Etiology and Treatment of Hallux Valgus

THE CHEVRON PROCEDURE

Edward O. Leventen, MD

The Chevron procedure is a distal first metatarsal osteotomy useful for correction of milder grades of hallux valgus and metatarsus primus varus un bunion deformity.

The operation was conceived and first performed by Austin in 1962. He and the author also presented it as an exhibit at the AAOS Meeting in 1968. Since then, the author has performed several hundred modified Chevron procedures to evaluate various techniques: with and without K-wire fixation, with short leg casting versus soft dressings, without adductor tenotomy versus tenotomies, and U-shaped versus L-shaped medial capsular flaps.

The indications and technique presented represent current thinking on the status of this operation. This article presents the conclusions of a series of 90 patients physically and radiographically evaluated in 1989, representing 120 feet over the past 3 years.

The pathomechanics and etiology of hallux valgus have been discussed in previous articles. The causes of hallux valgus are multifactorial.

Hallux valgus and metatarsus primus varus angles found on radiographs are important in decision making. Other radiographic information needed for treatment is the presence or absence of arthritis in the metatarsophalangeal (MTP) joint, and the status of the first and second metatarsocuneiform articulation.

INDICATIONS

Surgical indications are simple: a patient who has tried conservative shoe wear and is either dissatisfied or untreated regarding bunion pain. Cosmesis should not be a significant consideration in this or any other bunion surgery.

The Chevron osteotomy is most useful for the milder grades of hallux valgus deformities. With the normal hallux valgus angle being less than 15°, the upper limit for Chevron correction is 35°. With the normal 1-2 intermetatarsal angle being <10°, a 1-2 IM angle of 15° appears to be the upper deformity limit to achieve adequate Chevron correction. This operation is best done in the presence of a congruent MTP joint, and is contraindicated in the presence of significant joint disease (Fig 1).

In evaluating complications and failures, age does not appear to be a factor. Unlike others, the author found the Chevron procedure to be equally successful with juveniles and seniors with bunions.

The operation is a horizontally directed "V" displacement osteotomy of the first metatarsal head, combined with a soft tissue structure release and balancing on both sides of the joint, as described in most other bunion operations. Adductor release is never done through the first web space as in a McBride procedure, since this would jeopardize head fragment vascularity. All surgery is performed through a single medial longitudinal incision, with minimal soft tissue stripping. In this series, there has been no avascular necrosis.

In 85% of this study's cases, operations were done under ankle block anesthesia. Both feet can be operated on at one sitting, and an Esmarch bandage is used as an ankle tourniquet. Otherwise, pneumatic tourniquets are used at thigh level.

The operation is performed through a 6 cm medial longitudinal incision centered over the MTP joint, and deepened into the capsule. Care is taken to protect the dorsal cutaneous nerve. An "L" shaped capsular flap is cut based on the proximal phalanx and with the long limb of the "L" on the dorsal aspect of the joint (Fig 2). The flap is turned distally and inferiorly. About 1 to 2 mm is trimmed off the margin so later reattachment will tend to realign the sesamoids (Fig 3).

The condylar prominence is removed with a power saw just medial to the sagittal sulcus, and the osteotomy is kept parallel to the medial border of the foot. By distracting and forcing the great toe into valgus, the surgeon can reach through the joint, and cut the lateral capsule and conjoined tendon near their insertion (Fig 4).
Fig 1: A moderate deformity with a congruous metatarsophalangeal joint. A Chevron osteotomy may be used in this situation.

Fig 2: An "L" shaped flap permits easy removal of the medial eminence and realignment of the sesamoids (A) and hallux (B).

Fig 3: A "L" shaped flap enables adequate exposure.

The step defect remaining from displacement is removed with a power saw. In this series, K-wire fixation did not alter the end result, and is no longer performed, except in unusual unstable circumstances. The inherent stability of a 60° Chevron cut, coupled with capsular closure and a soft dressing, is quite adequate.

A drill hole is superiorly to inferiorly placed in the metatarsal metaphysis to anchor the capsular repair. A No. 1 chronic catgut suture is used to secure the capsule through the drill hole. The toe is held in slight varus and plantar flexion while the capsular flap is secured with a mattress suture (Fig 7). The remaining capsular repair is completed with absorbable sutures and a routine skin closure is performed. A soft dressing is applied using stockinette, maintaining the hallux in a slightly overcorrected position (Fig 8).

Patients having surgery on only one foot are discharged the same day, and ambulate in a wooden postoperative shoe with partial weight bearing. Patients undergoing bilateral bunion surgery are hospitalized and discharged on the third postoperative day, using crutches or a walker to assist in ambulation. In this series, correction loss was no greater in single or bilateral foot cases.

Dressings are changed weekly for about 3 weeks postoperatively. Patients are then placed in "Blucher style" tennis shoes. Oxford shoes are permitted at 1 month, and regular shoes after 2 to 3 months.

RESULTS

In this series of 90 patients (120 feet), the average evaluation occurred 29 months after surgery. Ninety-one percent of patients had
complete pain relief. Seventy-seven percent were unconditionally satisfied, 20% were satisfied with some reservations, and 3%, dissatisfied. The reasons for dissatisfaction included nerve damage, persistent pain, recurrence of hallux valgus, development of transfer lesions, and hallux elevatus.

The average hallux valgus angle of 27.4° was corrected to 12.6°. The average lateral sesamoid coverage increased from 33% to 41%. Transfer lesions under the second metatarsal head occurred in three patients, but were only mildly symptomatic, and required no further treatment. No occurrences of avascular necrosis were identified, although an adductor tenotomy was routinely performed.

CONCLUSION

The Chevron osteotomy has been found to be an excellent operation for mild to moderate hallux valgus deformity. Although it is tolerant of technique variations, strict procedural adherence gives dependable results. In the author's experience, while several different bunion repairs are regularly used depending on the deformity components, the Chevron procedure remains the "gold standard" for correcting milder grades of hallux valgus deformities.
Fig 8: A compression dressing is applied holding the hallux in slight varus overcorrection.

REFERENCES
1. Austin DW, Leventen EO. Scientific Exhibit of "V" osteotomy of the first metatarsal head. Annual Meeting of the American Academy of Orthopaedic Surgeons; 1968; Chicago, Ill.