

Immediate weight bearing post modified Lapidus arthrodesis



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Statement of Purpose

The retrospective study evaluates chart data on patients who underwent a modified Lapidus arthrodesis with immediate weight bearing in a removable boot. The goal of the study was to determine whether a modified Lapidus surgical technique in conjunction with rigid internal fixation produces the necessary correction and stability post-operatively to allow bony consolidation while immediately weight bearing.

Introduction

The procedure was first described by Paul W. Lapidus in 1931 (1). Although the original indication for the procedure was to correct metatarsus primus varus, it is now utilized for severe or recurrent hallux abducto valgus deformity, hypermobility of the first ray, metatarsocuneiform joint arthritis, and metatarsus primus elevatus. Interest in the role of the hypermobile first ray in forefoot pathology has resurfaced with the renewed popularity of the Lapidus arthrodesis procedure (2). The procedure has been modified significantly over the years since its original use by Lapidus with chromic catgut suture and no internal fixation (1,3,4).

Patients and methods

Patients (n=58) who underwent a modified Lapidus arthrodesis using a locking plate with or without an interfragmentary screw were included in the study. Patients with adjunctive osseous procedures were not included in the study. Inclusion criteria was also based on whether or not there was a complete medical record, including pre and post operative weight bearing radiographs, available for review.

The following data was extracted for each patient: age, body mass index (BMI), sex, nicotine use, and presence of diabetes. Fixation technique and additional surgical technique information such as bone graft utilization and adjunctive procedures were noted as well.

Comparisons between of pre-operative and immediately post-operative weight-bearing radiographs were made in order to determine the degree of correction achieved. Measurements of intermetatarsal (IM) angle, tibial sesamoid position, and talo-1st metatarsal (Meary's) angle were recorded. A series of radiographs were taken post-operatively at regular intervals in order to evaluate hardware integrity, alignment, and extent of osseous union. Complications associated with delayed union, non-union, DVT occurrence, pre-operative and post-operative visual analog scale (VAS) comparisons were also documented.

Surgical technique

A linear incision measuring 6 cm was made at the dorsomedial aspect of the first metatarsocuneiform joint (MCJ). Triplane correction was made at the TMT-1 following joint preparation. A lamina spreader was used to access the plantar and lateral MCJ. The subchondral plate was performed with drill bits until bleeding bone was identified. Debridement of the medial base of the second metatarsal was also performed. The first ray was then held in a corrected position indicative of reduction of the first IMA in the sagittal, transverse, and frontal plane using 2.0 Kirschner wires before hardware fixation was achieved. At this time, depending on the hardware utilized three 4.0-mm solid cortical stainless steel screws or a locking plate with or without interfragmentary screw were placed across the arthrodesis. A stress-relieving bone graft was also placed on the dorsum of the joint. This bone was obtained from the calcaneus via an ancillary incision made on the lateral aspect of the calcaneus, through which a curette was used to harvest cancellous bone.

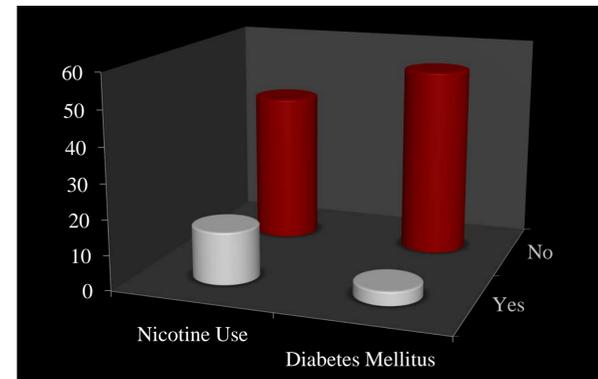
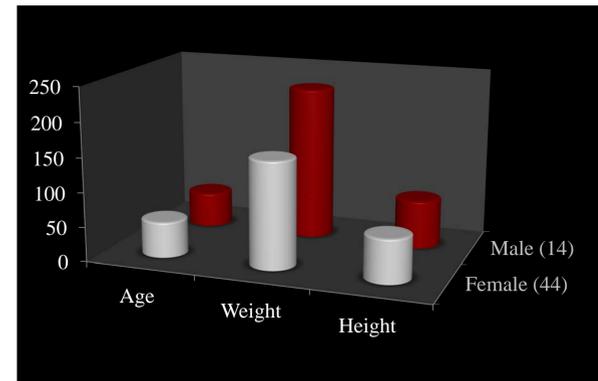


Preoperative and postoperative radiographs of the Lapidus arthrodesis construct with locking plate and screw construct

Postoperative protocol

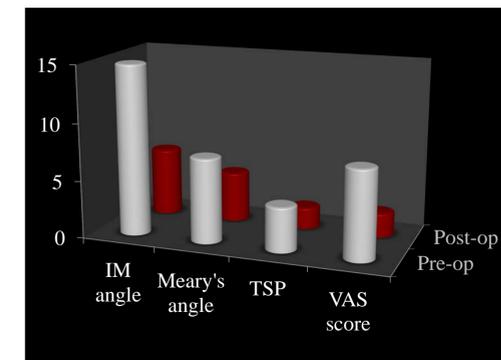
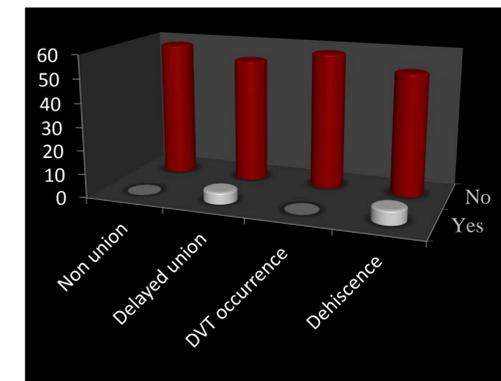
Patients were immediately weight bearing with a CAM (controlled ankle motion) boot as tolerated. Once radiographic evidence for osseous union was achieved, the patient transitioned to normal shoe gear. Two to three weeks postoperatively, patients were referred to physical therapy for muscle strengthening and range of motion exercises.

Patient Demographics



Results

A total of 58 patients met the inclusion criteria in this study. Patients followed the same postoperative protocol with no reported non-unions. 5 patients had delayed unions in the process but went on to full osseous consolidation within 4 months. Only 6 patients had superficial wound dehiscences which resolved with local wound care. On average the VAS pain score was 2.1 postoperatively. IM angle correction was an average of 8 degrees. Meary's angle also improved by 2.9 degrees. In addition, the average tibial sesamoid position was improved from 4 to 2 postoperatively.



Discussion

Minimum recommendations of six to eight weeks of protected non-weight bearing post-operatively have been documented in literature. This also coincides with the average time it takes to see radiographic evidence of bony union. (3,5,6) This post-operative management was implemented in the past as it was believed that early weight bearing resulted in fixation failure, fusion site instability, and possible nonunion. However, this notion has been challenged by recent studies that demonstrate no increase in non-union rate provided that the fixation is stable. (3,6,8)

Blitz et al. conducted a multicenter review of 80 feet in 76 patients with early weight bearing status after modified Lapidus arthrodesis (10). All patients underwent a modified first TMT arthrodesis using variations of the crossed screw technique utilizing 2 to 3 fully threaded screws across the fusion site. Patients began protected weight bearing at a mean 14.8 days postoperative. All 80 feet proceeded to successful union (100% union rate). Mean time to union was 44.5 days. No hardware failure occurred and no surgical revisions were performed. The study concluded that early weight bearing was possible without compromising correction or the rate of osseous union.

Sorensen et al reported on 21 patients who underwent the Lapidus arthrodesis with locking plate fixation. Patients were weight bearing at 2 weeks postoperative. An average of 6.95 weeks to radiographic fusion was noted. There was 9.52% rate of asymptomatic malunion and no evidence of delayed union or nonunion (11).

Basile et al. also presented a study involving immediate weight bearing following a modified Lapidus procedure (12). No significant radiographic changes between immediate and final 6-month postoperative radiographs were reported in relation to first IM angle and first ray elevation.

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