



How Do I Use the Scarf Osteotomy to Rotate the Metatarsal and Correct the Deformity in Three Dimensions?

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KEYWORDS

• Hallux valgus • Three-dimensional correction • Rotational osteotomy

KEY POINTS

- The scarf osteotomy has become the workhorse procedure for a large proportion of foot and ankle surgeons, especially in Europe, in the treatment of hallux valgus.
- Such a versatile procedure should not be underestimated, and planning and thought should precede any such procedure.
- The angle of bone cuts and magnitude of translation dictate the final position, and all movement axes should be given equal attention.

INTRODUCTION

The scarf osteotomy is a well-established procedure in the treatment of hallux valgus. A survey of Australian orthopedic surgeons found that greater than 50% would perform a scarf osteotomy for moderate-to-severe hallux valgus (HV) deformities when asked.¹ The earliest mention of a first metatarsal midshaft Z osteotomy in the literature is by Meyer in 1926.² This osteotomy was formally given its scarf name by Borrelli and Weil³ in 1984, who along with Barouk⁴ popularized the scarf osteotomy for the treatment of HV. Barouk⁵ describes the scarf osteotomy as possessing great versatility, as it can be used to not only provide lateral shift of the first metatarsal, but lower or elevate the metatarsal head, lengthen or shorten the first metatarsal, and even provide axial rotation. The authors use the osteotomy for mild-to-severe HV deformities because of its versatility, from mild to complex cases, and proven results.

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Because of the complex three-dimensional osteotomy of the scarf, it is technically challenging with a substantial learning curve. Its versatility, although advantageous, increases the risk of malunion, as axial, sagittal, and coronal plane corrections can be made. The results of scarf osteotomy are generally favorable, characterized by Crevoisier describing an 89% satisfaction rate.⁶ However, this positive result does not occur across the board. Coetzee described complications in 47% of cases, with troughing being the major complication (occurring in 35% of cases). Davies and colleagues⁷ also found the production of unintentional malunions in a geometric study on scarf osteotomies. A method for reducing this complication was described by Murawski and colleagues.⁸ By rotating the scarf, the cortices are no longer purely on cancellous bone as opposed to a traditional scarf. This highlights that when undertaking a scarf osteotomy, planning is paramount. Recognition of the three-dimensional aspects of the osteotomy allows all manner of deformities to be corrected and the potential complications negated.

TRANSLATIONAL CORRECTION AND ITS THREE-DIMENSIONAL EFFECT

A scarf osteotomy reduces the intermetatarsal angle through lateral translation of the metatarsal head. The basic concept to comprehend, however, is that with this translation the movement is in 3 planes, not just one. It is therefore paramount to recognize which bone cuts dictate which plane of movement. This is shown in [Fig. 1](#) and [Table 1](#). This demonstrates that with these cuts, one can achieve from neutral sagittal and coronal displacement to large deformity corrections. Standard practice is to make a Z osteotomy ([Fig. 2](#)) by producing a longitudinal axial cut starting 5 mm from the dorsal surface of the metatarsal head and moving proximally to the inferior flare of the metatarsal shaft. The author and colleagues have published previously their preferred method of this cut being made with a 10° declination angle to prevent dorsal malunions and subsequent transfer metatarsalgia.⁹ The 2 parallel sagittal cuts, 1 distal dorsal the other proximal plantar, are performed as planned on a prior templated radiograph, 90° to the second metatarsal shaft. This ensures length remains

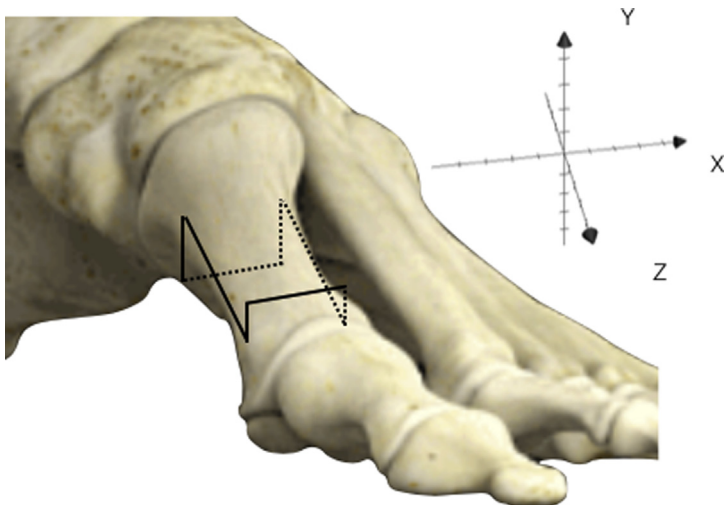


Fig. 1. Three-dimensional representation of a scarf osteotomy illustrating the 3-plane nature of the osteotomy.

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