Surgical Correction Algorithm of Adult Hallux Valgus Without Osteoarthritis and Associated Forefoot Deformities

Cesare Faldini[1], Antonio Mazzotti[1], Simone Bonelli, Alberto Arceri, Simone Ottavio Zielli, ELENA ARTIOLI, Valentina Viglione, Alessandro Panciera[2], Pejman Abdi
[1]Istituto Ortopedico Rizzoli, [2]Rizzoli Orthopaedic Institute

Introduction

Hallux valgus is the most common forefoot deformity and is characterized by a medial deviation of the first metatarsal bone associated with progressive subluxation of the first metatarsophalangeal joint and widening of the first intermetatarsal space. Morphologic changes in patients with a hallux valgus deformity affect forefoot kinematics and worsen function, which leads to transfer metatarsalgia and progressive deformities involving the lesser toes, such as hammer or claw toes.

Several bony and soft-tissue procedures have been described for the correction of hallux valgus, and the most used surgical techniques are represented by metatarsal osteotomies, which can be proximal, midshaft, or distal.

This video presents a treatment algorithm that was applied to 300 adult patients affected by mild to moderate hallux valgus without arthritis but with some of the most prevalent associated forefoot deformities. Management involved the minimally invasive distal metatarsal SERI (simple, effective, rapid, and inexpensive) osteotomy and associated procedures.

Materials and Methods

The study prospectively enrolled 300 patients between January 2017 and July 2022. The patients underwent forefoot correction via the SERI technique and associated procedures, such as Akin osteotomy, lesser toe proximal interphalangeal joint fusion, and shortening metatarsal osteotomy.

Patients were clinically and radiographically evaluated. Forefoot deformities were categorized based on the algorithm, which includes eight nosologic entities. The algorithm was developed to drive the treatment strategy. Surgical planning is performed to determine the location of the deformity, assessment of the metatarsal formula, associated forefoot deformities, and global foot morphology. All the procedures were performed by the same experienced surgeon.

Mean follow-up was 28.4 months (range, 12 to 48 months). American Orthopaedic Foot and Ankle Society and 36-Item Short Form Survey scores were submitted preoperatively and at final follow-up to show patient satisfaction after surgical treatment. The main radiographic parameters, such as the hallux valgus angle, inter-metatarsal angle, distal metatarsal articular angle, and hallux valgus interphalangeal index were assessed preoperatively and at final follow-up to report restoration.

Results

A total of 300 patients (25 males and 275 females) were included in the study. The mean patient age was 49.8 years (range, 26 to 82 years). Mean follow-up was 28.4 months (range, 12 to 48 months).

The mean American Orthopaedic Foot and Ankle Society score improved from 46.8 ± 6.7 preoperatively to 88.3 ± 9.3 postoperatively. The mean 36-Item Short Form Survey score improved from 47.3 ± 5.7 preoperatively to 86.4 ± 4.3 postoperatively. Complete healing of the osteotomy and remodeling of the metatarsal bone and satisfactory restoration of radiographic parameters were detected at radiographic follow-up. The mean hallux valgus angle improved from 32.2° ± 7.7° preoperatively to 10.8° ± 4.6° postoperatively. The mean inter-metatarsal angle improved from 15.1° ± 2.4° preoperatively to 7.5° ± 2.2° postoperatively. The mean distal metatarsal articular angle improved from 16.2° ± 5.3° preoperatively to 10.9° ± 4.6° postoperatively. Finally, the mean hallux valgus interphalangeal index improved from 12.3 ± 2.9 preoperatively to 4.5 ± 3.1 postoperatively. The metatarsal formula was evaluated via radiographs postoperatively and at final follow-up.

A low rate of complications was reported, with recurrence (approximately 3%) and stiffness with arthritis (approximately 6%) most reported. No differences were reported between the eight nosologic entities managed based on the algorithm.

Discussion

The purpose of the surgical management of hallux valgus is morphologic deformity correction and functional rebalance of the first metatarsophalangeal joint; however, surgeons must assess the entire foot morphology beyond the first ray deformity.

Many successful bony and soft-tissue procedures have been described for the correction of hallux valgus and associated forefoot deformity. Currently, no agreement exists in the literature with regard to the most appropriate treatment option for hallux valgus.

A treatment algorithm was designed, and patients were retrospectively followed for a mean of 28.4 months. The algorithm has proven to effectively correct the main parameters of the deformity, with durable clinical and radiographic results at midterm follow-up. To achieve these results, apart from specific features of the technique itself, surgeons must assess other associated foot deformities. If these deformities are not adequately corrected, surgical and clinical complications or failure may occur.

This algorithm aids in the management of the most common forefoot deformity but does not consider more complex deformities, such as posttraumatic, congenital, or arthritic deformities, that require customized management.

Conclusion

The surgical algorithm for adult hallux valgus and associated forefoot deformities is easy to use, even for the most frequent forefoot deformities, and involves minimally invasive surgical techniques without permanent fixation devices.

This approach may be a valid treatment strategy for surgeons and emphasizes the importance of a global foot evaluation.