Clinical and Radiographic Outcomes of Minimally Invasive Chevron Bunionectomy Compared to the Modified Lapidus Procedure

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Introduction/Purpose: Minimally invasive bunion surgery is relatively new in the United States, with the requisite burrs only approved for use by the FDA in 2017. Early reports on outcomes have been encouraging. However, no study to date has compared outcomes from the minimally invasive chevron and Akin procedures (MICA) to the modified Lapidus procedure. Our goal was to compare clinical and radiographic outcomes of MICA to those of the modified Lapidus procedure in patients with comparable deformities. We hypothesized that radiographic parameters of hallux valgus would be superior in the Lapidus group, but that there would be no significant difference in clinical outcomes or satisfaction between the two groups.

Methods: Patients were retrospectively reviewed for inclusion from a prospectively-collected foot and ankle registry at our institution. Patients were eligible if they underwent either the MICA or modified Lapidus procedure, were 18 years or older, and had preoperative and minimum 5 month postoperative weightbearing radiographs. Exclusion criteria included prior forefoot surgery, additional surgeries (such as metatarsal shortening), and concomitant foot conditions (such as flatfoot deformity). Each surgery was performed by one of six fellowship-trained orthopedic foot and ankle surgeons. Demographics, PROMIS scores, and satisfaction data were collected from the registry. Complications and reoperations were collected from chart review. The hallux valgus angle (HVA), intermetatarsal angle (IMA), and tibial sesamoid position (SP) were measured pre- and postoperatively.

Patients in the MICA group were matched to patients who underwent Lapidus bunionectomy based on radiographic parameters. Differences between the groups were assessed with paired t-tests for continuous variables and chi-square tests for categorical variables.

Results: 41 patients who underwent MICA and 81 patients who underwent Lapidus bunionectomy met the inclusion criteria. Of the Lapidus patients, 41 were included, matched to the MICA patients. There were no significant differences in demographics or preoperative parameters between groups aside from sex (Table). Both groups achieved similar radiographic correction (Table). Bunion recurrence (HVA >=20°) occurred in one MICA patient and two Lapidus patients, with all patients asymptomatic. The most common reason for reoperation was removal of hardware (4 patients in the MICA group, 2 patients in the Lapidus group). One additional patient in the MICA group required reoperation for wound closure, and one additional patient in the Lapidus group required a derotational proximal phalanx osteotomy.

Conclusion: This is the first study to our knowledge to compare outcomes between MICA and the modified Lapidus procedure in patients matched for bunion severity. We found that patients with similar preoperative deformities experience similar radiographic outcomes following MICA versus modified Lapidus bunionectomy. Our analysis of PROMIS scores and satisfaction data is currently underway. Although this is short-term data, it provides additional support for minimally invasive techniques which allow for faster, less painful recoveries. Further research is needed to investigate longer term outcomes and to establish which deformities are best suited to each procedure.
Table. Demographics and radiographic parameters are compared between the MICA group and the Lapidus bunionectomy group. *p < 0.05

|                          | MICA       | Lapidus    | p-value |
|--------------------------|------------|------------|---------|
| Age, mean ± SD           | 52.7 ± 13.7| 50.3 ± 13.1| 0.42    |
| Sex, % female            | 85.4%      | 97.6%      | 0.048*  |
| Preop. HVA, mean ± SD    | 25.1 ± 6.8°| 24.7 ± 7.6°| 0.77    |
| Preop. IMA, mean ± SD    | 13.0 ± 3.5°| 13.0 ± 3.0°| 0.95    |
| Preop. SP ≤4, % patients | 48.8%      | 31.7%      | 0.11    |
| Radiographic follow-up, months ± SD | 8.1 ± 3.1 | 9.5 ± 5.5 | 0.09    |
| Postop. HVA, mean ± SD   | 6.6 ± 5.3° | 6.8 ± 7.5° | 0.88    |
| Postop. IMA, mean ± SD   | 5.4 ± 2.4° | 5.7 ± 2.4° | 0.58    |
| Postop. SP ≤4, % patients| 85.3%      | 92.7%      | 0.29    |

HVA = hallux valgus angle; IMA = intermetatarsal angle; SD = standard deviation; SP = tibial sesamoid position