JKFAS Journal of Korean Foot and Ankle Society
Case Report
pISSN 1738-3757 eISSN 2288-8551
J Korean Foot Ankle Soc 2014;18(2):80-82
http://dx.doi.org/10.14193/jkfas.2014.18.2.80

Pseudoaneurysm after Proximal Metatarsal Osteotomy for Hallux Valgus Correction: A Case Report

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Occurrence of pseudoaneurysm in the foot and ankle is rare, and is usually caused by traumatic injury or by iatrogenic intervention. Iatrogenic pseudoaneurysms in the foot and ankle have been observed after rearfoot and ankle fusions, ankle arthroscopy, endoscopic and open plantar fasciotomy, tibial osteotomy with limb lengthening, midfoot amputation, and Lapidus procedure. We report on a patient who developed a pseudoaneurysm of the dorsal metatarsal artery following correction of hallux valgus. The patient underwent proximal chevron osteotomy and Akin phalangeal osteotomy. The feeding artery was ligated and the pseudoaneurysm was excised.

Key Words: Hallux valgus, Corrective osteotomy, Pseudoaneurysm

A pseudoaneurysm rarely occurs in the foot and ankle, and is usually caused by traumatic injury or by iatrogenic intervention. Iatrogenic pseudoaneurysms in the foot and ankle have been observed after rearfoot and ankle fusions, ankle arthroscopy, endoscopic and open plantar fasciotomy, tibial osteotomy with limb lengthening, midfoot amputation and Lapidus procedure.[1-4] In addition, pseudoaneurysms have been observed after direct or indirect foot and ankle trauma.[5-7] In a review of the literature, Wollstein et al.[8] found 19 reported cases of pseudoaneurysm in the foot, including 8 cases affecting the dorsalis pedis artery, 6 affecting the plantar artery, and 5 affecting the posterior tibial artery. Many other researchers reported some cases of pseudoaneurysm of the foot affecting the medial and lateral plantar artery, dorsalis pedis artery, and posterior tibial artery.[6,7]

We report a patient in whom pseudoaneurysms of the dorsal metatarsal artery developed following a correction of hallux valgus. The patient had proximal chevron osteotomy and Akin osteotomy. As far as we are aware, no one patient has previously been reported after such procedures. The patients and her families were informed that data from the case would be submitted for publication, and gave their consent.

Received March 21, 2014 **Revised** March 29, 2014 **Accepted** April 24, 2014
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Financial support: None.
Conflict of interest: None.

CASE REPORT

A 55-year-old woman presented for the evaluation of a mass on the dorsum of the left foot. On examination, there was an approximately 2×2 cm mildly tender pulsatile mass in the dorsal soft tissues of the right midfoot (Fig. 1A). By history, the mass had been present 3 months after hallux valgus correction. She had a proximal chevron osteotomy and Akin osteotomy with Kirschner wires fixation (Fig. 1B). The operation was done without any difficulties and specific problems. She felt bruit on her foot dorsum since 3 days after the operation. Kirschner wires were removed at 6weeks after the operation as usual. Ultrasound of the soft tissue mass was performed, demonstrating an ovoid heterogeneous well-defined vascular mass, measuring 1.3 cm longitudinally by 1.6 cm transversely by 1.2 cm in depth. Echogenic mural thrombus surrounded a central, well-defined, 8-mm diameter anechoic region within the mass that contained swirling vascular signal on a color Doppler ultrasound (Fig. 1C). An adjacent, normal-sized first dor-

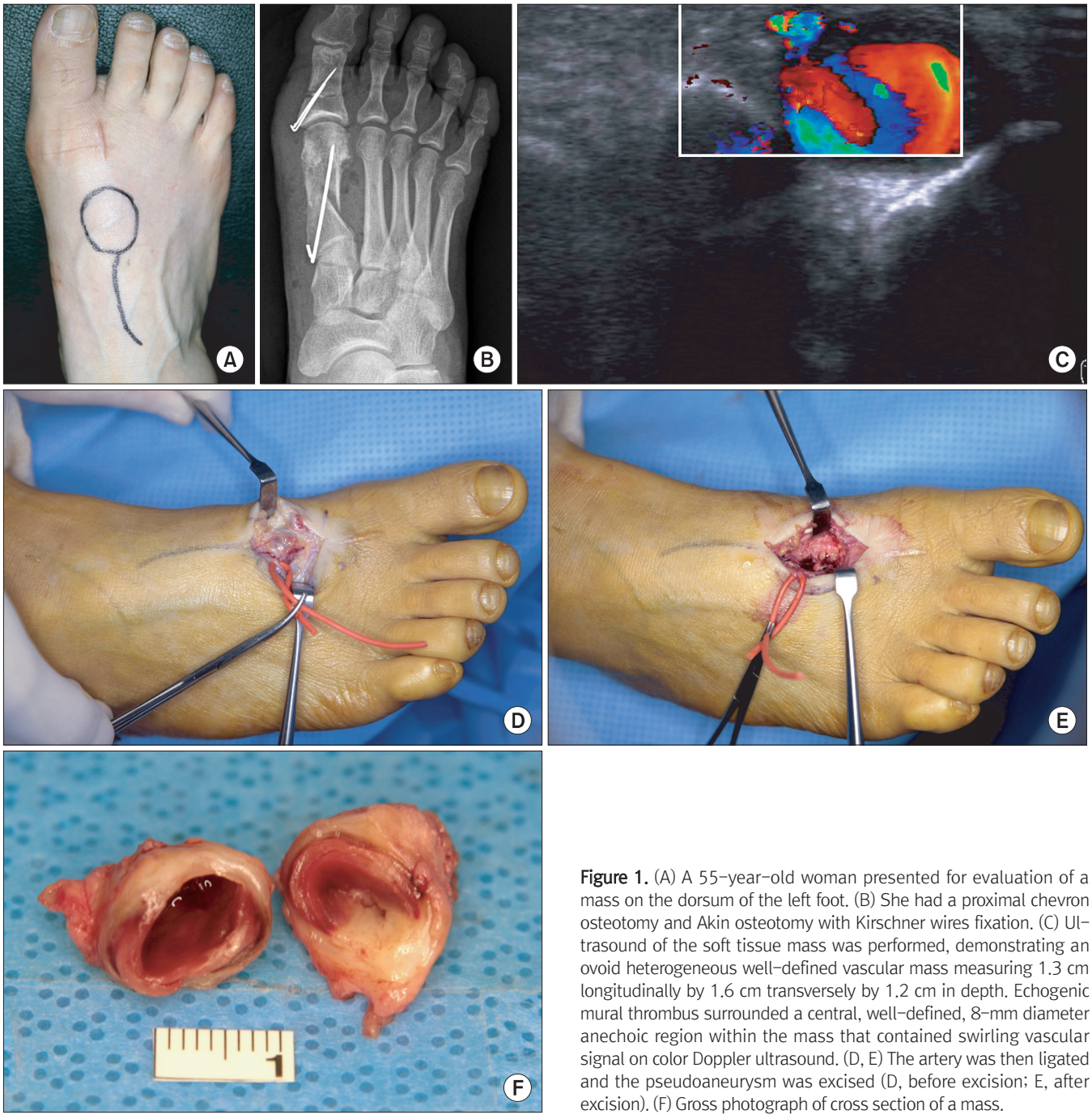

Figure 1. (A) A 55-year-old woman presented for evaluation of a mass on the dorsum of the left foot. (B) She had a proximal chevron osteotomy and Akin osteotomy with Kirschner wires fixation. (C) Ultrasound of the soft tissue mass was performed, demonstrating an ovoid heterogeneous well-defined vascular mass measuring 1.3 cm longitudinally by 1.6 cm transversely by 1.2 cm in depth. Echogenic mural thrombus surrounded a central, well-defined, 8-mm diameter anechoic region within the mass that contained swirling vascular signal on color Doppler ultrasound. (D, E) The artery was then ligated and the pseudoaneurysm was excised (D, before excision; E, after excision). (F) Gross photograph of cross section of a mass.

sal metatarsal artery appeared to communicate directly with the vascular mass.

Under ankle tourniquet control, the aneurysm was located immediately lateral and dorsal to the proximal chevron osteotomy site. The aneurysm was entered through a separate linear incision placed directly over the mass. Intraoperatively, the aneurysm was seen to be arising just inferior to the division of the dorsalis pedis artery into the arcuate artery and first dorsal metatarsal branches. The cystic structure measured approximately 2×1.5 cm in diameter and extended from a single feeding vessel, a branch of the arcuate artery, consistent with the first dorsal metatarsal artery. The first dorsal metatarsal artery was clamped proximally and distally for about five minutes, and the tourniquet was then released. The blood supply to the foot was found to be adequate. The artery was then ligated with 3-0 black silk sutures (Ethicon, Cincinnati, OH, USA) and the pseudoaneurysm was excised (Fig. 1D, E). Histopathological examination of the specimen revealed an organizing thrombus and a wall formed by a chronic inflammatory reaction

and granulation tissue, which confirmed the diagnosis of pseudoaneurysm (Fig. 1F). The patient had an uneventful postoperative course; arterial patency and good distal flow was documented on a follow-up duplex vascular imaging. At the time of the six-month follow-up, there was no evidence of any arterial insufficiency of the foot and the patient remained free of symptoms.

DISCUSSION

Pseudoaneurysm of the dorsal metatarsal artery has not been reported as a cause of soft tissue mass of the dorsal foot. Pseudoaneurysm of the foot occurs often in the setting of non-penetrating blunt trauma, which can be relatively minor, with cases reported after foot and ankle sprain[5] or bruise,[7] or after sharp penetrating injury[6] or fracture,[9] and also after many kinds of surgical procedures.[3,4] However, it has not been reported after proximal chevron osteotomy.

Unlike a true aneurysm, the pseudoaneurysm is a cavity enclosed by only a fibrous wall, lacking the complete arterial wall layers. It forms as a result of vessel wall rupture, which is initially contained by surrounding the adventitial tissues in the outer portion of the artery and perivascular supporting tissues.[10] Formation of a hematoma within the pseudoaneurysm and the persistence of a vascular tract communicating with the arterial lumen often ensue. Over time, the pseudoaneurysm wall weakens and thins, allowing aneurysmal enlargement. After the initial hematoma forms, development of a pseudoaneurysm may be gradual, occurring over several weeks to several years. If the pseudoaneurysm is patent, it will present as a pulsatile mass and bruit on physical examination; however, if thrombosis has occurred within it, the pulsations may not be detectable.

The pseudoaneurysm in this case report most likely resulted from an iatrogenic insult. In the case described, during proximal chevron osteotomy, the first dorsal metatarsal artery was not mobilized. It was retracted with dorsal soft tissue flap altogether. Thus, formation at the time of the inciting trauma is less likely. After then, metatarsal bone was cut with chevron shaped using a saw. During this procedure, sawing could potentially injure the first dorsal metatarsal artery. The location of the pseudoaneurysm on the medial half of the first dorsal metatarsal artery further corroborates this conclusion.

We believe that this rare surgical complication could have been prevented with more meticulous procedure and the use of a protective instrument.

To our knowledge, this is the first documentation of first dorsal metatarsal pseudoaneurysm. This is also the first report of development of psudoaneurym after proximal chevron osteotomy and resection arthroplasty of the second metatarsophalangeal joint. This potential complication should be considered when dissection and osteotomy are performed in the proximal metatarsal region and metatarsophalangeal joint area.

REFERENCES

1. Bogokowsky H, Slutzki S, Negri M, Halpern Z. *Pseudoaneurysm of the dorsalis pedis artery. Injury. 1985;16:424-5.*
2. Economou P, Paton R, Galasko CS. *Traumatic pseudoaneurysm of the lateral plantar artery in a child. J Pediatr Surg. 1993;28:626.*
3. Higgs SL. *Arteriovenous aneurysm of the posterior tibial vessels following operation for stabilizing the foot. Proc R Soc Med. 1931;24:1378-9.*
4. Nierenberg G, Hoffman A, Engel A, Stein H. *Pseudoaneurysm with an arteriovenous fistula of the tibial vessels after plantar fasciotomy: a case report. Foot Ankle Int. 1997;18:524-5.*
5. Bandy WD, Strong L, Roberts T, Dyer R. *False aneurysm--a complication following an inversion ankle sprain: a case report. J Orthop Sports Phys Ther. 1996;23:272-9.*
6. Thornton BP, Minion DJ, Quick R, Vasconez HC, Endean ED. *Pseudoaneurysm of the lateral plantar artery after foot laceration. J Vasc Surg. 2003;37:672-5.*
7. Yamaguchi S, Mii S, Yonemitsu Y, Orita H, Sakata H. *A traumatic pseudoaneurysm of the dorsalis pedis artery: report of a case. Surg Today. 2002;32:756-7.*
8. Wollstein R, Wolf Y, Sklair-Levy M, Matan Y, London E, Nyska M. *Obliteration of a late traumatic posterior tibial artery pseudoaneurysm by duplex compression. J Trauma. 2000;48:1156-8.*
9. Aiyer S, Thakkar CJ, Samant PD, Verlekar S, Nirawane R. *Pseudoaneurysm of the posterior tibial artery following a closed fracture of the calcaneus. A case report. J Bone Joint Surg Am. 2005;87:2308-12.*
10. Maydew MS. *Dorsalis pedis aneurysm: ultrasound diagnosis. Emerg Radiol. 2007;13:277-80.*