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Acute Ischemia after Revision Hallux Valgus Surgery Leading to Amputation

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ABSTRACT

Acute arterial insufficiency after revision hallux valgus surgery is a rare complication. The identification of surgical candidates who are at risk of vascular complications is of utmost importance. The patient-reported symptoms and physical findings combined with noninvasive vascular studies are generally reliable to assess the vascular status but can fail to identify patients with atypical disease patterns. We present the case of a patient with normal pulses who underwent revision hallux valgus surgery, leading to gangrene of the hallux that required transmetatarsal amputation. We reviewed the vascular evaluation methods and causes of acute ischemia after surgery, including vasculitis.

Acute arterial insufficiency after surgical intervention in the foot and ankle can lead to devastating complications, including loss of the limb. Patients with pre-existing peripheral arterial disease are at high risk of this complication; therefore, a careful preoperative vascular evaluation is paramount. The common causes of acute ischemia include embolism, thrombosis, and direct trauma. Vasculitis is another cause of vessel destruction that should be considered in patients with an unclear etiology of ischemia. We present the case of a 53-year-old female with acute arterial insufficiency after revision of hallux valgus surgery and provide a review of the published data on the potential causes.

Case Report

A 53-year-old female was seen in the attending surgeon's (D.K.) podiatry clinic as a returning patient with a complaint of aching pain around the medial eminence of the left first metatarsal head. The patient had undergone surgical correction of her bunion 9 years previously and had noted a gradual recurrence of her deformity. The pain had worsened with constricting shoe gear to the point that she was no longer able to tolerate her regular day-to-day shoes. Previous surgeries included a left chevron bunionectomy 9 years before and the same procedure on the right foot 2 years earlier, both with uneventful postoperative courses. Her medical history included osteoarthritis of the knees, hypertension, anxiety, and seasonal allergies. The medications taken orally included clonidine 0.1 mg daily, chlorthalidone 25 mg daily, lorazepam 1 mg twice daily, as needed, and cetirizine 10 mg daily, as needed. The patient smoked one-half pack of cigarettes daily with a smoking history of several decades, including when she had undergone the previous foot surgeries. She had no family history of bleeding or blood clot disorders, autoimmune diseases, or cold or burn injuries. She denied pain or color changes in the digits consistent with vasospastic disorders and denied symptoms of intermittent claudication. She did report arthralgias, which she had attributed to osteoarthritis. The physical examination revealed a mild hallux abductovalgus deformity of the left foot with pain on palpation of the medial eminence. Dorsalis pedis and posterior tibial pulses were palpable and graded at 2+ or normal (1,2), and the subpapillary venous plexus filling (SPVPF) time (2) was immediate to all digits bilaterally. Radiographs of the left foot (Fig. 1) showed exuberant bone formation of the medial aspect of the first metatarsal head with mild shortening and elevation of the first metatarsal. The hallux abductus angle was 15°, and the intermetatarsal angle was 12°. Given the structural deformity and failure of conservative treatment, surgical correction was recommended, and the patient wished to proceed. She was counseled during her preoperative clinic visit regarding the risks of tobacco use and was advised to stop smoking before surgery, to which she agreed.

Surgery consisted of both inverted scarf and Akin osteotomies, with a lateral soft tissue release. A Mayo block was administered,

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Fig. 1. (*A*) Preoperative radiograph showing recurrent hallux valgus deformity with previously placed hardware and (*B*) postoperative radiograph showing correction after inverted scarf and Akin osteotomies.

consisting of 20 mL of 0.5% ropivacaine without epinephrine at surgery, and 10 mL of the same was administered on completion of the procedure. A pneumatic ankle tourniquet was inflated for 60 minutes during the procedure for hemostasis. Because this was a revision surgery, minimal subcutaneous dissection was performed. Once the capsule of the first metatarsophalangeal joint (MTPJ) was identified, the periosteum, capsule, and subcutaneous tissues were all dissected off the bone in a single layer. No intraoperative complications occurred, and the patient was noted to have immediate SPVPF to all 5 digits of the operated foot, including the hallux in the post-anesthesia care unit. The patient was instructed to limit her activity after surgery but was allowed to bear weight as tolerated on the operated foot in a protective walking boot. On postoperative day 2, she presented to clinic with a complaint of throbbing pain in her toes that was not relieved with loosening of the outer bandage. Removal of the surgical dressing relieved her pain, and the physical examination at that time showed good maintenance of the deformity correction, with immediate SPVPF to all digits of the operated foot. One week later, on postoperative day 9, the patient presented for her scheduled appointment stating that she had stubbed her great toe. She complained of increased pain and a cold feeling to the tip of the great toe that had started 1 day earlier. She presented with her dressing removed and admitted that she had been smoking again during the second postoperative week. The physical examination revealed dark discoloration of the distal aspect of the hallux (Fig. 2*A* and *B*) that was cool to the touch, with no appreciable SPVPF. The skin along the incision line also appeared darkened. The dorsalis pedis and posterior tibial pulses were readily palpable, and SPVPF was intact to the lesser digits. An ultrasound examination in the surgeon's office with a hand-held Doppler device revealed audible arterial blood flow to the level of the first MTPJ, but no blood flow was detectable distal to this point.

Given the ischemic changes to the hallux, a prompt vascular consultation was obtained the next day on postoperative day 10. Small vessel disease was suspected, because ischemic changes were seen in the presence of palpable pedal pulses. An arteriogram (Fig. 3) was performed that same day to better visualize the arterial anatomy. This revealed widely patent vessels from the common femoral artery to the vessels of the calf, with occlusion of the posterior tibial artery, which was refilled by the peroneal artery. This provided good inflow to the plantar foot. The dorsalis pedis artery was widely patent and gave rise to the proximal perforating branch, with a well-formed deep plantar arterial arch joined by the terminal branch of the lateral plantar artery. Metatarsal arteries arose from the deep plantar arterial arch; however, owing to limitation of the views, they could not be differentiated into dorsal or plantar metatarsal arteries. Occlusion of the second and third metatarsal arteries and the digital arteries to the hallux was seen. Capillary filling was absent from the pulp of the hallux but was present by collateralization to the lesser digits with reconstitution of the digital arteries. In an attempt to relieve the tension from the level of occlusion, several skin sutures were removed during the arteriogram. This had no effect on the visualized blood flow into the hallux. Intra-arterial administration of nitroglycerin 300

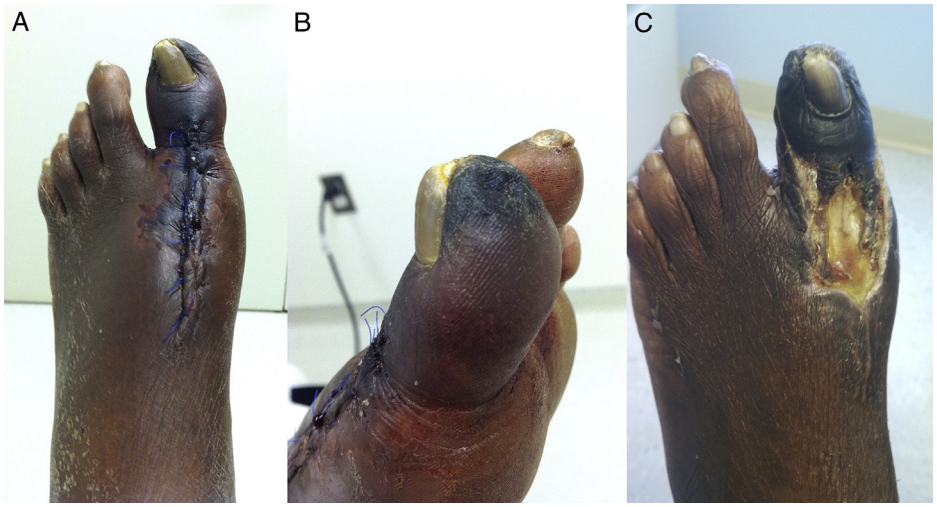

Fig. 2. Clinical appearance of the foot on (*A* and *B*) postoperative day 9 showing ischemic changes to the distal hallux and along the incision line and (*C*) 4 weeks postoperatively showing ulceration and hallux gangrene.