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# Restoring Sesamoid Position in Scarf Osteotomy: A Learning Curve

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ABSTRACT

Incomplete reduction of the sesamoid is a known risk factor for recurrence of the deformity after scarf osteotomy for correction of hallux valgus. The purpose of the present study was to determine whether a learning curve exists for successfully restoring the sesamoid position in scarf osteotomy. We reviewed 71 consecutive cases (71 feet) of scarf osteotomy performed on female patients during a 2.5-year period by the same surgeon. The cases were divided into 3 groups according to the date of surgery, with the first 24 cases assigned to group 1, the next 24 to group 2, and the last 23 to group 3. We compared the median sesamoid position of the 3 groups at 6 weeks postoperatively and patient reported satisfaction at 6 months postoperatively. The sesamoid position ranged from 1 to 7, using the Hardy and Clapham classification system. The median sesamoid position for all patients had improved from 7 preoperatively to 2 postoperatively. The postoperative sesamoid position was significantly better for the second and third groups than for the first ($p < .05$), and 92% of the patients were satisfied with the procedure. We have concluded that a learning curve to optimally restoring the position of the sesamoid in scarf osteotomy is present and that this has a direct effect on reducing the risk of recurrence of the deformity.



Hallux valgus is a common orthopedic condition and developing a surgical corrective procedure has been a challenge since one was first described by Hueter in 1870. To date, ≥130 procedures for the surgical correction of hallux valgus have been described (1). One consideration for the choice of operative procedure is the severity of the hallux valgus deformity (2,3). Although mild to moderate deformities can be treated adequately by distal osteotomies of the first metatarsal joint such as the chevron, Austin, Wilson, or Mitchell technique (1–4), a proximal metatarsal osteotomy is preferred for more severe deformities, because it allows a greater degree of correction (3). The use of a Z-step cut in the scarf osteotomy was first performed by Meyer in 1926, as described by Burutaran (5) in 1976, and the technique was further developed by Weil and Borelli (6) in the United States and Barouk (7) in France. The scarf osteotomy is now widely used for the treatment of hallux valgus because of its inherent stability, ease of internal fixation with 2 screws, and minimal shortening of the first metatarsal (8). In addition, the scarf osteotomy can be relatively safely performed in patients who are older. Furthermore, several studies have concluded that osteoporosis is not a contraindication for performance of the scarf osteotomy (4,9–12).

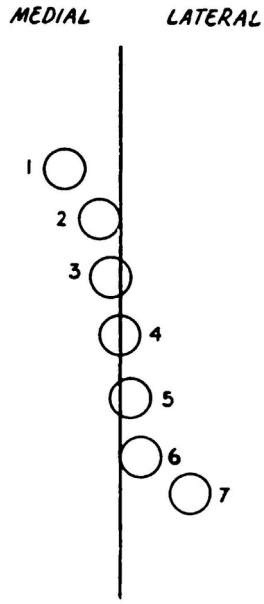


**Fig. 1.** Schematic diagram showing the position of the medial sesamoid proposed by Hardy and Clapham (22).

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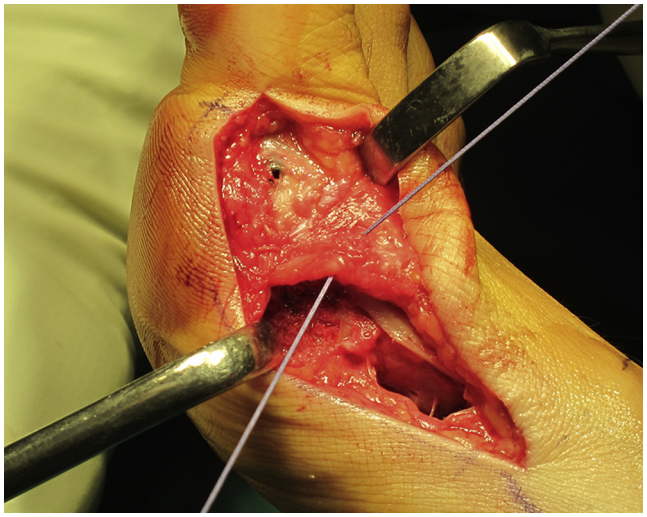

**Fig. 2.** Intraoperative photograph showing the first stitch at the dorsal capsule.

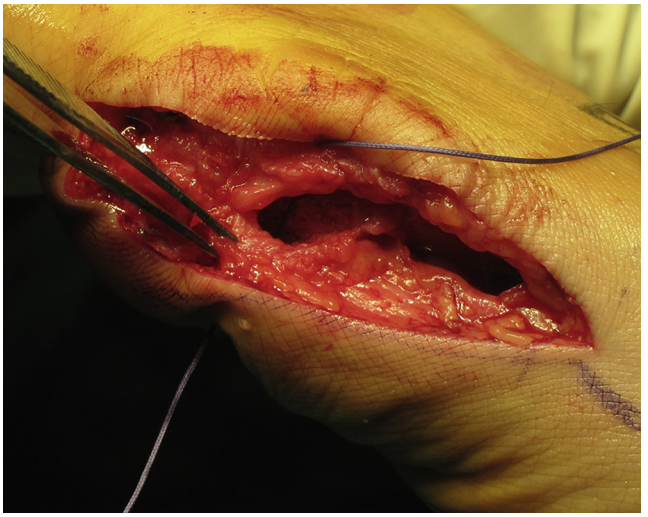

**Fig. 3.** Intraoperative photograph showing the suture passed next to the tibial sesamoid and through the skin.

Postoperative recurrence of hallux valgus is a noted complication, ranging from 4% to 11% (13–18). Recent investigators have concluded that incomplete reduction of the sesamoid postoperatively is a risk factor for the recurrence of hallux valgus and that reduction of the sesamoids under the first metatarsal head intraoperatively is an important element for preventing recurrence (19,20). Okuda et al (21) reported a significant correlation between the grade of the medial sesamoid displacement and the hallux valgus angle after proximal metatarsal osteotomy. They concluded that incomplete reduction of the sesamoid postoperatively is a risk factor for the recurrence of hallux valgus (21). Because the scarf osteotomy is a technically demanding procedure, we believe it would be important to determine whether a learning curve exists to restoring the sesamoid position using scarf osteotomy to reduce the risk of hallux valgus recurrence.

Therefore, we reviewed scarf osteotomies performed by a single foot and ankle surgeon during a 2.5-year period.

## Patients and Methods

The purpose of the present study was to determine whether a learning curve exists in restoring the sesamoid position in scarf osteotomy, with the aim of reducing the recurrence of hallux valgus. Included in the study were 71 consecutive female patients who had undergone scarf osteotomy by the same surgeon (K.W.C) for hallux valgus from May 2007 to December 2009. We excluded males from the review to decrease the heterogeneity of our cohort. Patients with a history of previous foot surgery or inflammatory arthritis conditions such as gout and rheumatoid arthritis were also excluded. No hypoplasia or an absent medial sesamoid was found in any of the cases. The patients were divided into 3 groups according to the date of surgery, with the first 24 consecutive patients in group 1, the next consecutive 24 in group 2, and the last 23 in group 3.

All patients had weightbearing plain radiographs of their foot taken in the dorsoplantar view preoperatively and at 6 weeks postoperatively. The sesamoid bone positions and intermetatarsal angles were measured on the dorsoplantar weightbearing radiographs of the foot by 2 of us (C.S., D.C.H). The position of the medial sesamoid was classified as grade 1 to 7, according to the measurement system proposed by Hardy and Clapham (22) (Fig. 1). The intermetatarsal angle was obtained by drawing 2 bisecting lines down the middle of the shaft of the first and second metatarsals along the longitudinal axes. We assessed patient satisfaction at 6 months and 2 years postoperatively using a modification of question 53 from the North American Spine Society Lumbar Spine Outcome Assessment Instrument (23): "how would you rate the overall results of your treatment for your foot and ankle condition?" (1, excellent; 2, very good; 3, good; 4, fair; 5, poor; 6, terrible). Patient satisfaction was deemed acceptable for scores ranging from 1 to 3. The collected data were analyzed using IBM® SPSS® Statistics software, version 17 (IBM Corp., Armonk, NY). Statistical significance was set at the 5% ($p \leq .05$) level.

### *Operative Technique*

All operative procedures were performed with the patient under general anesthesia by the senior author (K.W.C) using a standard technique. A mid-thigh pneumatic tourniquet was applied and inflated to 300 mm Hg. First, lateral release was achieved by a dorsal intermetatarsal incision, as described by Barouk (7). Next, a medial longitudinal skin incision was placed over the first metatarsophalangeal joint. Capsulotomy exposed the medial aspect of the first metatarsophalangeal joint, and an elliptical sliver of the medial capsule was removed. This was followed by bunionectomy, with a pneumatic oscillating saw to resect the medial eminence of the first metatarsal head. Next, the scarf osteotomy was cut with the pneumatic oscillating saw. The longitudinal cut was made first, running parallel to the plantar surface of the first metatarsal and at an angle of 30° to the horizontal plane to lower the metatarsal head during translation.

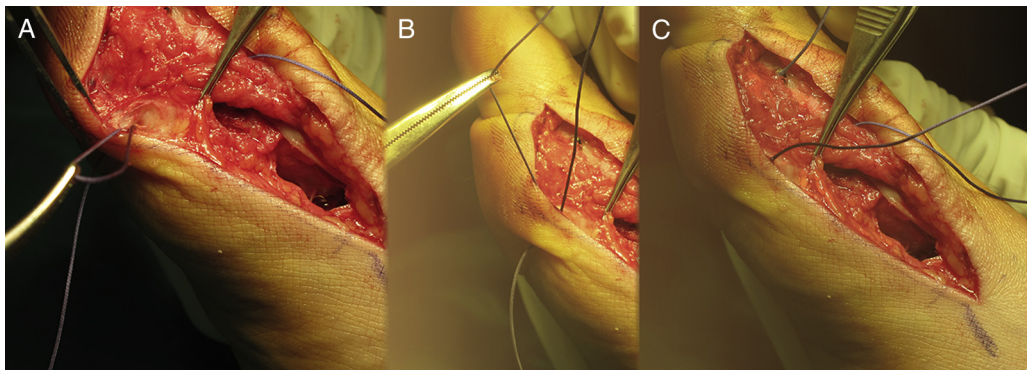


**Fig. 4.** *(A to C)* Intraoperative photograph showing the free end of the suture delivered back into the wound.