CHAPTER **21**

REPAIR OF THE DISPLACED AUSTIN OSTEOTOMY

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INTRODUCTION

Bunion surgery is frequently performed by foot and ankle surgeons. Generally, bunion surgery is quite predictable, but complications do occur. This discussion will center on identifying short-term complications that may require return to surgery and revisionary procedures.

Bunion surgery generally involves osteotomy and reconstructive joint procedures. it is necessary to have close inspection of immediate postoperative results and vigilant assessment during the near-term postoperative course where excessive weightbearing and activities may promote displacement and unsatisfactory clinical result.

BUNION SURGERY

All surgery has potential complications that may be prevented or minimized with cautious postoperative monitoring of the patient. Bunion surgery is such a frequently performed procedure that surgeons should have a very clear understanding of potential complications and watch carefully for their occurrence. Today, surgeons are able to perform more complex procedures on patients with significant comorbidities that may also contribute to the occurrence of postoperative complications. It is within this framework that our discussion develops.

The typical patient with hallux valgus generally presents with moderate to severe deformities. Most patients are middle age, female, and are frequently postmenopausal. Reduction of intermetatarsal angle and correction of first metatarsophalangeal joint deformity generally dictate the surgeon's decision making process regarding procedural selection. Comorbidities such as osteoporosis, diabetes, age, and ability to restrict nonweightbearing in the postoperative period must be considered.

Most bunion surgery involves a first metatarsal osteotomy, with distal osteotomy probably making up the majority of surgical procedures performed today. Surgeons have become very adept at performing complex osteotomies and rigid internal fixation. The surgery is generally accomplished on an outpatient basis under local anesthesia or with intravenous sedation, and patients may experience little pain due to prolonged nerve blocks. At times, a cavalier approach regarding foot surgery, by both patient and surgeon may lead to poorly compliant patients and increased frequency of postoperative complications.

Weightbearing has a tremendous negative implication upon any first ray osteotomy, but is predictably deleterious to proximal osteotomy or arthrodesis, i.e. Lapidus. Generally, 6 to 8 weeks of nonweightbearing with axillary crutches and some type of immobilization with a cam Walker or below knee cast is necessary for proximal osteotomy. Weightbearing too early in the postoperative period will generally lead to dorsal displacement and angular deformity with the apex at the surgical site or the osteotomy.

A distal osteotomy is somewhat more tolerant of weightbearing, although the author's typical postoperative regimen for distal osteotomy includes 4 weeks of restricted weightbearing in a below-knee cam-walker or brace. Even with these restrictions, complications may occur.

Hallux osteotomy is not without its difficulties. Both weightbearing and the influence of the EHL may lead to osseous displacement and postoperative deformity. The Akin procedure may be performed as either a proximal or distal osteotomy within the hallucal proximal phalanx. Excessive plantar pressure distal to the osteotomy may lead to angular displacement or complete disruption of the osteotomy site. We will review the Austin osteotomy because it is one of the most frequently performed procedures for the correction of hallux valgus.

CASE 1

Case 1 involves an Austin type bunionectomy in a 62-year-old woman with a history of osteoporosis, gastric ulcers, and osteoarthritis. Her current medicines included femhert, Prozac, Boniva and vitamins. Her initial radiographs showed a significant bunion deformity with a hallux abductus angle of 36°, and a 16° intermetatarsal angle (Figure 1A). She showed good bone density considering her history of osteoporosis. The patient

underwent an Austin type bunionectomy with excellent reduction of preoperative deformity. Fixation was achieved with a 2.7-mm fully-threaded absorbable bone screw (Arthrex, Naples, FL) placed from dorsal-proximal to plantar-distal. No intraoperative problems or difficulties occurred. She was discharged to her home, ambulatory in a below-knee cam walker with instructions for limited activities. The immediate postoperative radiographs showed the osteotomy to be well-aligned with reduction of preoperative deformity.

The patient was subsequently seen at 3 weeks post-operatively, the dressings were removed and the foot looked very nice. Radiographs were obtained and showed very nice position of the great toe in the transverse plane, but sagittal plane tilting of the capital fragment (Figures 1B, 1C). The patient was questioned regarding her activities and she states that in the week prior she was feeling so good that she walked to the neighborhood mall approximately 2 blocks from her home.

Revisionary surgery was recommended and performed, which included reduction of the sagittal plane deformity occurring at the osteotomy. This was made somewhat difficult due to presence of the absorbable screw and the degree of bony union occurring at the osteotomy. As a result of intra-operative manipulation, a crack in the capital fragment occurred extending from the apex of the osteotomy to the subchondral bone. Good reduction was achieved with the dorsally applied 2.4-mm modular hand Synthes T-plate. Additionally, a 2-mm absorbable bone pain was inserted obliquely through the capital fragment to stabilize the previously noted crack in the capital fragment. An area of bone void was apparent medially and this was packed with demineralized bone matrix.

Postoperatively the patient was placed in a below-knee fracture brace and axillary crutches. The cast was removed at 6 weeks postoperative, and radiographs showed good position of the great toe and nice maintenance of reduction at the osteotomy (Figure 1D, 1E). She went on to progressive weightbearing and increased activities. The subsequent postoperative course was unremarkable, and the patient was reevaluated at 1 year postoperative with excellent reduction of deformity and very nice range of motion. She was pleased with her surgical result and was ready to proceed with bunion surgery on the opposite foot.

Figure 1A. Preoperative AP radiograph of moderate hallux valgus deformity.

Figure 1B. AP radiograph taken at 4 weeks post-operative showing sagittal plane displacement and dorsal tilting of the capital fragment. Patient was taken back to surgery at 6 weeks for postoperative revisionary surgery

Figure 1C. Lateral view at 4 weeks postoperative.

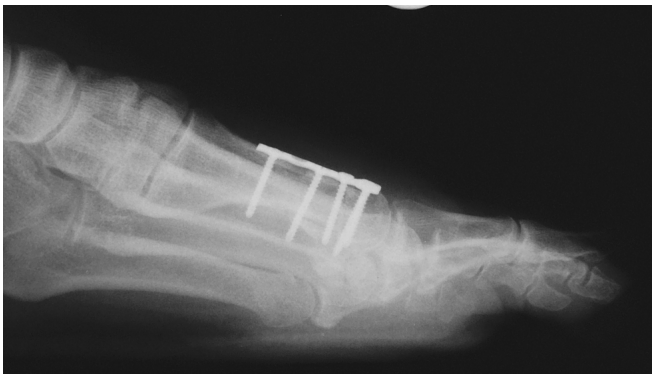

Figure 1E. Lateral view.

Figure 1 D Radiograph showing good alignment in both the transverse and sagittal planes as well as correction of preoperative hallux valgus.

CASE 2

Case 2 involves a similar situation where an Austin type bunionectomy was performed in a 59-year old patient who had significant hallux valgus deformity. Her past medical history was significant for hypothyroid, hyperlipidemia, and GERD. Her current medications included Synthroid, Paxil and Zetia. Preoperative radiographs showed good bone density and were significant for hallux valgus as well as lesser toe digital adduction. The hallux abductus angle was 30°, and the intermetatarsal angle was 12°.

She also underwent Austin type bunionectomy with 2.7-mm absorbable screw (Arthrex) fixation. No intraoperative difficulties were encountered, and postoperative radiographs showed excellent reduction of preoperative deformity and alignment of the great toe and osteotomy. The patient was followed by an out-of-town physician, and returned for evaluation at 6 weeks postoperative. She was experiencing no difficulties and did not give any history of injury. The patient stated that she used the below-knee fracture brace for the full 4 week postoperative period and then began transition into regular shoes. Postoperative radiographs at 5 weeks showed malalignment of the hallux valgus repair including medial subluxation of the first MTP joint. The capital fragment appeared to be displaced in both a lateral and dorsal direction. The patient was advised to have additional surgery for reduction of apparent deformity.

She subsequently underwent revisionary surgery for reduction of the displaced osteotomy. Intraoperatively, a fracture of the capital fragment was apparent. Initial reduction included applying a 2.4-mm Synthes T-plate to the dorsal surface of the capital fragment as well as stabilization of the noted metatarsal head fracture with another screw placed in the medial to lateral direction. Subsequently, the long arm of the T-plate was secured to the dorsal surface of the first metatarsal.

Reduction of the displaced capital fragment was achieved with good stabilization. She was discharged home nonweightbearing in a below-knee fracture brace on axillary crutches. The cast was changed at 3 weeks postoperative and subsequently removed at 6 weeks. Follow-up radiographs showed progress of consolidation of osteotomy with good maintenance of correction. She progressed to full weightbearing and regular shoes with out any further difficulties. On last evaluation at 6 months postoperative, she was fully ambulatory and had been experiencing no difficulties. She had an excellent range of motion with good position of the great toe.

CASE 3

Case 3 involves a 62-year-old woman with a significant bunion deformity and degree of osteopenia. Her hallux abductus angle was 40°, with an intermetatarsal angle of 16°. There was irregularity of the tibial sesamoid appearing to be multipartite and a tibial sesamoid position of 7. Several small cystic-like lesions along the medial half of the first metatarsal head and medial eminence are apparent in the preoperative radiographs.

She underwent an Austin type bunionectomy with 2.7-mm absorbable screw (Arthrex) fixation as well as use of a mini-tight rope between the first and second metatarsal to aid in reduction of intermetatarsal angle. No intraoperative difficulties were encountered and immediate postoperative radiographs showed excellent reduction of both the intermetatarsal angle as well as first metatarsophalangeal joint deformity.

The patient was placed in a below-knee fracture brace per routine for an Austin-type bunionectomy. She was initially followed by an out-of-town doctor, and then returned for reassessment at 6 weeks postoperatively. Clinically, she showed a medial prominence in the area of prior bunion, but a straight position of the great toe. Radiographs were obtained and showed significant displacement of the capital fragment in the transverse plane. The capital fragment appeared to swivel with medial deviation and first metatarsophalangeal joint subluxation.

The patient was informed of the displacement, and revisional surgery was recommended. The procedure was performed within a few days and included removal of the previously placed tight rope device as well as the absorbable screw. Reduction of the capital fragment was achieved, but resulted in a significant bone void medially, probably as a result of the medial displacement. Again, a 2.4-mm modular hand Synthes plate was applied to the dorsal surface with the base of the plate and initially applied to the capital fragment followed by reduction of the osteotomy. The bone void was filled with DBX bone matrix allograft. The patient was placed nonweight-bearing in a below-knee cast and axillary crutches. Postoperative radiographs showed nice reduction of the previously noted deformity and osseous displacement.

Figure 2A. Moderate hallux valgus deformity associated with adduction contractures of the lesser toes.

Figure 2B. Postoperative radiograph shows dorsal and lateral displacement of the capital fragment and medial subluxation of first MTP joint.

Figure 2C. Lateral view of postoperative radiograph showing displacement.

Figure 2E. Lateral view of dorsal T-plate.

Figure 2D. Patient returned to surgery for open reduction and internal fixation was achieved with dorsal T-plate and additional medial collateral interfragment screw

DISCUSSION

Complications of hallux valgus surgery do occur, with the most frequently probably being recurrent deformity. Joint malalignments seen include recurrence of hallux valgus or development of hallux varus deformities, which are in the forefront of the surgeon's mindset. Less frequent, but still a prominent consideration is that of osseous malalignment with or without joint deformity. These 3 cases involve significant malalignment of Austin type osteotomies in a postoperative period somewhere between leaving the operative center and subsequent radiographs (generally at 2 to 6 weeks postoperatively.) Minor osseous displacement may occur in the postoperative period particularly with weightbearing-type procedures. Surgeons must evaluate postoperative radiographs and decide upon the necessity of revisionary surgery when significant displacement or deformity are noted. It is never an easy task to recommend to the patient that they must return for a more difficult operation and subsequent disability.

In each of these 3 cases, routine type bunion procedures were performed and complications encountered. All patients had initially underwent an Austin- or Chevron-type bunionectomy with internal fixation performed with a fully threaded 2.7-mm PLLA absorbable screw placed from dorsal and proximal to plantar and distal utilizing lag technique for stabilization via interfragmentary compression. All 3 patients were postmenopausal females of approximately 60 years of age. Significant osteopenia was noted in 2 of the 3 patients, while only one was on a therapeutic drug for osteoporosis. No intraoperative difficulties were encountered, and even at the time of postoperative evaluation, patients were essentially symptom-free and not experiencing a problem.

Radiographs showed that significant displacement had occurred and that additional surgery was warranted. The patients elected to follow the advice of their surgeon and proceed with revisionary surgery. In each case, the initial surgery was more involved and more difficult than the initial procedure performed and the postoperative course more stringent with requirements of nonweightbearing and the use of axillary crutches. All 3 patients were very

pleased with their final result and one patient even requested that her other foot be corrected.

The obvious plan of most surgeons is to avoid complications. Patients do not appreciate poor results or the need to return to surgery. Complications do occur with some statistical frequency and the surgeon should be able to recognize problems when they occur. These cases involved significant displacement of Austin or chevron-type osteotomies. This surgeon's protocol is to obtain immediate postoperative radiographs at the surgical site prior to patient discharge to both ascertain the surgical result, but also to document that the toe and osteotomy are well aligned. These cases involve displacement in the postoperative period somewhere between leaving the operative center and subsequent radiographs.

When a patient is brought back to surgery, the surgeon takes on the added difficulty of handling a complication that is likely more difficult than the original problem. Each of these cases involved open reduction and internal fixation of a malaligned osteotomy often with an osseous defect. There had been prior surgery, and the removal of implanted fixation devices must also be considered. Defects should be repaired with some type of bone grafting or bone graft substitute. Good osseous stabilization with adequate internal and/or external fixation should be performed. Intraoperative radiographs or fluoroscopy should be utilized to ascertain intraoperative progress and adequacy of reduction. The surgeon should be adequately trained to handle these intraoperative challenges.

CONCLUSION

Surgeons perform hallux valgus surgery every day, and fortunately complications are rare as most results are very predictable with correction of osseous and joint deformities. Complications do occur and surgeons must be vigilant. A surgeon's recognition of the problem as well as their willingness and ability to correct the complication are all necessary. Patients should be made aware of complications when recognized and presented with a role in the decision making process that will improve their condition or alleviate the problem. Certainly, it is generally very difficult to tell your patient that he or she must return to surgery but there are times when this is necessary. Surgeons must maintain their objectivity and fortitude to admit to a problem and willingness to correct such.

Figure 3A.This case illustrates a somewhat more severe hallux abductus deformity. The initial hallux repair included Chevron type osteotomy combined with mini tightrope.

Figure 3B. Radiograph taken immediately post-operatively in the recovery room, which shows the osteotomy to be well aligned and no apparent deformity.

Figure 3C. Displacement occurred in the postoperative period with transverse plane medial angular deviation of the capital fragment.

Figure 3D. Patient returned to surgery for open reduction and internal fixation which included dorsal T-plate.

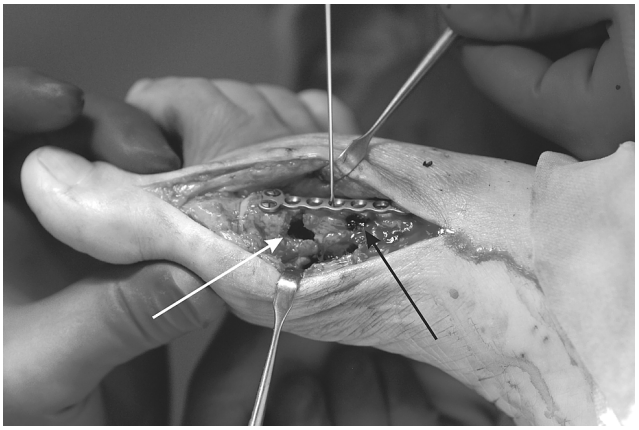

Figure 3E. Osseous defect at osteotomy, white arrow, and screw hole, black arrow, were packed with allograph bone matrix.