

Minimally Invasive Chevron-Akin for Correction of Moderate and Severe Hallux Valgus Deformities: Clinical and Radiological Outcomes with a Minimum 2-Year Follow Up

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INTRODUCTION: The Minimally Invasive Chevron-Akin (MICA) technique has already demonstrated efficacy compared with other known surgical treatments for mild to moderate hallux valgus (HV). MICA combines percutaneous osteotomies with the benefits of modern, rigid internal fixation. The objective of the present study is to evaluate the radiographic parameters, clinical improvement, and potential complications in cases of moderate and severe hallux valgus operated on at our institution using the MICA technique. We hypothesized that the MICA technique would be able to maintain clinical and radiographic improvement in a minimum 2-year follow-up.

METHODS:

This study is a single-center, retrospective study that included patients with moderate to severe HV who underwent surgical correction using the MICA technique. The standard radiographic cutoff was HVA <15 degrees, IMA <9 degrees. The sample size calculation was based on the American Orthopaedic Foot and Ankle Society (AOFAS) hallux metatarsophalangeal-interphalangeal (MTP-IP) questionnaire.

The AOFAS hallux MTP-IP score for HV evaluation and Weight-bearing Anterior to Posterior radiographic views were obtained in each case, preoperatively, after a follow-up period of 6 months, after 1 year of follow-up, and after 2 years of follow-up, and Visual Analogic Scale (VAS) was applied preoperatively, after 1 year of follow-up and after 2 years of follow-up. Preoperative and postoperative Visual Analogue Scale (VAS) measurements were used to assess pain, ranging from 0 to 10 points (with 0 indicating no pain and 10 denoting disabling pain by the procedure performed).

The following radiographic parameters were measured: intermetatarsal angle (IMA) between the first and second metatarsals, metatarsophalangeal hallux valgus angle (HVA), distal metatarsal articular angle (DMAA), and interphalangeal angle (IPA). All radiographic parameters were measured by two fellowship-trained orthopaedic foot and ankle surgeons with >7 years of experience.

RESULTS:

Preoperative VAS scores averaged 8.24 ± 1.51 in the preoperative period and decreased to 1.37 ± 2.27 after 1 year and to 1.19 ± 2.23 after 2 years ($p < 0.01$). The average preoperative AOFAS hallux MTP-IP score was 43.97 ± 17.89 and demonstrated a positively satisfactory variation when compared to the AOFAS hallux MTP-IP score measured in the 6-month postoperative period, which was 90.17 ± 10.21 ($p < 0.01$). This score was maintained in subsequent postoperative periods of 12 and 24 months.

The mean preoperative IMA was 14.8 ± 3.6 degrees compared with a mean of 7.5 ± 2.1 degrees ($p < 0.01$) at 24 months. The preoperative HVA value averaged 30.4 ± 9.8 degrees and at six months postoperative 11.1 ± 6.8 degrees ($p < 0.01$) which remained stable until measured at 24 months. The mean preoperative DMAA was 16.3 ± 8.6 degrees and at the 6-months was 7.8 ± 5.4 degrees ($p < 0.01$). The mean preoperative IPA was 7.63 ± 4.4 degrees compared with a mean of 6.28 ± 3.5 degrees ($p > 0.05$) at 24 months.

Complications included painful hardware, irritation of the medial sensory cutaneous nerve, and loss of correction. Pain due to prominent hardware at the screw heads in the first metatarsal occurred in 14.28% of the cases. In all cases, screw removal resulted in complete resolution of pain. Hardware pain complaints were eliminated when we switched to using bevel screws instead of head screws, however, there was no significant difference between the groups ($p = 0.392$).

DISCUSSION AND CONCLUSION:

Our hypothesis that the MICA technique would be able to maintain clinical and radiographic improvement in a minimum follow-up of 2 years was confirmed.

It demonstrated that the MICA technique is a safe and effective procedure for correcting moderate to severe HV, with a low rate of recurrence and an acceptable rate of complications. In our series, the patients showed a significant reduction in clinical outcomes and showed significant improvement in radiographic scores, maintaining these results over time.