Proximal Supination Osteotomy of the First Metatarsal for Hallux Valgus

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KEYWORDS

• Hallux valgus • Surgical technique • Metatarsal osteotomy • Crescentic osteotomy • Supination osteotomy • Pronation correction • Locking plate

KEY POINTS

- Varus and pronation of the first metatarsal are intimately related and seem to contribute to the development of hallux valgus.
- Postoperative pronation of the first metatarsal may cause risk factors, including a round lateral edge of the first metatarsal head (a positive round sign) and incomplete reduction of the sesamoids, for recurrence of hallux valgus.
- Proximal supination osteotomy of the first metatarsal facilitates correction of varus and pronation of the first metatarsal and achieves significant correction in moderate to severe hallux valgus deformities.
- Correcting pronation of the first metatarsal is effective in reducing postoperative recurrence of hallux valgus.

INTRODUCTION

Numerous investigators have reported the results of a proximal crescentic osteotomy combined with a distal soft tissue procedure and have recommended it for patients with moderate to severe hallux valgus.[1–14] However, postoperative recurrence of hallux valgus is a relatively common complication and is associated with unsatisfactory surgical outcomes.[1,7,11,15] Several investigators have reported that pronation of the first metatarsal is radiologically observed in patients with hallux valgus and suggested that pronation of the first metatarsal is intimately related and seems to contribute to the development of hallux valgus.[16–22] In addition, residual pronation of the first metatarsal after hallux valgus surgery may appear as a round lateral edge of the first metatarsal head (a positive round sign) and incomplete reduction of the sesamoids.[18,23] Based on these studies, some investigators recommended correction of pronation of the first metatarsal in hallux valgus surgery.[16–24] In a few

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recent studies, the pronation of the first metatarsal was corrected along with correction of the metatarsus primus varus to achieve better correction and to reduce the recurrence of hallux valgus; these investigators reported on the results of their surgical procedures.[13,23–26]

In 2007, the author devised a novel technique of a proximal supination osteotomy using Kirschner-wire fixation and performed this procedure for correction of moderate to severe hallux valgus. However, postoperative dorsiflexion deformity at the osteotomy site due to inadequate fixation was observed in a significant number of the patients.[13] Since 2012, the author has performed fixation of the osteotomy site with a locking X-plate. This article aims to describe the indication and surgical technique of a proximal supination osteotomy and to discuss the effect of pronation correction of the first metatarsal and stability of locking X-plate fixation at the osteotomy site in hallux valgus surgery.

INDICATIONS

The indications for a proximal supination osteotomy with a distal soft tissue procedure are (1) symptomatic moderate to severe hallux valgus deformity (a hallux valgus angle >25° and/or an intermetatarsal angle $\geq$12°) that has a round or intermediate-shaped lateral edge of the first metatarsal head on a preoperative dorsoplantar weight-bearing radiograph according to a measurement system[19] and (2) no response to conservative treatment, including modification of shoe wear, nonsteroidal antiinflammatory medication, or arch support. The shape of the lateral edge of the first metatarsal head, which consists of the articular surface and the lateral cortical surface of the metatarsal head on the dorsoplantar radiograph, is classified as one of 3 types, round (type R), angular (type A), or intermediate (type I) (**Fig. 1**). The round sign is positive when the shape of the lateral edge is classified as type R, and it is negative when the shape of the lateral edge is classified as type I or A.

Although there are no strict lower limits of a hallux valgus angle and an intermetatarsal angle in a proximal supination osteotomy, a mild hallux valgus deformity is mainly the indication for a distal metatarsal osteotomy.[27] The upper limits of the hallux valgus angle and an intermetatarsal angle, which can be corrected by a proximal supination osteotomy, are not identified. A proximal supination osteotomy can be performed in patients of all ages except patients with open physis.

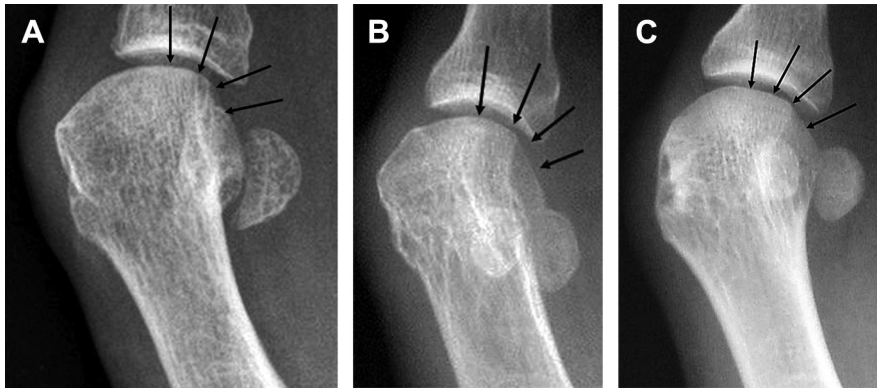

Fig. 1. The shape of the lateral edge of the first metatarsal head (*arrows*). (*A*) Angular: type A, (*B*) intermediate shape: type I, (*C*) round shape: type R.