Retrospective measurements of sesamoid position for the Lapidus bunionectomy without performing a lateral release

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Statement of Purpose

The goal of this retrospective study is to determine whether a modified Lapidus surgical technique produces the necessary correction of the sesamoid position postoperatively without the need for performing a lateral release.

Introduction

Although originally introduced by Albrecht in 1911 (1) and further described by Truslow in 1925 (2) and Kleinberg in 1932 (3), the first tarsometatarsal arthrodesis did not gain acceptance until popularized by Paul W. Lapidus (1, 2, 4). In 1934 Paul W. Lapidus published his first article on the etiology and surgical technique used to correct the severe hallux abducto valgus deformity secondary to metatarsus primus varus. The procedure Lapidus described included fusion of the first metatarsal cuneiform joint and fusion of the base of the first metatarsal to the base of the second metatarsal (3).

Many surgeons still perform a lateral release at the level of the metatarsophalangeal joint in conjunction with a Lapidus procedure in order to realign the sesamoids. However, many complications such as hematoma, stiffness, hallux varus, and avascular necrosis as a result of excessive soft tissue stripping are associated with first MTPJ procedures (5-9).

However, a lateral release may prove to be an unnecessary step as the sesamoid subluxation development is thought by some authors to be a direct result of the medial migration of the first metatarsal rather than movement by the sesamoids (10). In essence, repair of the structural component of hallux abductovalgus entails relocation of the relatively mobile first metatarsal over the relatively immobile sesamoids (11, 12, 13).

Patients and methods

A retrospective chart and radiographic review of 83 patients who underwent a modified Lapidus arthrodesis using a locking plate without a lateral release. Preoperative diagnoses included first ray instability/hypermobility, metatarsal primus varus, and hallux abducto valgus.

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.

Radiographic values of IM 1-2, Meary's angle, and tibial sesamoid position were assessed postoperatively.

Surgical procedure

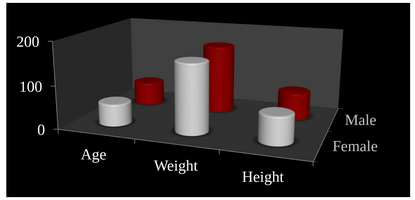
A linear incision measuring 6 cm was made at the dorsomedial aspect of the first metatarsocuneiform joint (MCJ). A triplane correction was made at the TMT-1 following joint preperation. A lamina spreader was used to access the plantar and lateral MCJ. The subchondral plate was perforated with drill bits until the 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 locking plate with or without interfragmentary screw were then 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.

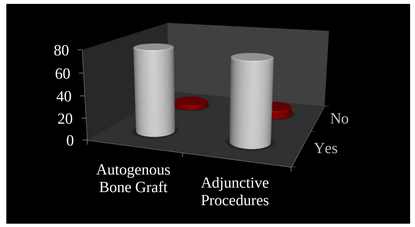
Postoperative management

Postoperatively, weight bearing with a CAM (controlled ankle motion) boot was permitted as tolerated by each individual patient. The patients were allowed to ambulate in the CAM boot until evidence of radiographic union was noted and no complications were present. When radiographic union was achieved, the patient transitioned to normal shoe gear.

Preoperative and postoperative sesamoid position.

Patient Demographics

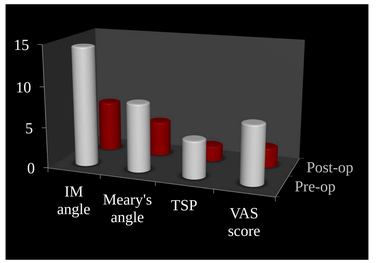


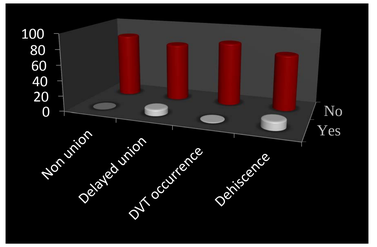


Results

A total of 83 patients were included in the study. Mean radiographic values for IM 1-2 angle improved 8.4 degrees. The tibial sesamoid position was 4 or greater preoperatively and 2 or less postoperatively as classified utilizing the Hardy and Clapham grading system. No patients underwent a lateral soft-tissue release. 75 patients underwent adjunctive procedures such as the Endoscopic Gastrocnemius recession. 78 patients required autologous bone graft harvested from the calcaneus.

Data Analysis





Discussion

Traditionally, the lateral release of soft-tissue structures at the first metatarsophalangeal joint involves the adductor hallucis tendon, lateral capsule, transverse metatarsal ligament and fibular sesamoid metatarsal ligament. Advocates of the lateral release argue that in doing so, the lateral deforming forcers are reduced thus improving the realignment of the first MTP joint.

Resch et al. in 1994 demonstrated through their randomized study that moderate hallux valgus deformities did not require a lateral release procedure as the mean correction of IM 1-2 angles was similar in the control and trial groups (15). Likewise, Lee et al. conducted a prospective study with 86 patients who underwent a distal chevron osteotomy with and without the lateral soft-tissue release. Patients without a lateral release had a better first MTPJ range of motion, no complications of digital neuritis, and similar post-operative reduction in the IM 1-2 and HAV angles (14).

To our knowledge, no study has been developed to assess postoperative sesamoid position after surgical correction of moderate to severe HAV deformity without lateral release. In avoiding the lateral release, complications such as digital neuritis and AVN of the metatarsal head are minimized. Moreover, according to Meier et al., the risks for AVN can reach up to 40% with a combination of chevron osteotomy and lateral release (16).

In preserving the lateral soft-tissue structures and the joint capsule of the first MTP, we allow for the tissues to adapt once surgical correction is established proximally at the first tarsometatarsal joint. The sesamoid correction can be established with the appropriate frontal plane alignment and be maintained throughout the postoperative period.

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