of the articular surface and intra-articular fracture.

Multiple saw cuts or passes repeated in different or diverging directions may widen the osteotomy or create incongruity in the opposing surfaces of the osteotomy. Incongruity can lead to instability and the ultimate fracture of the capital fragment as well.

REPAIR FOLLOWING INTRA-ARTICULAR FRACTURE

In most instances, intra-articular fracture and displacement of the capital fragments of an Austin-type osteotomy will require an additional surgical intervention for reduction and secure fixation. (Figure 5A, 5B) Surgical repair should re-establish the congruity of the articular surface of the metatarsal head, length of the metatarsal and ultimately weight-bearing function of the first ray segment.



Figure 5A, 5B. Postoperative intra-articular fracture following Austin osteotomy with internal pin fixation. Note the dorsallateral dislocation of the superior fragment.



Figure 5B.

CASE PRESENTATION

Figures 6 through 12 demonstrate the surgical repair of a displaced intra-articular fracture of the capital fragments following an Austin-type unionectomy. This case was also complicated by

wound dehiscence and positive wound cultures of *Pseudomonas aeruginosa*. Bone cultures were negative even though loss of bone substance was noted intra-operatively. Bone grafting was necessary for the final repair and the overall site was secured by plate fixation. Intravenous antibiotic therapy was also employed post-operatively.

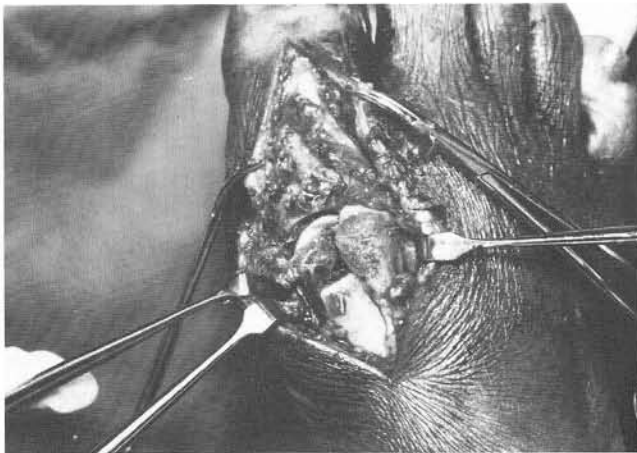


Figure 6A. Intra-operative identification of the capital fragments.

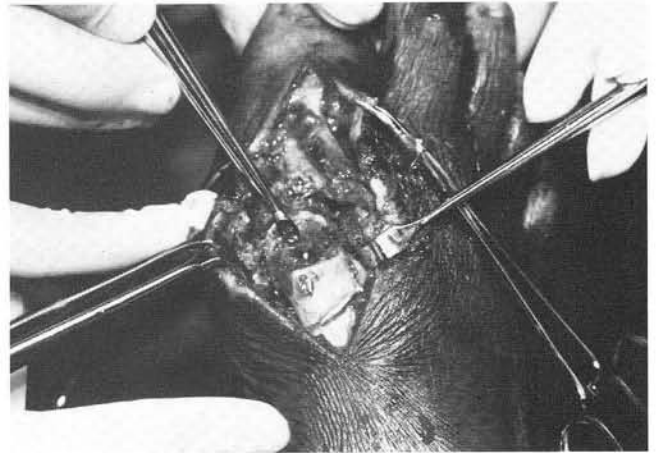


Figure 6B. Intra-operative curettage of the capital fragments.

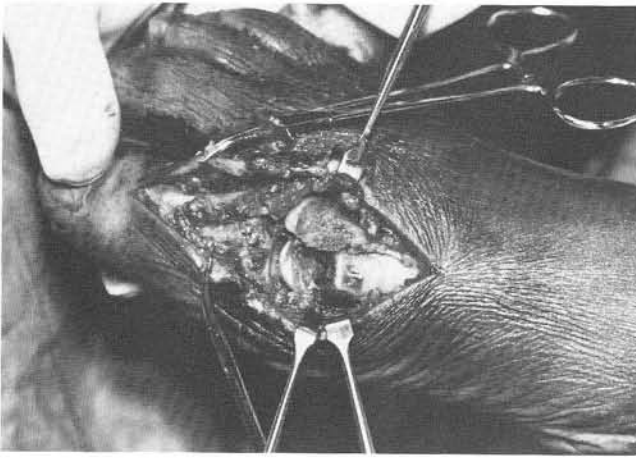


Figure 7A, 7B. Intra-operative view of the metatarsal head fragments and inspection of the bone loss.

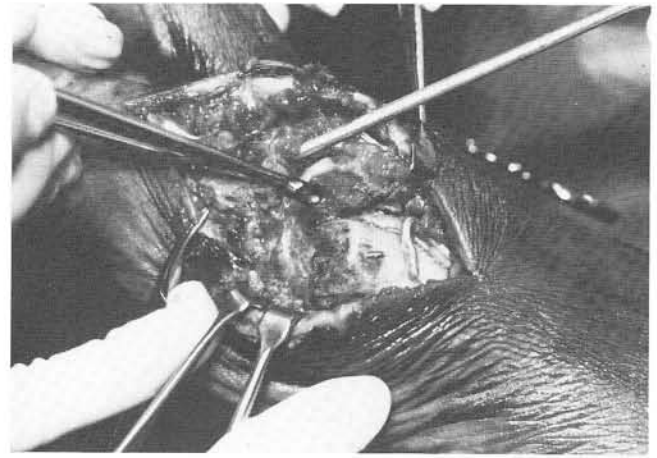


Figure 7B.

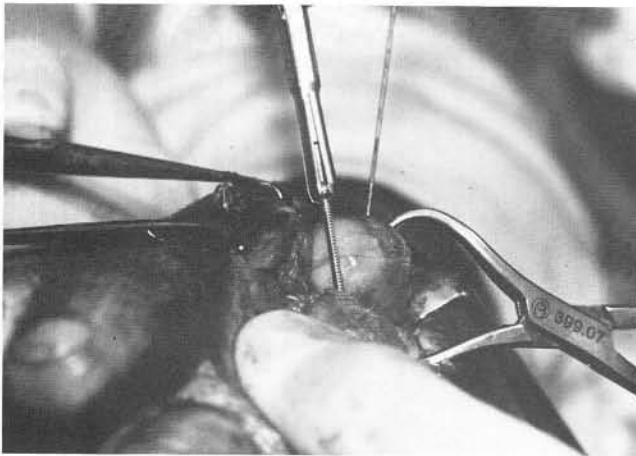


Figure 8A. Anatomic reduction and restoration of the articular surface of the metatarsal head. Reduction of the alignment of the capital fragments is maintained by the insertion of two 2.0 mm cortical screws.

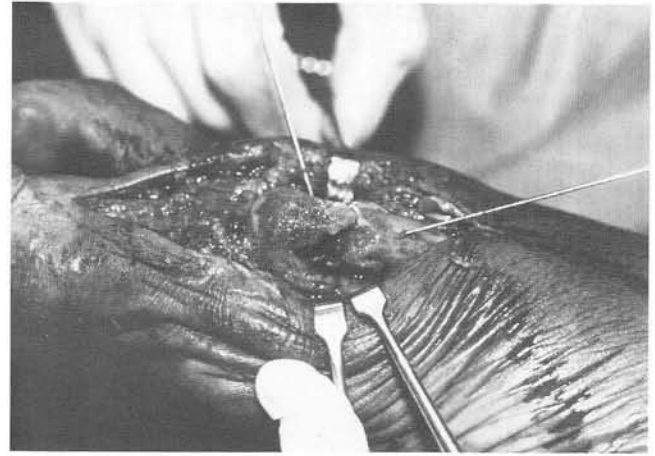


Figure 8B. Temporary anatomic reduction. Note the loss of bone substance between the metatarsal head and the plantar cortex of the proximal metatarsal segment.



Figure 9A, 9B. Intra-operative x-ray demonstrates anatomic restoration of the metatarsophalangeal joint and length of the metatarsal segment. The defect had been repaired with the use of a bone graft

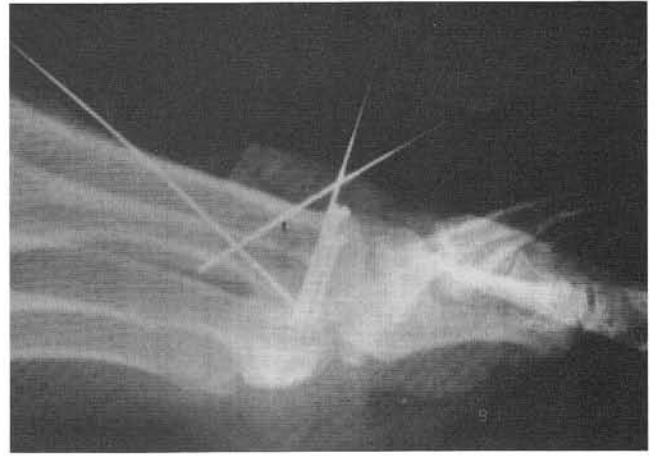


Figure 9B.



Figure 10A, 10B. Intra-operative x-rays demonstrating additional plate fixation for reinforcement of the primary reduction.

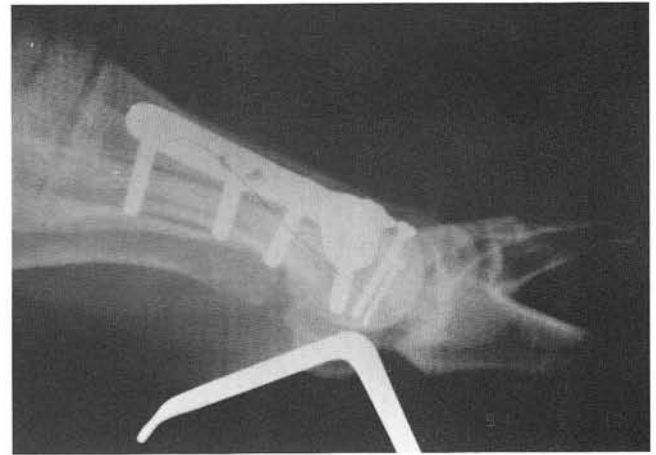


Figure 10B.

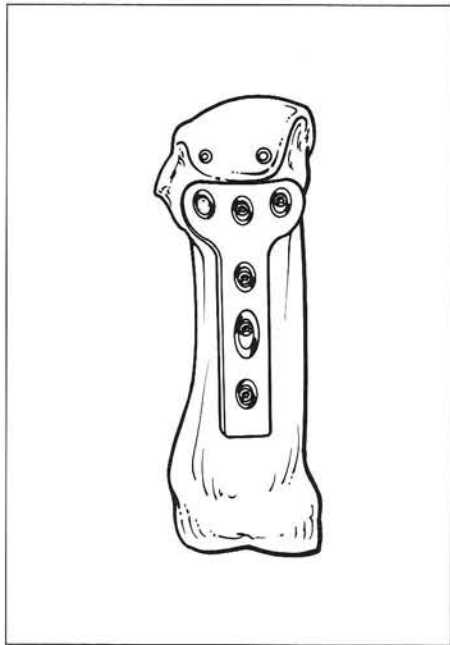


Figure 11A, 11B. Reduction and stabilization using a small T-plate.

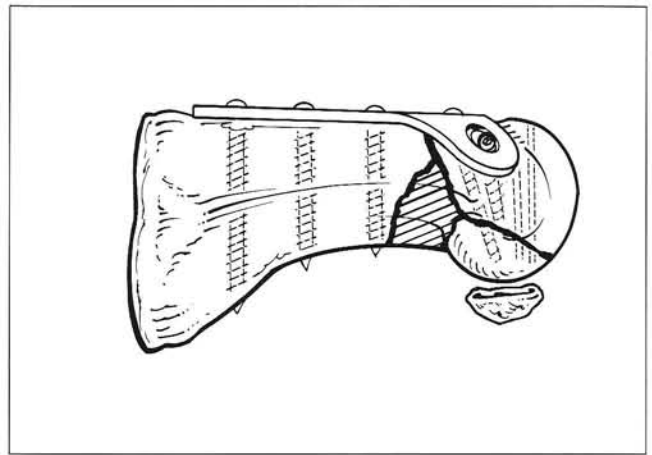


Figure 11B.



Figure 12A, 12B. Final healing and union.



Figure 12B.

CONCLUSION

Although rare, intra-articular fracture following an Austin-type osteotomy represents a significant postoperative complication. Surgical management of this fracture is usually necessary for anatomic reduction and stabilization of the involved architecture. Fixation will depend upon the configuration and stability of the fragments found at the time of surgery, bone stock, and the degree of soft tissue and osseous integrity.