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The Lapidus Procedure as Salvage After Failed Surgical Treatment of Hallux Valgus

Surgical Technique

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ABSTRACT

BACKGROUND:
Recurrent hallux valgus is a relatively common, yet challenging, condition for both the patient and the surgeon. The literature on the treatment of recurrent hallux valgus is sparse. The purpose of this study was to evaluate prospectively the functional outcome and patient satisfaction following the Lapidus procedure for the treatment of recurrent hallux valgus deformity.

METHODS:
Twenty-four patients with a total of twenty-six symptomatic recurrences of hallux valgus after previous procedures for treatment of the deformity were included in the study. Exclusion criteria included prior fusion procedures on the foot or ankle, a previous Keller or Mayo procedure, insulin-dependent diabetes, peripheral vascular disease, or peripheral neuropathy. A visual analog pain scale and the American Orthopaedic Foot and Ankle Society

INTRODUCTION

Paul Lapidus was an orthopaedic surgeon who worked at the Hospital for the Ruptured and Crippled in New York when he wrote his first article on the surgical correction of the metatarsus primus varus in patients with hallux valgus deformities. The premise of his approach was that the metatarsus primus varus was a result of instability at the first tar-

[continued]

FIG. 1-A

Figs. 1-A through 1-D
Schematic illustrations of the Lapidus procedure.
Figs. 1-A and 1-B Anteroposterior (Fig. 1-A) and medial (Fig. 1-B) views of the foot, showing metatarsus primus varus and hallux valgus deformities.
sometatarsal joint. Correcting the alignment at the base of the deformity yielded the most powerful correction. The Lapidus procedure consists of correction of the metatarsus primus varus at the first tarsometatarsal joint through fusion of the joint (Figs. 1-A through 1-D).²

**SURGICAL TECHNIQUE**

The patient is placed supine with a tourniquet around the thigh. A 6-cm incision is made over the dorsum of the foot in line with the extensor hallucis longus tendon. The interval between the extensor hallucis longus and the extensor hallucis brevis is used to expose the first and second tarsometatarsal joints. A large vein crossing the line of the dissection is almost uniformly present at the distal end of the incision. The vein is cauterized and is an indication that the dissection is distal enough (Fig. 2).

The dorsalis pedis artery and the deep peroneal nerve are usually encountered in the interval between the extensor hallucis longus and the extensor hallucis brevis. Careful dissection is mandatory to prevent damage to these structures. The dorsalis pedis enters the plantar aspect of the foot through the first web space, about 1 to 1.5 cm distal to the first tarsometatarsal joint. One should be aware of this fact when débriding the interval between the bases of the first and second metatarsals.

The entire first tarsometatarsal joint must be exposed (Fig. 3). The medial aspect of the second metatarsal is exposed and denuded of soft tissue, and the cortex is also perforated to augment the subsequent fusion.

The articular cartilage is removed from the opposing surfaces of the first tarsometatarsal joint. Correcting the alignment at the base of the deformity yielded the most powerful correction. The Lapidus procedure consists of correction of the metatarsus primus varus at the first tarsometatarsal joint through fusion of the joint (Figs. 1-A through 1-D).²

**ABSTRACT | continued**

Hallux Metatarsophalangeal-Interphalangeal Scale were administered preoperatively, at six months postoperatively, and yearly thereafter. Weight-bearing radiographs were also made preoperatively; at six weeks, three months, six months, and one year postoperatively; and yearly thereafter. Patient satisfaction was assessed at the latest follow-up evaluation.

**RESULTS:**

At twenty-four months, the mean score according to the American Orthopaedic Foot and Ankle Society (AOFAS) Hallux Metatarsophalangeal-Interphalangeal Scale had increased from 47.6 to 87.9 points, the mean score according to the visual analog pain scale had improved from 6.2 to 1.4, the mean hallux valgus angle had improved from 37.1° to 17.1°, and the mean intermetatarsal angle had improved from 18° to 8.6°. The patients were very satisfied after 77% of the twenty-six procedures, satisfied after 4%, and somewhat satisfied after 19%; no patient was dissatisfied. There were no cases of hallux varus. Complications included three non-unions, all of which occurred in smokers, and two superficial wound infections.

**CONCLUSIONS:**

In appropriately selected patients, the Lapidus procedure is a reliable and effective operation after failed surgical treatment of hallux valgus.
joint with small osteotomes and curettes (Fig. 4). When the first metatarsal is short as a result of the previous procedures, only the cartilage should be removed to limit additional shortening. When the first metatarsal is long, a small laterally based wedge is removed from the medial cuneiform to help to realign the tarsometatarsal joint. A small plantar-based wedge is also removed from the tarsometatarsal joint to ensure slight plantar flexion of
PITFALLS:
- The dorsalis pedis artery and the deep peroneal nerve are usually encountered in the interval between the extensor hallucis longus and the extensor hallucis brevis. Careful dissection is mandatory to prevent damage to these structures (Fig. 2).
- One should be cognizant of the tendency to fuse the first tarsometatarsal joint in dorsiflexion, which can lead to lesser metatarsal overload. The dorsoplantar extent of this joint is about 30 mm. It can be difficult to denude the plantar one-half or one-third of the joint without adequate exposure. A mini lamina spreader is very helpful to ensure complete visualization of the joint.
- When the interval between the first and second metatarsal bases has not been adequately débrided, it might be difficult to completely reduce the intermetatarsal angle.
- The medial cuneiform is only 1.5 cm wide. Screw placement is therefore very important. It is most reliable to insert the first screw from the middle of the medial cuneiform into the first metatarsal. The second screw is then inserted from the base of the first metatarsal into the base of the second metatarsal.
- During the insertion of the intermetatarsal screw, one should keep the first and second metatarsals in the same plane, avoiding excessive plantar flexion or dorsiflexion of the first ray.
Next, the adductor hallucis tendon is released through a 2-cm incision in the first web space. The lateral aspect of the first metatarsophalangeal joint capsule is incised longitudinally to allow the sesamoids to reduce. A medial incision is then made over the first metatarsophalangeal joint (Fig. 1-B).

Adequate exposure of the first tarsometatarsal joint is paramount. A small lamina spreader is invaluable for allowing visualization of the plantar third of the joint as well as the medial aspect of the base of the second metatarsal.

FIG. 4

Intraoperative radiograph showing good correction of the intermetatarsal angle, the hallux valgus, and the distal metatarsal articular angle. When there is substantial residual hallux valgus, one can correct the hallux alignment either through a closing-wedge distal metatarsal osteotomy or a proximal phalangeal osteotomy as was done in this case.

FIG. 5

A Weil shortening osteotomy of the second, and sometimes the third, metatarsal is indicated if the first ray is very short. With first metatarsal shortening of between 0.5 and 1 cm, the surgeon must be sure that the first metatarsal is fixed in a slightly plantar flexed position. For shortening of >1 cm, we recommend adding Weil shortening osteotomies of the second and third metatarsals (Fig. 6). For shortening of >2 cm, the preferred procedure is lengthening of the first ray with use of an interpositional bone-block fusion technique.

CRITICAL CONCEPTS

PITFALLS (continued):

- Attention should be paid to the distal metatarsal articular angle. Less than 10° is normal. Too much valgus may be due to the original problem or may be secondary to the initial bunion procedure. If the hallux remains in valgus after an adequate reduction of the intermetatarsal angle with the tarsometatarsal fusion, a distal procedure should be performed. This can be either a medial closing-wedge osteotomy of the distal part of the first metatarsal or an Akin closing-wedge osteotomy of the proximal phalanx of the great toe.

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joint, the capsule is incised longitudinally, and any residual bunion prominence is removed.

The first metatarsal is then reduced parallel to the second by closing the intermetatarsal gap. It is very important at this time to confirm that the first metatarsal is slightly plantar flexed and is rotated correctly. One 3.5-mm cortical screw is then inserted from the medial cuneiform into the first metatarsal under compression. A second screw is inserted from the medial aspect of the base of the first metatarsal into the base of the second metatarsal to close the intermetatarsal gap securely. With the intermetatarsal gap reduced, the medial aspect of the capsule of the first metatarsophalangeal joint is plicated. It should not be necessary to overtighten the capsule in order to maintain the alignment of the hallux (Fig. 5). Local bone graft is packed into any osseous defects at the bases of the metatarsals. The tourniquet is deflated, and the wounds are closed in layers.

Postoperatively, the foot is immobilized in a slipper cast (fiberglass great-toe spica) for two weeks. At two weeks, the sutures are removed and a second slipper cast is applied; this cast is worn for an additional four to six weeks. The patient should remain non-weight-bearing for six weeks. If the six-week radiographs demonstrate satisfactory progression of the fusion, the cast is removed.

**CRITICAL CONCEPTS** | continued

**AUTHOR UPDATE:**

Only a few minor changes have been made in the procedure since our original article was published.

It is almost never necessary to use a saw when performing the preparation of the first tarsometatarsal joint. Careful use of small osteotomes will allow an adequate preparation without producing excessive shortening of the first ray.

We now use 4-mm self-tapping cortical screws (Synthes USA, Paoli, Pennsylvania). These screws have the same head as ordinary small-fragment screws, but an increase in the shaft diameter has reduced the potential for screw breakage and nonunion. (Our nonunion rate over the past year has been reduced to 2%.)

The patients are allowed to begin “heel-touch” weight-bearing on Day 1. They can put 30 lb (13.6 kg) of weight on the heel when standing and walking. This does not adversely affect healing, and patient compliance is much easier than with complete non-weight-bearing.
and weight-bearing and physical therapy are started. Patients are advised not to return to any vigorous physical activity for at least three months, although they may begin swimming and bicycling at eight weeks.

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