CHAPTER **27**

THE AUSTIN BUNIONECTOMY: THE AUTHOR'S 20+ YEAR EXPERIENCE

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The Austin Bunionectomy has been one of the most widely performed procedures for the correction of hallux valgus since its introduction in the late 1970s. This osteotomy has enjoyed popularity with both podiatrists as well as orthopedists. The Austin or chevron osteotomy was initially described as a 60° osteotomy performed within the 1st metatarsal head.[1] The apex of the osteotomy is placed distal at the geometric center of the metatarsal head with the arms of the osteotomy extending dorsal and plantar to the metatarsal neck region (Figure 1). The procedure involved lateral transposition of the capital fragment following performance of the osteotomy and was usually performed with a lateral release combined with capsule tendon balance. Medial exostectomy of the 1st metatarsal head may be performed either before or after the osteotomy.

The osteotomy has undergone modifications to evolve from a simple transpositional osteotomy to one that allows triplane correction.[2-7] In the 1980s, surgeons became very aware of osteotomy mechanics and these same principles were applied to all osteotomies. The other very important development was that of modern power equipment, which allowed for precise bone cuts for clinical application of the geometric designs placed on paper. This osteotomy was one that renewed the popularity of distal osteotomy in the correction of hallux valgus.

The most common distal osteotomies performed prior to the Austin were the Reverdin, Hohmann, and Mitchell type procedures. The advent of the Austin also came at a period of time when there were many disappointments and poor results with the proximal 1st metatarsal closing wedge. The Austin offered a more stable osteotomy configuration that allowed for transverse plane correction of the metatarsal deformity. Later, this was modified with removal of a medially based portion of bone that allowed correction of PASA. The osteotomy underwent further variations to allow for shortening and plantar displacement of the capital fragment (Figure 2).

This article will review the author's 20-plus year experience with this procedure and in particular the fixation of the osteotomy. Fixation may vary from the use of Kirschner wires, screws or absorbable fixation.

THE OSTEOTOMY

With the advent of screw fixation, the natural tendency was to insert the screw in either a dorsal-distal to plantar-proximal manner or from a medial-proximal to lateral-distal location. The

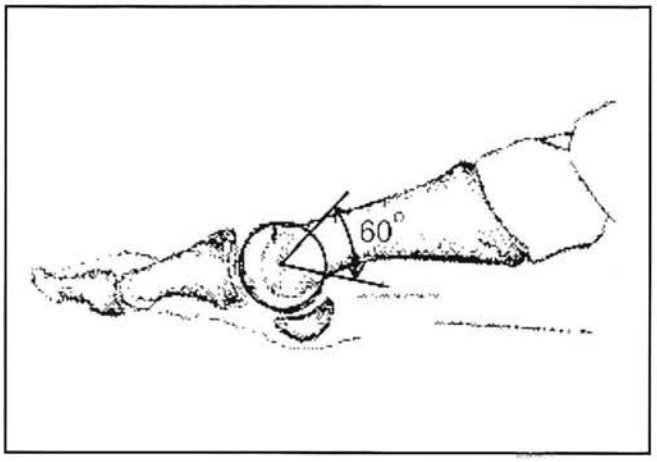

Figure 1. The Austin or Chevron osteotomy.

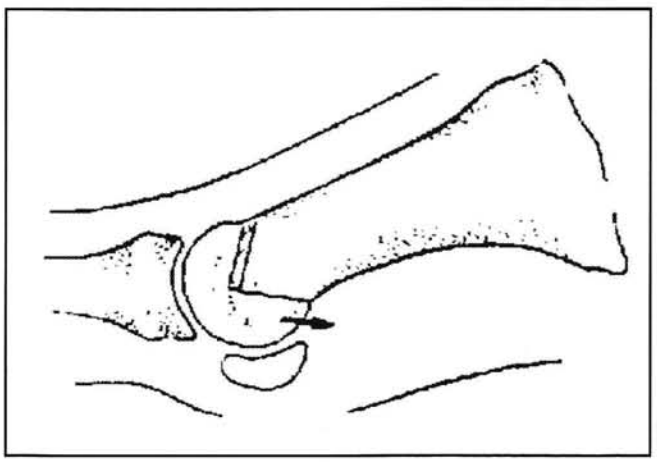

Figure 2. Variations on the Austin.

author observed that medial fixation techniques might have a detrimental effect with regard to the cosmetic bone resection of the bunion medially. Placement of a dorsally based screw immediately adjacent to the joint surfaces should be avoided to allow free and unimpeded movement. For these reasons, a more proximal insertion point but dorsal in location has proven very effective.

As a consequence of the selection of screw insertion, modification of the osteotomy has evolved. Occasionally, the screw hole and its countersink bone deficit encroached upon the dorsal arm of the osteotomy. Fracture of the dorsal cortex during screw insertion was occasionally seen. In an effort to avoid this, the dorsal arm of the chevron osteotomy was placed at an angle greater than 60°. Subsequently, the apex of the osteotomy was chosen at a point superior to the geometric center of the first metatarsal head to allow greater bone volume for screw purchase in the capital fragment. The plantar arm of the osteotomy is cut first to ensure that the osteotomy connects the apex with a point just proximal to the sesamoidal flare of the first metatarsal head. The dorsal arm of the chevron osteotomy is cut so that the osteotomy perforates the lateral surface somewhat plantar as well as proximal to the corresponding points medially. This will provide for plantar transposition and shortening with lateral translocation of the capital fragment. It also provides for a large dorsal cortical surface for insertion of screw fixation.

FIXATION TECHNIQUES

Our basic technique of screw insertion has varied little over the years even though numerous screw designs have been used. Following displacement of the capital fragment, preliminary fixation with a 0.045" Kirschner-wire was performed inserting the wire in a medioplantar to dorsolateral direction. This is quick, easy, and stable and allows for insertion of the screw without the screw running into the preliminary fixation. Screw insertion is with standard AO techniques although several techniques for determination of proper screw length have been used. Initially, Austin and many others described performance of the osteotomy without any fixation beyond "impaction" of the cancellous bone surfaces. Later, Austin did publish use of a K-wire placed in a dorsal to plantar direction and numerous other fixation designs were advocated.

My experience began in 1980 with performance of the osteotomy in a typical 60° configuration followed by medial impaction in an effort to reduce PASA followed by fixation with a K-wire. At that point of time, surgeons varied their choices with placement of the K-wire either through the incision or percutaneous insertion distant to the osteotomy. The wire was usually left in place for 3 to 6 weeks and patients were allowed to ambulate either in a surgical shoe or foot cast.

Initially following transposition of the capital fragment, a 0.062" K-wire was inserted at the dorsolateral corner of the articular surface and drilled in a medial and plantar direction. The object was to pierce the medial cortex of the first metatarsal proximal to the neck region. The wire was then retrograded proximal so that the tip of the wire would lie just below the articular surface. This wire came through the skin medially and was either bent or a Jurgen ball placed on the end.

Due to reports of medial irritation in some patients, an alternative approach was used. This involved percutaneous insertion through the skin and subcutaneous tissues lateral and proximal to the osteotomy. The K-wire was then driven distally and medially to perforate the bone near the medial plantar corner of the first metatarsal head. This wire was better tolerated but often would loosen prior to anticipated removal in 4 weeks. Many procedures were performed bilaterally and patients were allowed to ambulate immediately in a surgical shoe. Several hundred procedures were performed between 1981 and 1983.

In the early 1980s, podiatric surgeons began using screws and ASIF techniques of osteosynthe-

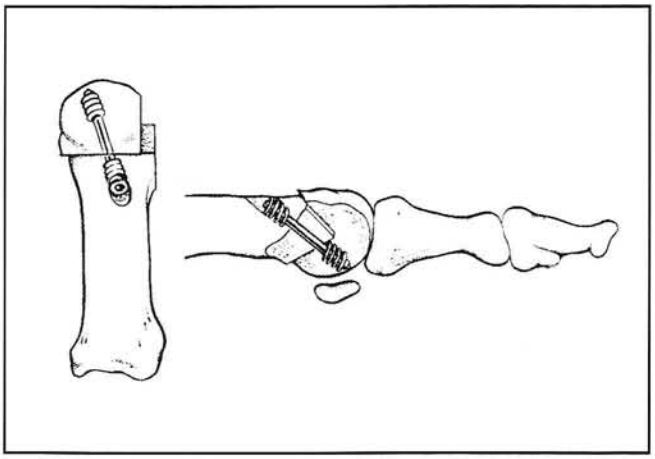

Figure 3. Fixation in elective osteotomies. The screw is inserted in a proximal a dorsal to distal and plantar direction.

sis in their elective osteotomies. Due to the subcutaneous nature of the dorsal metatarsal surface, the Herbert bone screw seemed to be a natural choice for fixation of this osteotomy. The screws were inserted in a proximal and dorsal to distal and plantar direction (Figure 3). Over 200 procedures were performed in this manner and for the most part, patients did well with predictable bone healing and limited complications.[8] Insertion was performed in a manner to provide interfragmentary compression although subjectively not to the same degree as that achieved with typical AO screws. Some difficulties were encountered with purchase of the trailing thread within the dorsal cortex. Clinically, simpler techniques were sought.

Initially, the choice of a standard ASIF screw was either the 2.7 cortex screw or 3.5 or 4.0 mm cancellous screws (both narrow core, 1.75mm pitch). Oblique placement of the screws required very significant countersinking or troughing of the dorsal cortex. These latter screws, the 3.5 and 4.0 mm cancellous, were used sporadically due to a rather large 6.0mm head, which made it prominent postoperatively. It was at this time (1985), that a custom-made 4.0mm cancellous screw was designed, the "bunionectomy screw". Now, the screw could be placed in a similar manner to the Herbert bone screw but without the subcutaneous prominence noted with a standard screw. Actually, two different screws were used: 1) the bunionectomy screw, 4mm thread diameter, 1.9mm core diameter, 5 mm head and 1.75 pitch and 2) the maxillofacial emergency screw, 3.5mm thread diameter, 1.9mm core diameter, 5mm head and 1.75mm pitch. Both these screws were used in large numbers, particular the former with over 1000 osteotomies performed.

The next development was the 4.0mm cannulated screw, 4mm thread diameter, 1.9mm core diameter, 5mm head and 1.75mm pitch. This screw was utilized in over 300 procedures and placed in much the same manner as described prior. These self-drilling, self-tapping cannulated screws offered little advantage to solid screws except that insertion was into "virgin bone", that is without any prior drilling or tapping, and felt to have some advantage with screw purchase.

Absorbable fixation then came into clinical practice, first with Orthosorb (poly-para-dioxanone, PDS) and then Biofix (polyglycolic acid PGA) rods. These products were evaluated but neither seemed to offer any advantages. Later, poly-L-lactide (PLLA) rods were reformulated and the screws marketed by Bionx. The 3.5mm fully threaded screw was selected for use and over the last 3 years represents the most common fixation alternative for distal osteotomies. Few problems have been noted, with only occasional difficulty inserting the screw into dense sclerotic cancellous bone. Good stability is generally achieved and healing has been very predictable with none of the soft tissue reactions associated with PGA devices. An advantage of the bioabsorbables is that the material may be modified following insertion. After secure placement of the screw, the head is re-modeled or "melted" with a hot tip cautery. This is particularly appropriate with the oblique placement utilized for these distal osteotomies. No portion of the screw head is left prominent.

POSTOPERATIVE CARE

Initially, many procedures for the treatment of hallux valgus were performed bilateral with little more than a surgical shoe used for ambulation. This included most first metatarsal osteotomies. Surgeons then realized that weight-bearing was detrimental to the process of healing. Since the early 1990s most osteotomies have been performed unilateral and with restricted weight-bearing in a below-knee fracture brace for 3 to 4 weeks. This cautious postoperative regimen has proved successful regardless of whether fixation is accomplished with traditional metallic screws or bioabsorbables.

SUMMARY

The author has utilized variations of the Austin osteotomy for more than 20 years. It is one of the most commonly performed of all operations for the correction of hallux valgus. Although, initially performed with minimal or no fixation, like most osteotomies today, fixation is recommended. Internal fixation be it wire, staple, or screw maintains the position of the bone that the surgeon places it in at the time of surgery. The surgical goal is to minimize morbidity and provide for rapid return to preoperative activity. The innate stability of the Austin osteotomy combined with stable internal fixation has achieved very predictable results for the correction of hallux valgus with

generally limited complications. Fixation is an important aspect of elective osteotomies and arthrodesis. Many good alternatives are available and are largely selected based upon surgeon preference and availability.

This procedure that began as a simple translational osteotomy has evolved into one that allows for multiplanar correction appropriate for a large variety of bunion deformities. In this era of cost containment, there are issues regarding the use of less expensive implants versus more costly ones. My own experience validates published studies that the cost of a fixation implant does not necessarily play a role in the success or patient satisfaction of a procedure.[9-12] The implant chosen for fixation of the osteotomy generally does not influence the correction of deformity as long as some type of fixation is used.

Table 1.

Fixation Technique	CIRCA	Procedural Numbers(est)
Kirschner Wire	1980-83	250
Herbert Bone Screw	1983-85	225
4.0 (3.5) Standard AO screws	1983-85	50
Bunionectomy Screw	1985-1999	1000+
4.0 Cannulated Screw	1993-1999	300
Absorable Screw	1998-2001	150

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