Early Results and Complication Rate of the Lapidus Bone Block Fusion in the Treatment of Medial Longitudinal Arch Collapse: A Prospective Cohort Study

Cesar de Cesar Netto, MD, PhD; Amanda Ehret; Jennifer S. Walt, MD; Rogerio Chinelati; Kevin N. Dibbern, PhD; Kepler Carvalho, MD; Tutku Tazegul, BBME; Samuel Braza; Vineel Mallavarapu, BS; Matthieu Lalevée, MD; Nacime SB Mansur, MD

Category: Midfoot/Forefoot; Bunion; Hindfoot

Keywords: Lapidus; Complications; Flatfoot

Introduction/Purpose: An unstable medial column lever arm may be associated with many conditions, particularly progressive collapsing foot deformity (PCFD), hallux valgus (HV), and midfoot arthritis (MA). Restauration of the first metatarsal length and its lever in the tripod is essential when surgically treating these deformities. Fusion of the first tarsometatarsal joint (TMT) using a structural graft aims to correct the first metatarsal malalignment and create a firm construct on the medial arch. This study aimed to assess early results, healing, and complication rate of a distraction dorsal opening plantarflexion wedge allograft first tarsometatarsal joint fusion in patients with collapse/instability of the medial column. Our main hypothesis is that using a structural allograft on a TMT fusion might present a considerable rate of nonunion.

Methods: In this IRB-approved prospective cohort study, patients with a clinical diagnosis of PCFD, HV, MA that underwent a TMT distraction arthrodesis at our institution were evaluated. Adults undergoing the procedure and had performed a weight-bearing computed tomography (WBCT) at 12 weeks postoperatively were included. The technique was carried using a pre-shaped anatomically specific structural allograft and specific implants. Fusion was defined by two fellowship-trained orthopedic foot and ankle surgeons and one fellowship-trained musculoskeletal radiologist, unrelated to the study. A percentage higher than 50% of crossing trabeculae over the entire proximal and distal allograft surfaces had to be noticed. Complications were established as minor (superficial dehiscence, superficial infection, and neuropraxia) and major (deep dehiscence, deep infection, nerve damage, residual deformity, sesamoiditis, limited motion, lateral overload, and reoperation). Collapse correction was assessed by the talus-first metatarsal angle (TFMA).

Results: A total of 22 patients (22 feet) were included (11 PCFD, 6 MA, and 5 HV patients) with a mean age of 52.6 years (range, 19-75 years; SD, 14.4), and a mean body mass index (BMI) of 32.9kg/m2 (95% CI, 29.2 to 36.5). Mean follow-up was 5.9 months (range, 3-12), and median allograft size was 8mm (range 5-19mm). Bone healing was observed on 91% of cases, and two patients (one PCFD and one MA) presented a non-union. Two minor complications (9%, both superficial dehiscence) and one major complication (4.5%, deep infection on a MA patient) were observed. Inter-observer reliability for TFMA measurements was excellent, with an ICC of 0.86. Statistically significant improvement of the sagittal plane TFMA was observed, with a mean enhancement of 9.4 degrees (95% CI, 6.7 to 12.1 degrees; p<.0001).

Conclusion: In this prospective cohort study of 22 patients treated with the TMT distraction arthrodesis for medial longitudinal arch collapse/instability, we observed a low complication rate (9% minor, 4.5% major). A high healing rate after 3 months (91%), one clinically stable radiographic non-union (4.5%), and one unstable non-union (4.5%) needing reoperation were noted, despite the use of a structural allograft requiring healing at two surfaces. Our results demonstrate promising initial outcomes for this technique in treating collapse of the medial longitudinal arch in patients with PCFD, MA, and HV deformities. Long-term results are needed to confirm these promising results.
Early Results and Complication Rate of the Lapidus Bone Block Fusion in the Treatment of Medial Longitudinal Arch Collapse: A Prospective Cohort Study

Consecutive Screened/Enrolled Patients (August 2020 – October 2021)

- 29 Patients (50 feet)
  - Inclusion Criteria
    - Age of 18 years or older
    - Underwent Lapidus Procedure
    - Pre-operative MRI
  - Exclusion Criteria
    - Less than 3-months follow-up
    - Peripheral Neuropathy/Charcot Arthropathy
  - Excluded
    - Six Patients (<6 months follow-up)
    - One Patient (Charcot Arthropathy)

22 Patients Included

Examples

- Pre-operative:
  - Foot & Ankle Orthopaedics, 7(4)
  - DOI: 10.1177/2473011421S00644
  - © The Author(s) 2022

TFMA

- TFMA Example
  - P<0.001*
  - 15.3°
  - 5.8°