Intraosseous and Extraosseous Vascular Supply to the Medial Cuneiform: Implications for Dorsal Opening Wedge Plantar Flexion Osteotomy

Jonathan Kraus, MD
Kathleen McKeon, MD
Jeffrey Johnson, MD
Jeremy McCormick, MD
Sandra Klein, MD
CONFLICTS

- Full disclosure is in the AOFAS Program
- None of the authors have any potential conflicts with this presentation
The dorsal opening wedge osteotomy of the medial cuneiform (Cotton osteotomy) has been described for correction of forefoot varus.

Despite dissection and periosteal stripping through a dorsal or dorsal medial approach of this widely articulated bone, nonunion is rarely reported.
METHODS

- 30 matched pairs of adult cadaver legs (n=60) were prepared
- The specimens were injected with India Ink and blue latex
- Soft tissues were chemically débrided
- The extraosseous vascular supply was photographed
- The specimens were then cleared using a modified Spälteholz technique and the intraosseus vascularity was photographed and catalogued
RESULTS

- Medial views of the extra- and intraosseous supply of the same specimen
- Two small arterioles outline the course of the tibialis anterior tendon
- Numerous small arterioles line the medial cortex, most notably at the central and dorsal-central portions
Most specimens contained a larger intraosseus arteriole on the dorsal medial aspect, and the plantar aspect was very well vascularized:
- Above: dorsal, medial and plantar views
- Left: plantar medial view of extraosseous blood supply
Similar views of the medial cuneiform looking proximal to distal. The naviculo-cuneiform (NC) and proximal portion of the 1-2 intercuneiform (IC) joints are outlined.

- In this specimen, robust plantar and plantar lateral arterioles are seen.
DISCUSSION

- The superficial medial plantar artery supplied the plantar aspect of the bone.
- Intraosseous analysis showed a dense capillary network throughout the cuneiform with typically one central medial major and several minor nutrient arteries noted.
- A large branch seen at the middle of medial aspect was seen in 36/46 of specimens.
- The plantar and lateral surfaces demonstrated several large arterioles.
- Areas of hypovascularity were noted to occur at inconsistent locations of some specimens but were infrequent.
CONCLUSION

- The medial cuneiform is well-vascularized from dorsal, medial and plantar surfaces.
- The plantar blood supply is likely sufficient to allow bone healing after dorsal periosteal exposure.
REFERENCES

- Thompson IM et al. Fusion rate of first tarsometatarsal arthrodesis in the modified Lapidus procedure and flatfoot reconstruction. Foot Ankle Int. 2005 Sep;26(9):698-703.