CHAPTER 19

TECHNIQUES OF MEDIAL COLUMN ARTHRODESIS FOR HALLUX VALGUS

Jeffrey Boberg, DPM
Aimee A. Nichols, DPM

Medial column fusions have gained significantly in popularity in the last several years. The Lapidus (first metatarsal-cuneiform) and McKeever (first metatarsophalangeal) joint arthrodesis are now accepted as primary procedures for the correction of hallux valgus. Recent articles have discussed the indications, post operative results and confirmed the benefits of these procedures. It is not the purpose of this paper to discuss all the biomechanical alterations or the myriad of indications of these procedures but to give the author's experience, especially as it relates to the nuances of surgical technique.

LAPIDUS BUNIONECTOMY (FIRST METATARSOCUNEIFORM ARTHRODESIS)

I prefer to utilize this procedure in bunions with a high intermetatarsal angle, hypermobility of the medial column and appropriate age and health. The aforementioned terminology is somewhat vague, therefore open to some interpretation. To be a little more precise I prefer doing this procedure when the IMA is greater than 15°. My definition of hypermobility is a foot with a callus or lesser metatarsalgia and the intermetatarsal angle can be manually reduced to 0° by trans-metatarsal head compression. This is almost exclusively in a flexible collapsing anterior cavus foot type (flexible forefoot valgus). I generally reserve this procedure for patients in their mid 20's to the mid 50's. I will not perform this procedure with an open epiphysis and feel uncomfortable locking up the medial column in a young adult. Although literature indicates a majority of the medial column movement takes place proximal to the metatarsal cuneiform joint I have often found this is not the case. Many patients have markedly reduced sagittal plane ROM with lack of toe purchase resulting. Adults must be able to be non weight bearing postoperatively.

The procedure itself can difficult to perform by traditional descriptions. The first metatarsocuneiform joint is relatively narrow and deep in dimension, measuring nearly 3cm from dorsal to plantar. Although a dorsal incision is best for visualizing transverse plane correction, a medial incision makes it much easier to visualize the joint and perform the bone work (Figure 1). I perform the distal bunionectomy through a medial incision as well and as the incision is brought proximal as it is gradually curved dorsal. This allows for excellent exposure to the entire joint. The incision is deepened through the subcutaneous tissue with minimal reflection laterally and only enough medial to identify the medial dorsal cutaneous nerve and medial aspect of the joint. The retinaculum over the EHL is incised for a short distance proximally and the tendon is retracted laterally. Minimizing the dissection will reduce post op edema and help preserve blood supply to the bone (Figure 2). Two parallel capsular incisions are now placed along the entire length of the metatarsal cuneiform joint from dorso-lateral to plantar-medial. These incisions are placed over the distal aspect of the cuneiform and proximal aspect of the metatarsal (Figure 3). This maneuver removes all redundant tissue allowing for excellent visualization of the joint surfaces. There is no need for any further dissection and periosteum is left intact.

Correction of the intermetatarsal angle is accomplished by planar resection of the joint surfaces. As one of the criteria for performing this procedure is a manually reducible IMA, the first and second metatarsals are pressed and held together while the joint surfaces are resected (Figure 4). The bone is still held in place by dense plantar ligaments which can make removal of the bone fragment difficult. These ligaments can usually be torn by placing osteotomes along the cut surfaces and using a twisting and prying motion allowing the bone to be removed intact. A minimal amount of bone is resected (Figure 5). The cut edges of bone are now opposed and ready for fixation. Curettage of the joint surfaces is an acceptable alternative but I have experienced a higher rate of non-union with this technique. Wedging the osteotomy to correct the IMA greatly complicates the procedure. It is difficult to cut properly, will usually dorsiflex the metatarsal and results in significant shortening. I have found it easier and more predictable to perform a proximal osteotomy with a rigidly increased IMA, than to perform the Lapidus.

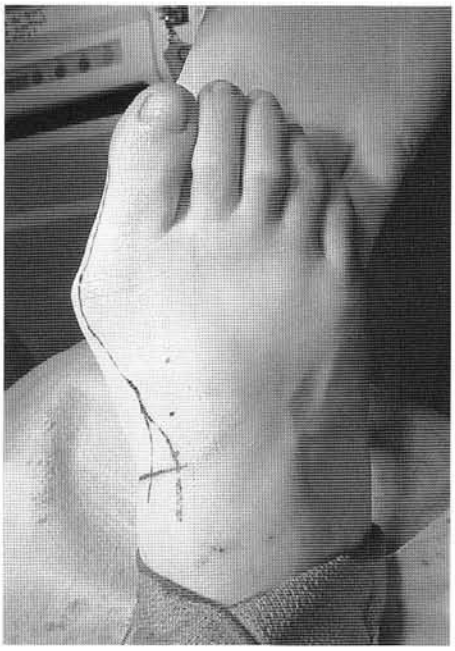

Figure 1. Placement of skin incision allows for visualization of the medial and dorsal aspect of the metatarsal cuneiform joint.

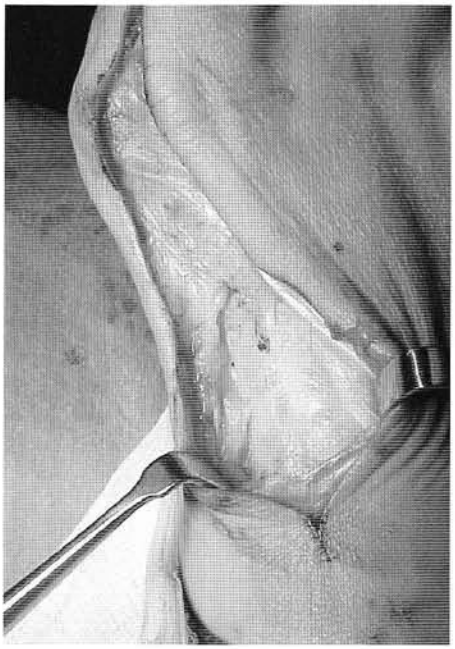

Figure 2. The medial dorsal cutaneous nerve is retracted medial and the EHL laterally. Subcutaneous tissue is not undermined.

The cut edges of bone are now opposed and ready for fixation. The metatarsal is plantarly displaced on the cuneiform several millimeters to accommodate for the shortening which occurs with bone resection (Figure 6). Fixation can be the most difficult part of the procedure but is greatly facilitated by the use of 4.0mm cannulated screws. Two screws from distal to proximal provide the most even degree of compression. When screws are crossed from proximal to distal and vise versa, they cross the arthrodesis site at midpoint providing essentially one point of fixation. Screws placed parallel, one dorsal the other plantar provide for compression through out the large surface area of the arthrodesis (Figure 7).

The pins for the cannulated screws are placed in the arthrodesis site and drilled distally. One will exit on the dorsum of the metatarsal, usually within the incision line. The other will exit plantar to the incision and this screw will be place percutaneously. Once the pins have been driven flush with the metatarsal, the bones are approximated and the pins are retrograded across the arthrodesis site. Fluroscopy or plain films are obtained to ensure adequate correction of the bunion and placement of the fixation. The screws are then inserted by standard technique (Figure 8).

I keep the patient non-weight bearing for a month and then allow weight bearing to begin in a CAM walker or similar device. At two months most patients are back in shoes. The best radiographic view to judge healing is the medial oblique. Typically solid union takes a good 3 months.

MCKEEVER PROCEDURE (FIRST METATARSOPHALANGEAL JOINT ARTHRODESIS)

Although generally utilized as a revisional procedure for complications following HAV surgery, I have been utilizing this more frequently as a primary means of correction. This procedure is used in place of Lapidus or base osteotomy in patients with severe hallux valgus who can not be non weight bearing. I most often use this in the geriatric population.

The techniques of minimized subcutaneous dissection, no periosteal dissection and cannulated screw fixation are again employed. The procedure is performed through a dorsal incision beginning over the mid part of the proximal phalanx and extended proximally to the metatarsal neck (Figure 9). The incision is deepened directly to the deep fascia (Figure 10). Subcutaneous tissue is bluntly dissected off the medial and lateral aspects of the joint capsule utilizing the scalpel handle. The retinaculum over the joint is incised and the EHL is retracted laterally. Two parallel capsular incisions are made, one over the base of the phalanx, the other over the metatarsal head, from

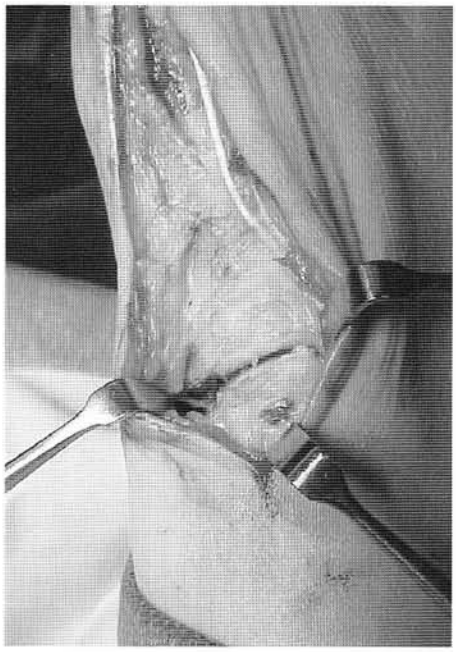

Figure 3. Capsule excision from the 1st metatarsal cuneiform joint.

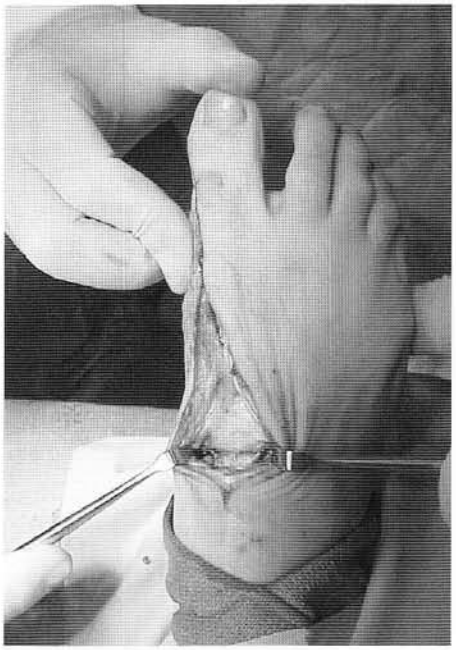

Figure 4. The IM angle is manually reduced allowing the bone to be resected parallel to the joint surfaces.

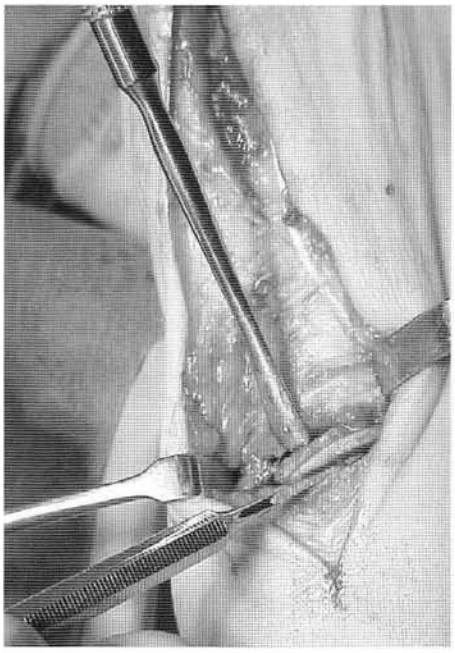

Figure 5. A small amount of bone is resected.

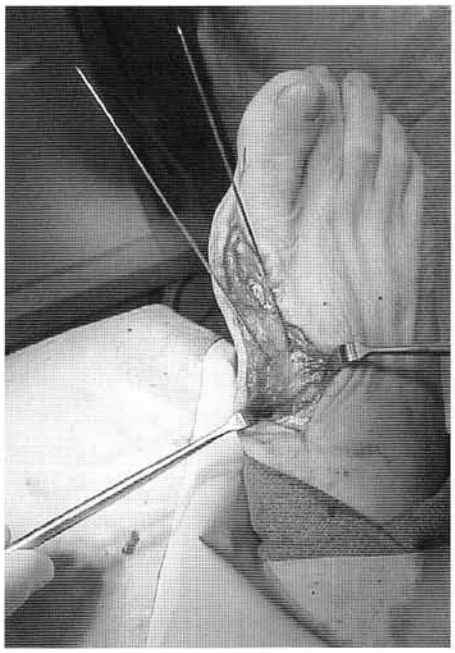

Figure 6. The metatarsal is plantarly displaced on the cuneiform and fixation is accomplished via two cannulated bone screws.

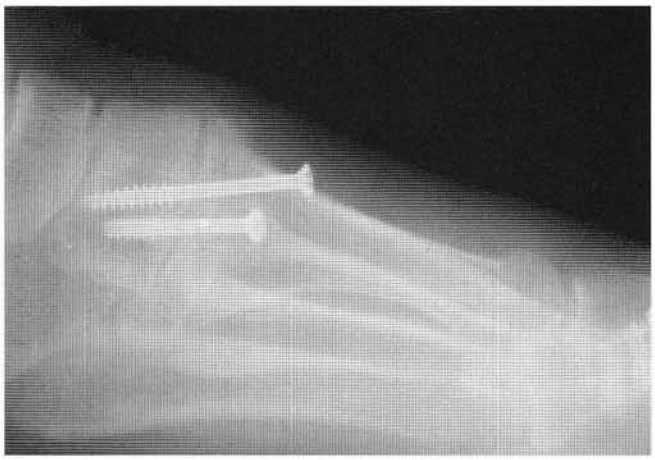

Figure 7. Lateral radiograph showing two parallel screws compressing a large surface area.

Figure 8. Postoperative correction with no bone wedging.

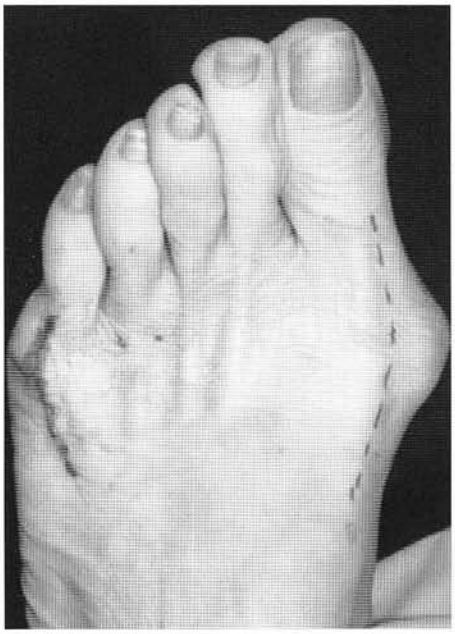

Figure 9. Skin incision is placed dorsally.

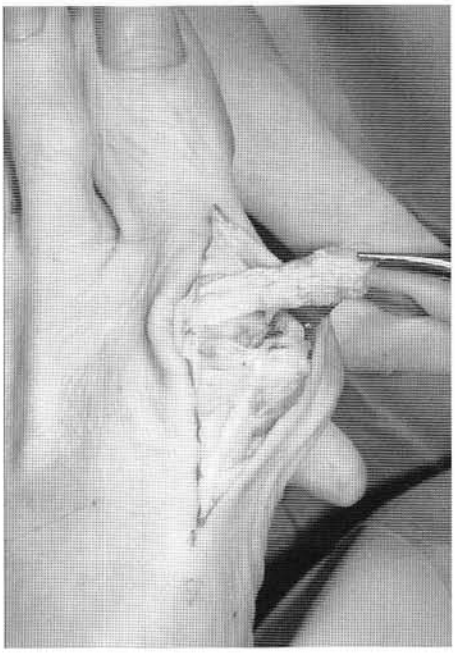

Figure 10. Minimal subcutaneous dissection with little or no periosteal dissection. The redundant capsule is excised.

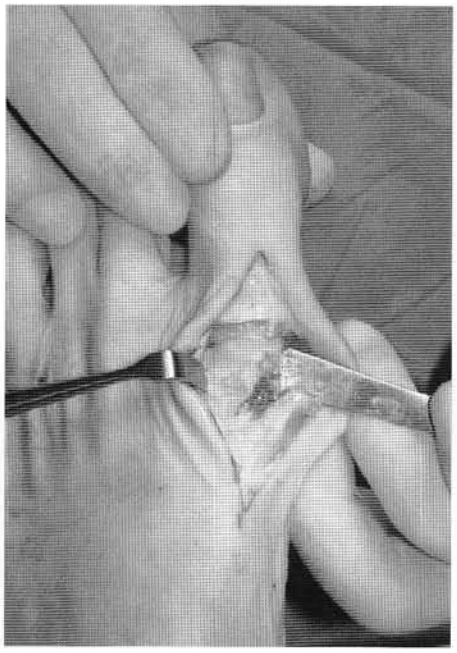

Figure 11.The medial eminence has been resected and the toe is now held in the corrected position.

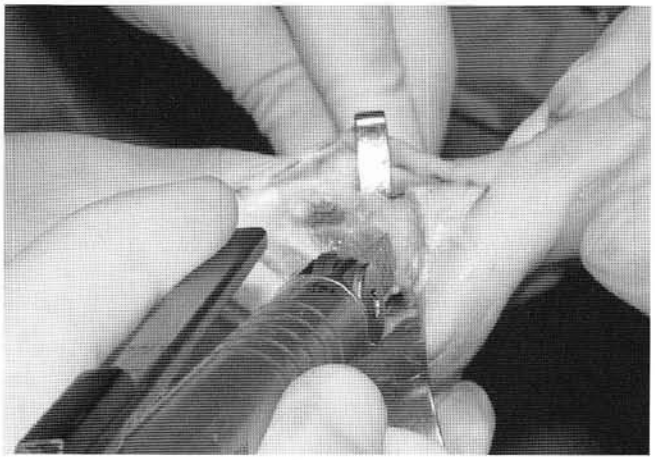

Figure 12. Maintaining toe position, the joint surfaces are resected. First the metatarsal head is cut utilizing the base of the phalanx as a template.

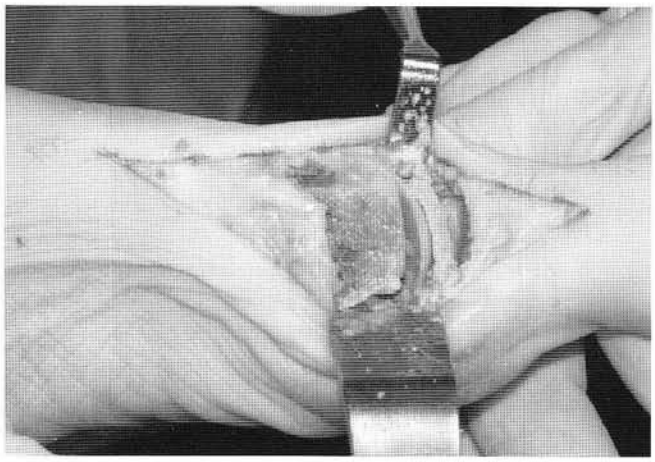

Figure 13. Only the articular surface of the metatarsal head is resected thus preserving weight bearing.

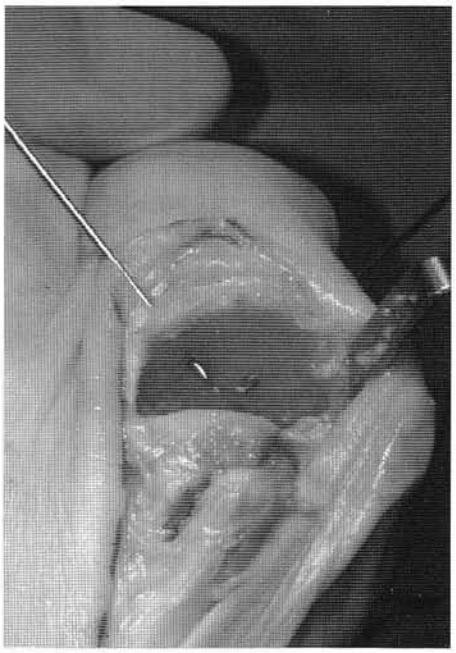

Figure 14. K-wires are introduced into the base of the phalanx exiting out the toe.

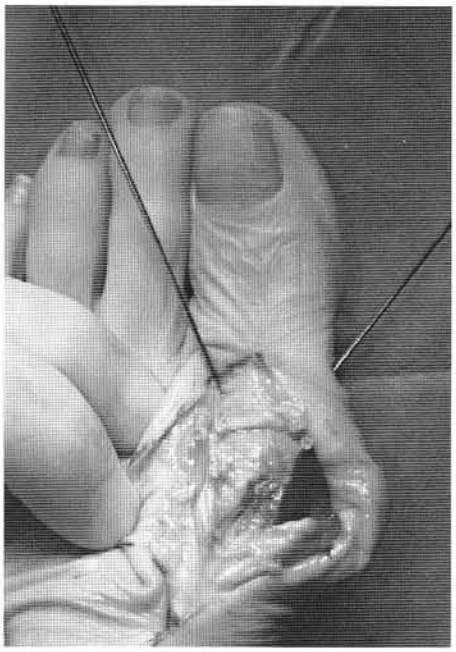

Figure 15. The joint is rearticulated and the wires are retrograded across the arthrodesis site.

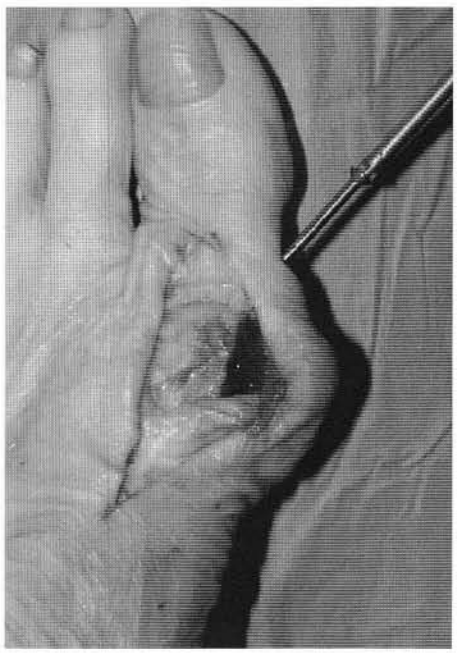

Figure 16. Cannulated screws are then placed over the wires.

Figure 17. Typical orientation of internal fixation at the arthrodesis site.

Figure 18. Preoperative view.

dorso-lateral to plantar-medial. The tissue wedge is now excised providing excellent visualization of the joint surfaces. In most instances a prominent medial eminence needs to be reduced. A short dorsal periosteal incision is made over the metatarsal. The medial capsule is reflected and the eminence resected (Figure 11).

The hallux is now positioned on the metatarsal head in the corrected position. Sometimes the lateral conjoined tendon needs to be incised to allow for this movement. Once the hallux is properly oriented in the sagittal and transverse planes, the bone is resected with the first cut being in the metatarsal head (Figure 12). The saw blade is placed against the proximal phalanx using it as a template to make a straight, even cut. Only the portion of the metatarsal articulating with the phalanx is cut, preserving full weight bearing of the metatarsal (Figure 13). The cut initially is not made through the lateral cortex to provide a stable base while making the next cut. Next the base of the phalanx is cut, parallel to the base. The first cut is now completed and the bone is removed. The bones are now ready for fixation.

Fixation is again accomplished with 4.0mm cannulated screws. The pins are introduced into the base of the proximal phalanx (Figure 14). One pin is placed into the plantar medial aspect, the other into the dorso-lateral aspect. The pins are driven distally. The dorsal pin will usually exit in the skin incision and the other in the plantar skin. The arthrodesis site is approximated and the pins are retrograded proximally (Figure 15). It is easier to apply fixation from distal to proximal on both screws, the medial screw inserted percutaneously (Figure 16 and 17). If one desires the pin(s) can be advanced fully proximal and fixation accomplished in the opposite direction.

Postoperatively the patient is placed in a CAM walker and allowed to bear weight on the foot. The patient is transitioned into a surgical shoe at 6 weeks and by 8-10 wks the patient is back in shoes.

In summary, the Lapidus and McKeever arthrodeses are valuable tools as both primary and revisional procedures in the properly selected patient. Although anatomic dissection principles are of utmost importance, excessive dissection resulting in further tissue damage should be avoided.

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