

## KEY PROCEDURES

# MINIMALLY INVASIVE CHEVRON AKIN OSTEOTOMY FOR HALLUX VALGUS CORRECTION

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Published outcomes of this procedure can be found at: *Foot Ankle Int.* 2020 Jan;41(1):50-6, *J Bone Joint Surg Am.* 2021 Jul 7; 103(13):1203-11, and *Foot Ankle Int.* 2021 Jun;42(6): 676-88.

*Investigation performed at the Department of Orthopedic Surgery, University of Texas Medical Branch, Galveston, Texas*

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## Abstract

**Background:** The minimally invasive chevron Akin osteotomy technique is indicated for the treatment of symptomatic mild to moderate hallux valgus deformities. The aim of the procedure is to restore alignment of the first ray while minimizing soft-tissue disruption.

**Description:** Prior to the procedure, radiographs are utilized to characterize the patient's hallux valgus deformity by determining the hallux valgus angle and intermetatarsal angle. The metatarsal rotation is also assessed via the lateral round sign and sesamoid view. To begin, a stab incision is made over the lateral aspect of the first metatarsophalangeal (MTP) joint and a lateral release is completed by percutaneous fenestration of the lateral capsule. Next, the chevron osteotomy of the first metatarsal is performed. To begin this step, a Kirschner wire is inserted in an anterograde fashion from the medial base of the first metatarsal to the lateral aspect of the metatarsal neck. The wire is then withdrawn just proximal to the osteotomy site. A stab incision is made at the medial aspect of the metatarsal neck, and periosteal elevation is utilized for soft-tissue dissection. A minimally invasive burr is utilized to complete the osteotomy cuts. With the osteotomy complete, the first metatarsal translator is utilized to lever the metatarsal head laterally. Once satisfactory alignment has been achieved, the Kirschner wire is advanced into the metatarsal head. A cannulated depth gauge is utilized to measure the length of the screw. The near cortex is drilled, and the screw is inserted over the Kirschner wire, which is then removed. The next step is the Akin osteotomy of the proximal phalanx. Again, a Kirschner wire is placed in an anterograde fashion from the medial base of the proximal phalanx to the lateral neck. The Kirschner wire is then withdrawn until the tip is just proximal to the osteotomy site. A stab incision is made over the medial aspect of the proximal phalangeal neck, and periosteal elevation is carried out. The burr is utilized to complete the osteotomy; however, care is taken not to cut the far cortex. The great toe is then rotated medially, collapsing on the osteotomy site and hinging on the intact far cortex. When satisfactory alignment has been achieved, the Kirschner wire is advanced across the osteotomy and far cortex. A cannulated depth gauge is utilized to measure the length of the screw, and the wire is then driven through the lateral skin and clamped. The near cortex is drilled, the cannulated screw is inserted, and the Kirschner wire is then removed. Final fluoroscopy is performed to assess

**Disclosure:** The Disclosure of Potential Conflicts of Interest forms are provided with the online version of the article (<http://links.lww.com/JBJSEST/A430>).

adequate correction, alignment, and hardware placement. The stab incisions are closed with use of simple interrupted 3-0 nylon. A tongue-depressor bunion dressing is applied. The patient is discharged to home with this dressing, as well as with an offloading postoperative shoe.

**Alternatives:** Surgical alternatives include open distal chevron osteotomy, open Akin osteotomy, MTP joint arthrodesis, Lapidus fusion, and Scarf osteotomy<sup>7</sup>. Nonsurgical alternatives include the use of insoles, nonsteroidal anti-inflammatory drugs, wide-toed footwear, bunion shields and/or toe spacers, and physical therapy.

**Rationale:** The minimally invasive chevron Akin technique for hallux valgus correction provides alignment restoration of the first ray with less soft-tissue trauma than conventional open surgical procedures. This technique utilizes dorsal and medial stab incisions, instead of a more extensive open dorsal incision. These smaller incisions minimize the soft-tissue disruption, which has been reported to improve postoperative range of motion and to reduce loss of postoperative dorsiflexion related to scar tissue formation. Even while minimizing soft-tissue disruption, this technique still enables adequate correction and reliably stable fixation.

**Expected Outcomes:** The expected outcome of this procedure is a return to normal activities following the recovery period. Prior to correction, the patient is counseled regarding the risk of persistent or recurrent deformity postoperatively. The patient is also informed regarding potential postoperative stiffness. According to the literature, outcomes following minimally invasive chevron Akin hallux valgus correction have been shown to be equivalent to traditional open correction, with reported recurrence rates of <1% and excellent or good patient satisfaction in >90% of patients<sup>2-4</sup>. Function, as measured with use of the Manchester-Oxford Foot Questionnaire, has been shown to improve significantly from preoperatively ( $58.5 \pm 15.9$ ) to postoperatively ( $9.6 \pm 9.2$ )<sup>2</sup>. Lastly, reported complication rates have varied according to the author's definition of complications, but typically range from 10% to 22%<sup>2-4</sup>.

**Important Tips:**

- If the chevron osteotomy cut accidentally turns into a transverse cut, then add a second screw to provide rotational stability.
- Obtain a perfect lateral view after placing the Kirschner wire in order to ensure satisfactory trajectory of the Kirschner wire in all planes.
- Drive the Akin Kirschner wire through the skin distally and clamp with a mosquito to prevent pullout after drilling.
- If the Akin Kirschner wire is too flimsy to get a good starting point and trajectory, exchange it for the chevron Kirschner wire and use the drill to exchange back just prior to screw insertion.
- Subtract approximately 4 mm from the measured screw length in order to ensure that the screw is not too long; otherwise, it may create a gap in the osteotomy site.

**Acronyms and Abbreviations:**

- NSAIDs = nonsteroidal anti-inflammatory drugs
- K-wire = Kirschner wire
- HVA = hallux valgus angle
- IMA = intermetatarsal angle
- MIS = minimally invasive surgery
- AP = anteroposterior
- OR = operating room
- MTP = metatarsophalangeal
- VAS = visual analog scale
- MOXFQ = Manchester-Oxford Foot Questionnaire

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