Session 2:  8:23 – 8:33 am

Technique Video Presentations

How to Fuse the First MTP Joint

Panelists:

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2 (Stryker)
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8 (Foot and Ankle International)
9 (AAOS; AAOS; American Orthopaedic Foot & Ankle Society)

Goals:
1) Correction of hallux valgus deformity
2) Establish a plantigrade toe capable of push off
3) Obtain a solid arthrodesis

Methodology in Concept
When I approach a first MTP fusion for an arthritic bunion deformity, I ignore all of the previously mentioned “rules” of position of fusion. Unlike the ankle joint, which requires predictable fusion at 90 degrees with respect to the axis of the tibia, the position of great toe fusion is largely dependent on the patient’s foot anatomy:
1) Cavus feet require a relatively steep sagittal metatarsal-phalangeal angle at the 1st MTP due to the declination of the 1st ray
2) Flatfeet require a mild sagittal metatarsal-phalanx angle to the flat first ray

In addition, with respect to the coronal plane, if one fuses the great toe in 15 degrees of valgus, the patient will complain of lack of correction of the bunion deformity. At most, I fuse the 1st MTP joint in 5 degrees of valgus, relying on auto-correction of the intermetatarsal angle to establish a hallux that does not inappropriately encounter the medial toe box of the shoe (creating pain and potentially ingrown toenails).

Now, if the intermetatarsal angle does not auto-correct sufficiently, with my digital placement you must correct it simultaneously. This is rarely required, but if it is required, I perform a proximal osteotomy to correct the intermetatarsal angle simultaneously. I do not advocate a simultaneous Lapidus procedure, however, as fusing both the 1st MTC and 1st MTP joint creates undue stress at the tip of the hallux. Over time, the patient will complain of hallux IP joint pain from eventual arthrosis. Over the years it is clear to me that the first ray requires some form of “give” during gait to avoid undue stress on the great toe, and thus I make every attempt to fuse either the 1st MTP or 1st MTC joint (depending on the anatomy and pathology) and not both. Thus, proximal osteotomies
can be in the form of an opening wedge basilar osteotomy or a crescentic osteotomy (I prefer the former for its stability). I do not do a Ludloff osteotomy in this case, for the distal extension of the oblique cut may create vascular compromise that inhibits arthrodesis of the 1st MTP.

**Steps:**

1) Dorsal surgical approach, unless the patient had a prior bunion correction through a medially based approach. I then (begrudgingly) use the medial incision for the arthrodesis, for I avoid narrow skin bridges about the hallux due to the increased risk of necrosis.

2) Expose the entire 1st MTP joint, free up plantar attachments, and strip the volar plate with an elevator.

3) Use a high speed burr (under iced irrigation, of course) to burr the first metatarsal head and proximal phalanx articulations to excellent cancellous bone. I prefer to stay subchondral, but my goal is have this bone be of excellent vascular quality to promote fusion. Please note that the proximal phalanx base often requires eccentric reaming (more medial than lateral) as the anatomy of that joint surface is often sloped, and if you follow the natural contour, you will place the hallux back into valgus. I thus use the burr to create an artificial contour where the former joint surface is perpendicular to the axis of the proximal phalanx bone itself.

4) I use a hemispherical reaming system to contour the fusion surfaces. I do NOT use the hemispherical reaming system to ream the sclerotic bone, for the heat generated will clearly create necrosis and affect the fusion. Thus, the reaming system is used briefly, and only to purify the congruent surfaces.

5) In using the hemispherical system, I make sure that the Kirschner wires placed to ream over are placed in my proposed position of fusion. Despite the curved nature of these surfaces, I have found that as you compress the fusion, the toe will rotate into the position established by these guide wires. So, they are placed appropriately according to the position guidelines mentioned above, and reamed over.

6) Thus, I use a flat plate (a flat piece of metal) to simulate weight-bearing in the operating room, and adjust the sagittal position of the hallux to have the tip of the toe rest approximately 3mm above the surface of the loaded great toe (you must truly load the foot with force, understanding the "give" provided by the MTC joint).

7) As stated above, the fusion is performed in no more than 5 degrees of valgus.

8) Fixation is generally crossed screws, with the distal to proximal screw placed first. No matter the circumstances, I always find it frustrating to place the second screw from proximal to distal without encountering the first screw. If you encounter the first screw, you will rotate the fusion (often into supination) creating painful IP joint overload medially.

9) Thus, with screw placement, keep the distal-to-proximal screw dorsal, and the proximal-to-distal screw plantar. Purchase sufficient bone stock of both lateral cortices (proximal and distal) by:
   a. Use a burr to notch the medial proximal phalanx and medial 1st metatarsal head at the site of entry for your cannulated drill bit. Even if you don’t prefer cannulated screws, I think it is reasonable to drill with a cannulated bit for accuracy.
   b. By notching these medial cortices, you can place your hand nearly parallel to the medial border of the foot when driving the guide wire (without the guide wire slipping against the medial surface of the cortical bone) and allow good bone stock at the far cortex of bone fusion sites.
   c. I countersink the screw head at both medial cortices (though I am careful at the 1st metatarsal head due to the softer cancellous bone) in order to prevent screw head irritation.
d. Compression is excellent by these techniques, and nonunion is rare due to well prepared, congruent surfaces.

10) If you plan on allowing earlier weight-bearing, or if you know the patient may be non-compliant, I do use a dorsally based plate. I never love (any) of these plating systems, however, for they have the tendency to distort the fusion site and create incongruence. It is rare to provide a perfect contour in the sagittal plane for these plates, and most are built with more valgus than I prefer). Thus, use these plates with caution, and be sure they do not disrupt your perfect compression and contour. If you do not have good contour of the dorsally based bone, create is with a saw so the plate does not distort the fusion.

a. I do appreciate the increased rigidity that these plates provide, however. Clearly there is more confidence in strength of fixation with these plates.

11) Be certain to close the soft tissue capsule (independent of the EHL) to provide added vascularity to the fusion mass.

a. Do not entrap the EHL in the closure, as you need a well-functioning IP joint of the hallux for push off and gait.

12) I like to cast these patients 6wks non-weight-bearing with crossed screws, but if I use a plate, I modify this protocol with an earlier postoperative shoe.

That's all I know. What do YOU know, Roger??

Notes: