

Procedure Selection for Hallux Valgus

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KEYWORDS

- Hallux valgus • Bunion • Bunionectomy
- Hypermobility • First ray

There are more than 100 different types of surgical procedures described for the correction of hallux valgus deformity.^{1,2} It has been the subject of much interest by many foot and ankle surgeons with varying opinions regarding etiology and treatment. For more than a century, a significant portion of the medical literature has focused on bunion surgery, yet there is still much debate and little consensus as to what the best way is to correct this complex and often underappreciated deformity. The criteria for procedure selection for hallux valgus are poorly defined. This has led to high reported failure rates.³ Clinical studies have supported various procedures based on the successful elimination of pain and bunion deformity. One of the first published treatments of hallux valgus was described by Heuter in 1870 as subcapital amputation of the metatarsal head.^{4,5} More than a decade later, Barker described an osteotomy in the metatarsal head that removed a wedge of bone to effectively decompress the bunion.⁶ Over the next half a century many modifications were made to this osteotomy to correct the angular malalignment of the first metatarsal and hallux. Hallux valgus surgery has become more sophisticated since its introduction as a “bunionectomy.” Focus on reduction of the intermetatarsal angle and other measurable parameters, via osteotomies or fusions, is now the standard of care for bunion “correction”. Selecting the appropriate procedure however, is not as straightforward as plugging numbers into a formula. Understanding the biomechanical forces affecting the first ray and the first ray’s effects on associated deformity and correlating patient and surgeon goals and expectations are critical factors in determining which procedure is best suited for each patient.

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FIRST RAY FUNCTION

Historically, the success rate for bunion surgery has not been universally satisfactory, with a high number of patients remaining dissatisfied even when good correction of radiographic measurements was achieved.⁷ Many complications have been reported that often parallel the associated morbidities found in patients who have hallux valgus. Plantar callosities, lesser metatarsal stress fractures, second metatarsophalangeal joint (MTPJ) instability, hammertoes, metatarsus elevatus, posterior tibial tendon dysfunction, and other problems can be attributed directly to a dysfunctional first ray with hallux valgus or to complications from hallux valgus surgery (Fig. 1).^{8–15} Many of these complications are despite excellent correction of the intermetatarsal and hallux abductus angles. King and Toolan warned that this may be due to a failure to recognize or appreciate the implications the first ray has on the proximal foot.¹⁶

The reliance of the body on normal first ray mechanics strongly suggests that re-establishing normal function of the first ray is of paramount importance. During midstance, a cantilever load is applied to the first ray during normal physiologic loading.¹⁷ It is well known that a structurally stable first ray is necessary for even distribution of weight across the forefoot.¹⁸ When stable and anatomically aligned, the first ray's buttressing effect along the medial column of the foot also resists overpronation of the midfoot and collapse of the medial longitudinal arch.¹⁹ This in turn helps prevent



Fig. 1. Second metatarsophalangeal joint dislocation associated with (A) hallux valgus and (B, C) as a consequence of malunion after hallux valgus surgery. As the lesser metatarsal parabola is normal in both cases, it is clear that the lack of proper first ray load sharing has resulted in adjacent metatarsal overload.

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