

Radiographic Evaluation of the Lapidus Procedure and Resultant Forefoot Symptomatology

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Introduction:

One of the potential complications that arises as a result of the Lapidus arthrodesis procedure is shortening of the first metatarsal as too much bone may be resected.^{1,2} This was first recognized by Lapidus himself; he noted that excessive shortening could result in metatarsal overload (*metatarsalgia*).^{1,3,4} A shortened first metatarsal and the resultant shortened lever arm have not been reviewed in conjunction with objective and subjective evaluations in isolation.

The purpose of this study was to determine whether subjective symptoms of lesser metatarsal pain and objective signs of lesser *metatarsal overload* correlate with radiographic shortening of the first metatarsal after Lapidus arthrodesis.

Materials and Methods:

Medical charts, radiographs, and electronic databases were retrospectively reviewed for 44 patients who underwent Lapidus arthrodesis from April 1999 through May 2003.

The operative technique, principles of joint preparation, method of fixation, and postoperative management were applied similarly for each patient by 2 different surgeons (LAF, GAH).

Independent reviewer assessed weight-bearing pre-operative and post-operative lateral and antero-posterior radiographs were utilized to obtain metatarsal length (*metatarsal protrusion distance—MPD*) as described by Hardy and Clapham and *metatarsal declination* as described by Schereff.

Multivariable logistic regression analysis (SAS version 8.02, Cary, NC) was performed.

Statistical significance was defined as $p < 0.05$.

Results:

- ❑ 6 patients (13.6%) suffered postoperative complaints
 - ❑ 1 non-union (2.2%)
 - ❑ 1 hardware irritation (2.2%)
 - ❑ 3 of the 44 patients (6.8%) experienced transfer lesions
 - ❑ 4 of the 44 patients (9%) complained of lesser metatarsal pain
- ❑ The average change in MPD from pre-op to post-op measurements was -2.09 mm
- ❑ The average change in the talar-first metatarsal declination angle was 2.95 degrees (pre-op average, 3.04 degrees; post-op average, 0.045 degrees)
- ❑ An absence of change in talar first metatarsal declination angle correlated with the presence of transfer lesions, but this failed to reach statistical significance ($p = 0.10$).

Discussion:

Shortening of the first metatarsal after Lapidus arthrodesis is well documented. Our data supported shortening with joint preparation using curettage and drilling techniques. Plantar translation of the first metatarsal prior to fixation, as evidenced by a decrease in the talar-first metatarsal declination angle, is an essential component of compensation for shortening of the first ray. Failure to maintain the even weight distribution across the metatarsal head parabola may result in lateral forefoot symptomatology.

References:

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Figure 1. Pre-operative AP view.



Figure 2. Post-operative AP view.



Figure 3. Pre-operative lateral view.



Figure 4. Post-operative lateral view.