

LAPIDUS FUSION FOR HALLUX LIMITUS

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Etiologies of hallux limitus have long been recognized to include elevated and/or long first metatarsals. Many procedures have been described for treatment of this condition from simple cheilectomy for milder conditions, up to joint destructive procedures such as implant arthroplasty or fusion of the first metatarsophalangeal joint for more severe or definitive treatment.

It is the more intermediate procedures and deformities, that are of greater interest. It is these procedures that have occupied the interest of most practitioners for the moderate hallux limitus deformity. These procedures have been thought to allow for decompression of the joint and relative plantarflexion of the metatarsal while maintaining normal function of the first metatarsophalangeal joint.

The greatest challenge of these procedures has always been the ability to achieve adequate plantarflexion while at the same time not causing what was thought to be excessive shortening of the metatarsal. At best, the head procedures such as the Reverdin Green Laird and Youngswick Austin generate 1 mm of plantarflexion for each mm of shortening. It has been the author's experience that the shortening of the metatarsal is actually minimized and better tolerated with the Lapidus procedure than with the distal metaphyseal osteotomy (DMO). This is due to the more aggressive plantarflexion that is available with the Lapidus than with the DMO. With the Lapidus, there is a structural amount of shortening that occurs with joint resection while plantarflexion is essentially limitless between plantar translocation, which generates no additional shortening and wedging, which will result in additional shortening of the plantar cortex due to the axis of rotation.

One of the difficulties with current iterations of the Lapidus procedure has been the relatively high incidence of nonunion. This has been cited to be as high as an alarming 10%. The author's experience reflects this, however it seems to be directly associated with the type of fixation utilized. All of the nonunions seen by the author have occurred in instances where fixation has been limited to screw

fixation. Plate fixation was initially avoided due to bulk of fixation, increased need for exposure, anatomic limitations in smaller patients, and frequent need for removal of fixation. Though the stability achieved with plate fixation resulted in essential absence of nonunion a better "mouse trap" was needed. Recently new plates have become available for fixation of the Lapidus, which offer multiplaner stability, low profile and the advantage of the rigid stability as is only achieved with the newer locking plate technology.

CASE STUDIES

The effectiveness of the Lapidus procedure for hallux limitus first became obvious to the author in the following case. AE presented with a concern of painful limitation of motion of the great toe joint bilaterally, though much worse on the left than the right. Condition and treatment options were reviewed with the patient, and due to elevation of the first metatarsal recommendation for correction via Lapidus arthrodesis was given.

The patient elected to undergo correction of the less symptomatic right side initially as this would allow quicker recovery and the ability to continue recovery on the right foot while the more symptomatic left foot was addressed. Due to the overall less impressive nature of the deformity with less spurring and limitation of motion, a Youngswick Austin procedure was performed (Figure 1). The patient's follow up was initially unremarkable, although the range of motion was never as significantly improved as was eventually achieved on the contralateral extremity.

Approximately four weeks after the initial surgery on the right foot, the left foot was addressed. Pre and postoperative radiographs are presented in Figure 2. It should be noted that despite the difficulties with nonweightbearing, the patient tolerated the postoperative period uneventfully and subsequently noted excellent range of motion and complete resolution of pain.



Figure 1A.

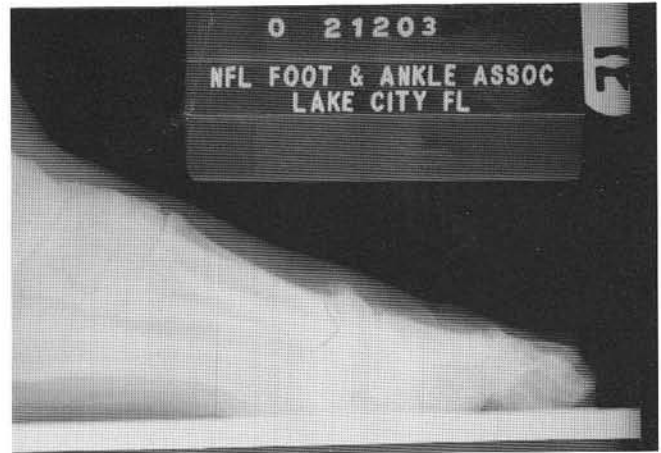


Figure 1B.



Figure 1C.



Figure 1D.

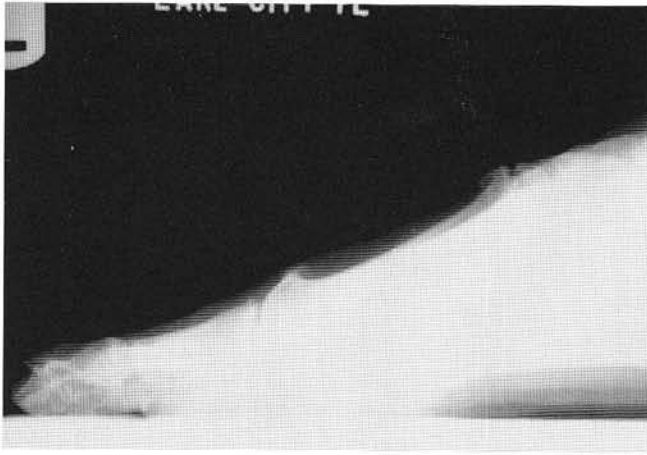


Figure 2A.



Figure 2B.



Figure 2C.



Figure 2D.



Figure 3A.



Figure 3B.

At 7 months postoperative on the right foot, the patient presented with pain and swelling laterally (on the right foot). Radiographs eventually revealed stress fracture of the second metatarsal (Figure 3).

This was the author's initial reinforcement of the idea that the Lapidus fusion procedure could be used to plantarflex and decompress the first MTPJ. This would give predictable results and less potential for lateral transfer overloading due to the greater ability to affect plantarflexion of the metatarsal without causing additional shortening of the metatarsal as is required in the DMO procedures.

Long term follow up x-rays (6 months postoperative, prior to onset of stress fracture right) in this patient show radiographic shortening of 4 mm on the lateral view. Preoperative views of both feet showed the first ray to be approximately 7 mm shorter than the second. The postoperative films (with well healed osteotomy and arthrodesis sites) demonstrate that the first metatarsal is about 11mm shorter than the second.

FIXATION ADVANCES

More recently, a low profile locking plate system has become available, which allows stable multiplanar fixation of the Lapidus procedure with minimal additional exposure.

MG presented with symptomatic hallux limitus deformity. After review of the condition and treatment options the patient opted for repair via Lapidus procedure.

Intraoperatively, moderate to severe wasting of the articular cartilage was noted, most notably dorsally and laterally (Figure 4). Remodeling of the joint was undertaken followed by plantarflexory Lapidus fusion procedure. Provisional fixation was undertaken using a 0.062 inch wire. Following verification of position under fluoroscopic guidance permanent fixation was achieved using a 4.0mm axially oriented partially threaded Synthes titanium screw and the 0 mm (no offset) Darco Lapidus fixation plate (Figure 5). It should be noted that although the Darco Lapidus plate offers the

advantage of locking screw technology it offers the option of utilization of a non locking screw in circumstances where position of the plate or other fixation would result in loss of the additional screw should the locking option be attempted/utilized.

In summary it is felt that the Lapidus procedure offers a superior approach to correction of hallux limitus which is further reinforced with utilization of plate fixation, particularly multiplanar locking plate technology as afforded by the Darco Lapidus fusion plate.

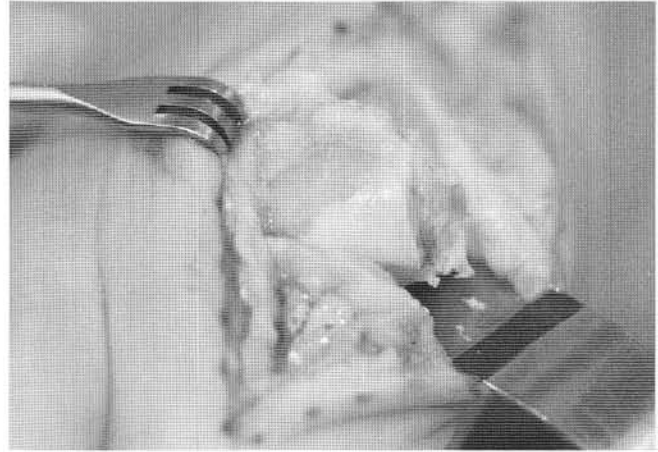


Figure 4.

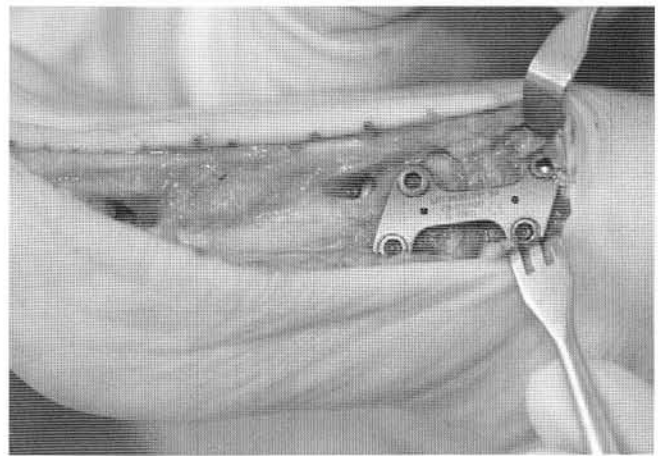


Figure 5.