The corrective ability of the double chevron and Akin osteotomies on medial sesamoid position in Hallux Valgus deformity

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Introduction/Purpose: Recurrence of hallux valgus deformity is a common post-operative complication with rates in the literature ranging from 2.7 – 30%. Lateral displacement of the great toe medial sesamoid is correlated with a high recurrence rate, and failure to reduce sesamoid position has been implicated as a risk factor for recurrence due to an uncorrected deforming force. Sesamoid position has been studied in relation with Scarf osteotomy, but not other corrective osteotomies. The goal of this study is to determine the efficacy of the double chevron and Akin osteotomy in reducing the great toe medial sesamoid.

Methods: We retrospectively reviewed all patients in the last five years undergoing hallux valgus correction via the double chevron and Akin osteotomy method with pre-operative and post-operative weight bearing radiographs. We measured sesamoid position pre and post-operatively using the Hardy-Clapham (HC) scale of I-VII with V or greater representing a laterally displaced medial sesamoid. We also measured hallux valgus and inter-metatarsal angles. Measurements were made by three authors in orthopedics and one in radiology. We used intra-class correlation coefficient (ICC) to determine inter-observer agreement and establish reliability. With adequate ICC, we could consider the lead author’s measurements as representative of the group. We examined the percent of hallux valgus cases with displaced sesamoids pre-operatively. Next, we determined how many of those cases did we reduce the sesamoids to grade IV or less. Finally, we performed subgroup analysis for pre-operative HC grades V, VI, and VII to determine correction percentage by severity.

Results: There were 49 patients with 53 feet treated with the double chevron and Akin osteotomies for hallux valgus correction. Of these, 39 (73.6%) had significant preoperative lateral displacement of the medial sesamoid characterized by HC grade of V or greater. We corrected 30/39 (77.0%) to a reduced position of HC grade IV or less (p-value 0.048). In sub-analysis, we achieved reduction of the medial sesamoid position in 14/14 feet (100%) with HC grade V, 6/9 feet (66.7%) with HC grade VI, and 10/16 feet (62.5%) with HC grade VII (p-value 0.037). The ICC was 0.91 for pre-operative HC scores and 0.79 for post-operative HC scores. Average pre and post-operative HVA was 29.4° and 8.7°, respectively. Average pre and post-operative IMA was 13° and 5.2° respectively.

Conclusion: Our study validates the double chevron and Akin osteotomies as effective in correcting sesamoid position. We achieved correction in 30/39 (77%) cases with initial sesamoid displacement. For mild cases of displacement with HC grade V, sesamoid correction was always achieved, and we were likely to achieve correction in the more severe cases of sesamoid displacement with HC grade VI or VII as well. The technique is also effective at reducing HVA and IMA. We had acceptable inter-observer agreement which supports the reliability of our methods. Future studies should examine recurrence rate following the double chevron and Akin osteotomies prospectively.
Figure 1. Pre (left) and post-operative (right) radiographs demonstrating medial sesamoid correction from a Hardy-Clapham VII to a Hardy-Clapham II.