Incidence of First Ray Elevation with Early Weight Bearing After Lapidus Arthrodesis

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Abstract

Traditionally patients have been kept non weight bearing for a minimum of 6 weeks following a proximal metatarsal osteotomy or metatarsocuneiform arthrodesis. The aim of the current study was to assess for incidence of first metatarsal elevatus after allowing patients to begin protected weight bearing at two weeks postoperatively following a Lapidus arthrodesis. 31 procedures in 29 patients met the inclusion criteria. Elevatus was assessed for by measuring the Seiberg index on their initial post-operative weight bearing radiograph at two weeks and on their final radiograph prior to discharge from clinic. The mean Seiberg index was -0.06mm on both the initial and final weight bearing radiographs, showing no incidence of elevatus. We conclude that early weight bearing after a Lapidus arthrodesis, using the described fixation method and post-operative protocol, does not increase risk of first metatarsal elevatus.

Introduction

Arthrodesis of the first metatarsocuneiform joint for correction of HAV deformity, commonly referred to as the Lapidus procedure, was originally described by Albrecht in 1911 (4). Paul Lapidus is credited with the increased popularity of the procedure after publishing his initial papers describing his experiences in 1934 (5). Traditionally the post-operative protocol included 6-8 weeks of non-weight bearing, primarily to avoid the complication of a nonunion. Historically nonunion rates have been reported to be as high as 25% (6). More recent studies have shown nonunion rates closer to 0-5% (7-8). With the improved nonunion rates a newer trend towards earlier weight bearing has emerged in the literature (8-11). The few published studies have shown promising results with regard to the incidence of nonunion, however, no study has evaluated the incidence of acquired first ray elevatus following an early weight bearing protocol.

The primary purpose of this study was to evaluate the incidence of first metatarsal elevatus following an early weight bearing post-operative protocol after a Lapidus arthrodesis utilizing a novel medial positioned plate with a plantar locking arm.

Figure 1: Pre-op Lateral radiographs demonstrating measurement of Seiberg index

Figure 2: Final post-op lateral radiograph showing no elevatus

Materials/Methods

A total of 41 Lapidus arthrodesis procedures were done during this study period and a total of 31 procedures in 29 patients met the inclusion criteria.

Surgical Technique: All patients underwent same surgical technique with a single incision along the dorsomedial aspect of the first ray extending from proximal aspect of the medial cuneiform and ending at the base of the proximal phalanx. A lateral release and resection of hypertrophic bone at the medial aspect of the 1st metatarsal head was done in all patients. The first metatarsal-cuneiform joint was prepped for arthrodesis using a combination of planal resection of joint surfaces and fenestration. A 4.5mm interfragmentary screw was driven from 1st met to medial cuneiform and a 5 hole Lapidus Arthrodesis plate was then fixated with 3.5mm locking screws to the medial side of the first metatarsal-cuneiform arthrodesis site.

Post-operative course: Patients were kept non-weightbearing for 2 weeks and were transitioned to full weight bearing as tolerated in a CAM boot at 2 weeks post op. At 6 weeks patient were transitioned to a regular athletic shoe. Patients were discharged from clinic at 10 weeks if they were ambulating comfortably in regular shoe.

Radiographic Assessment: Assessment of 1st ray elevation was performed using the Seiberg index. Seiberg index was evaluated at first weightbearing radiographs at 2 weeks and final post-operative radiographs.

Patient	Age	Sex	Pre-Op IM	Post Op IM	Initial Seiberg (mm)	Final Seiberg (mm)	Time to Union (weeks)
1	26	F	12	8	0	0	6
2	62	M	14	8	0	0	8
3	37	F	12	7	1	1	6
4	50	F	11	7	-1	-1	6
5	57	F	18	8	1	1	10
6	59	F	16	8	-1	-1	6
7	51	F	14	9	0	0	8
8	59	F	21	8	0	0	6
9	39	F	11	7	1	1	6
10	42	M	13	7	-1	-1	6
11	58	F	14	8	-1	-1	6
12	67	F	13	7	1	1	8
13	66	F	14	8	0	0	6
14	41	F	15	5	-1	-1	8
15	31	F	14	9	-2	-2	6
16	15	F	16	7	1	1	6
17	43	F	14	9	0	0	6
18	22	F	13	6	-1	-1	6
19	71	F	14	8	0	0	8
20	31	F	13	8	1	1	6
21	60	F	13	6	0	0	6
22	60	F	12	5	-1	-1	6
23	41	F	18	6	0	0	8
24	71	F	12	7	0	0	6
25	63	F	13	6	0	0	8
26	52	F	12	7	0	0	6
27	52	F	13	7	-1	-1	6
28	50	F	15	7	0	0	6
29	42	F	12	7	0	0	6
30	46	F	13	6	0	0	6
31	47	M	14	8	-1	-1	6

Table 1: Patient demographics and results.

Results

29 patients with a total of 31 Lapidus procedures, mean age 48.7. Mean pre-op IM angle was 13.8 and improved to 7.2 post operatively. The mean measured Seiberg index was -0.06mm on initial WB radiographs, indicating slight plantarflexion and was -0.06mm on final radiographs. Osseus union was in 30/31 patients (96.8%)

Discussion

Traditionally patients have been kept non-weight bearing for a minimum of six weeks in order to allow for osseous consolidation across the arthrodesis site before weight bearing axial loads were applied. Aside from fear of a nonunion, another primary factor was the reportedly high rate of iatrogenic metatarsus elevatus following proximal metatarsal osteotomies. It was further shown that keeping patients non-weight bearing for a longer period of time resulted in a decreased incidence of iatrogenic first metatarsal elevatus (17).

Blitz et al. retrospectively reviewed 80 feet in 76 patients who were allowed to begin weight bearing in a walking boot at two weeks following a Lapidus arthrodesis. They reported a 100% successful union rate at a mean time to union of 44.5 days using either two or three crossed interfragmentary screws and no cases of pathological first ray elevatus. This study did not describe how they evaluated elevatus or how many patients developed elevatus.

In conclusion, allowing patients to participate in controlled weight bearing at two weeks post-operatively following a Lapidus arthrodesis does not result in an acquired first metatarsal elevates when using the currently described technique and post-operative protocol.

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