

## CLINICAL RELEVANCE OF THE HALLUCAL SESAMOIDS

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Restoring the sesamoids to their anatomic position has always been considered one of the goals in hallux valgus surgery. In years past, soft tissue release with adductor tendon transfer to "pull" the sesamoids medial, back under the metatarsal head, was the recommended procedure. It is now accepted that the sesamoids remain fixed and the metatarsal head has to be moved back over the sesamoids to adequately correct the deformity.

Evaluation of the sesamoid position is performed on a grading scale of 1-7 by most podiatrists and 1-4 in the orthopedic community. Both of these grading systems are based on the longitudinal bisection of the first metatarsal. This bisection is assumed to overlay the plantar cristae with the sesamoids evenly spaced on either side of this line.

The cristae, however is not consistently located under the longitudinal bisection of the metatarsal. The metatarsal head is not symmetrical, having a large flare to the lateral condyle. While the cristae is



Figure 1. Radiograph of lesion marker on the cristae. Note its lateral to the bisection of the metatarsal

central to the metatarsal head, it is not always central to the metatarsal shaft. Therefore the position of the sesamoids relative to the cristae cannot be accurately obtained from AP radiographs. In a study of 34 radiographs with hallux valgus deformity last year I found the sesamoid position could be off by as many as 4 places. The most accurate way to determine the sesamoid position was on axial radiographs (Figures 1, 2).

Correction of a bunion deformity is accomplished by removal of the medial eminence and reduction of the intermetatarsal angle (IMA). The choice of procedure is usually determined by the size of the IMA. Surgeons attempt to reduce this to a normal angle of 0-8°. The procedure of choice and degree of correction obtained are often haphazard and determined more by the surgeon's training, experience and clinical evaluation than by radiographic evaluation and templates.

The most common group of procedures utilized to correct the IM angle are the transpositional osteotomies such as the Austin, its modifications, and the Scarf. Surgeons will transpose the metatarsal head laterally based more on experience than science. Some will consistently

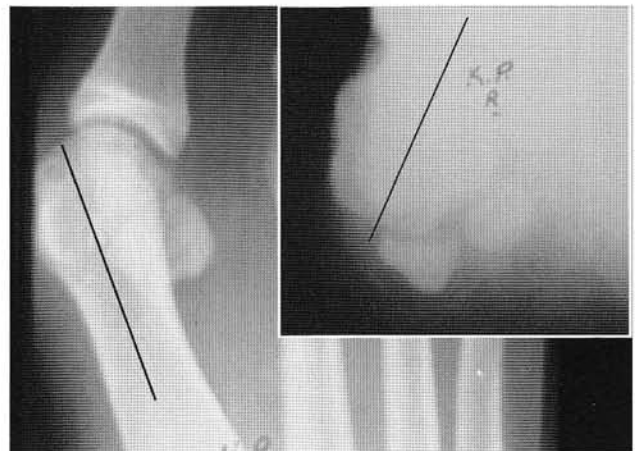


Figure 2. AP radiograph showing tibial sesamoid in position 7. Axial xray of same foot reveals sesamoid in position 3+. Note the position of the cristae in relation to the bisection of the 1st metatarsal on the axial position.

move the head 2 mm, others  $1/3$  or  $1/2$  the width of the metatarsal, or "as far as it will go", etc. On occasion the surgeon will attempt to transpose the capital fragment 5 mm, but is unable to move the fragment more than 2 or 3 mm. Proper evaluation of the sesamoid position can eliminate this variability and allow for consistent movement of the metatarsal head.

An axial projection clearly reveals the relationship of the sesamoids to the cristae. In many instances the sesamoids are in their normal anatomic position yet the patient has a bunion deformity. The intermetatarsal angle is therefore not increased and only a simple exostectomy should be required. Attempts to transpose the head laterally are often unsuccessful or difficult because the metatarsal heads are closer than they would appear from an AP radiograph.

If the sesamoids are displaced it is quite simple, from the axial view, to measure the distance from the cristae to the lateral aspect of the tibial sesamoid. This distance, is the amount of displacement required to anatomically correct the bunion deformity. Since the maximum amount of displacement

for a transpositional osteotomy is about 5 mm, anything over this amount will usually require a more proximal osteotomy.

If the distance measured is only a mm or so, and the capital fragment is displaced a greater distance an interesting radiographic feature can be seen. The distance between the first and second metatarsal heads on the AP x-ray does not seem to have diminished, despite transposition of the capital fragment. The IM angle as measured on the proximal half of the metatarsal shafts shows an increase as the capital fragment slides back medially to re-orient the sesamoids.

AP radiographs do not clearly demonstrate the distance between the first and second metatarsal heads and do not provide an accurate picture of the sesamoid position in relation to the crista. Axial x-rays should be taken to better determine these structural relationships.

The amount of displacement required to correct a bunion should be determined by the axial radiograph. Accurate measurements of the displacement of the sesamoids can be obtained and the proper procedure chosen.