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Pseudoaneurysm of the Perforating Peroneal Artery After Ankle Fracture Fixation: Case Report and Review of the Literature

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ABSTRACT

Pseudoaneurysm formation around the ankle area is a very rare complication of an anatomic region that is highly exposed to trauma. A review of the published medical data revealed the rarity of the condition. Pseudoaneurysms of the perforating branch of the peroneal artery account for only 8 in the published data, with 6 (75%) cases related to sprain injury and only 2 (25%) to fracture fixation. We present a pseudoaneurysm of the perforating peroneal artery after a bimalleolar ankle fracture in a patient taking warfarin and a review of the published data. Our patient was treated successfully with thrombin embolization, and at 6 weeks after embolization, she remained completely free of symptoms.

Peripheral pseudoaneurysms rarely present after trauma or surgery around the foot and ankle. In terms of the anatomy, they can develop in several locations. The anterior tibial artery is the most commonly involved, presumably owing to the greater incidence of ankle injury and anterior ankle surgery. Pseudoaneurysms of the posterior tibial artery, dorsalis pedis artery, peroneal artery and its branches, and the medial plantar artery have been reported.

We present a very rare case of a pseudoaneurysm of the perforating branch of the peroneal artery after a bimalleolar ankle fracture and a review of the current published data regarding the peroneal arterial branch provoked by sprains or fractures.

Case Report

A 65-year-old female, well in herself, sustained a mechanical fall on her right leg. She presented to the accident and emergency department (March 2014) in a wheelchair and unable to walk on the injured limb. The right ankle was swollen, bruised, and painful to palpation, and the active and passive range of motion was limited by the pain. Radiographic examination revealed a Weber B fracture of the fibula combined with a fracture of the medial malleolus. The leg was immobilized in a below-the-knee back slab, anticoagulant treatment with dalteparin was administered, adequate analgesia was prescribed, and the patient was admitted to the orthopedic department. She provided informed consent for internal fixation of the malleoli fractures.

Her medical history included mitral valve replacement (metallic), and she was taking oral warfarin, with an admission international normalized ratio of 2.4. Warfarin was reversed, and on the second day after admission, the patient underwent surgery. She was placed on the operating table in a supine position, and a tourniquet was inflated. Two incisions, a posterolateral incision for reduction and fixation of the fibula with a 7-hole, one-third tubular plate and an anteromedial longitudinal incision for reduction and fixation of the medial malleolus with 2 cancellous screws (Fig. 1). The plafond was reduced properly, scrutiny hemostasis was performed, and the wound was sutured in layers. A below-the-leg backslab was placed again for comfort.

Within the subsequent postoperative days, coadministration of warfarin and dalteparin achieved an international normalized ratio >2.0. The patient was discharged from the hospital when the warfarin levels were safe.

Two weeks later, she returned to the hospital with acute right abdominal pain. The emergency computed tomography scan revealed a large thecal hematoma of the rectus abdominis muscle. The decision was made to treat the hematoma conservatively with bed rest; warfarin was stopped and low-molecular-weight heparin (dalteparin) administered.

The sutures were removed, the leg was released from the back slab, and physiotherapy of the ankle was initiated, followed by partial

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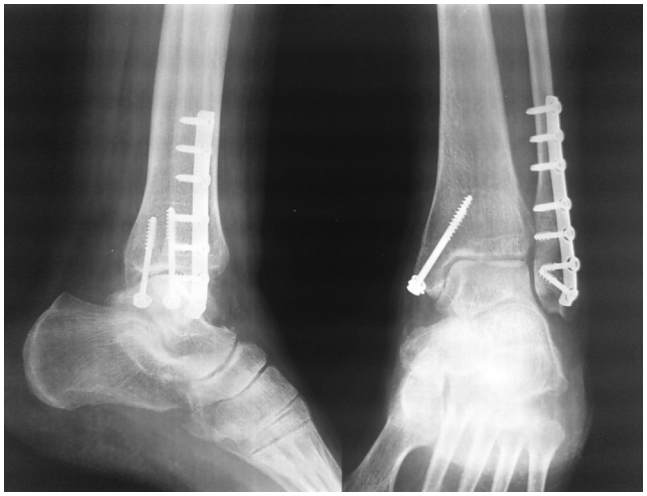

Fig. 1. Anteroposterior and lateral views of postoperative outcome. A one-third, 7-hole tubular plate was used for fixation of the fibula, and 2 cancellous screws were used for fixation of the medial malleolus.

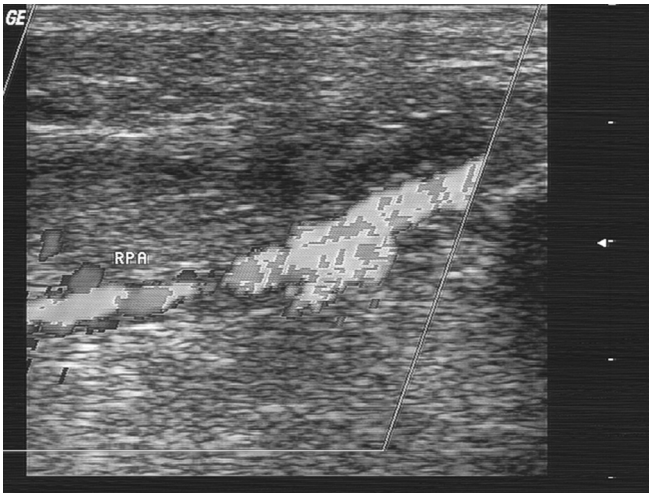

Fig. 3. Another view of an arterial duplex scan of the perforating peroneal artery showing the pseudoaneurysm. RPA, right peroneal artery.

weightbearing on the limb. Within the next 2 weeks, the abdominal hematoma had shrunk satisfactorily, and the patient was instructed to resume her warfarin scheme and discharged from the hospital.

At 4 weeks postoperatively, the patient complained of an expanding pulsatile painless mass on the anteromedial aspect of the distal shin, 2 cm in front of the incision. No evidence of wound infection was present. Arterial duplex images (Figs. 2 and 3) confirmed the presence of a pseudoaneurysm of the perforating peroneal branch.

Ultrasound-guided percutaneous thrombin injection embolized the pseudoaneurysm, and the mass rapidly disappeared. At 10 weeks after the embolization, the patient was ambulating with full weightbearing. No recurrence had been observed at the latest follow-up examination (Fig. 4) at 18 months postembolization, verified by a new Doppler ultrasound.

Discussion

Injuries around the foot and ankle area are a pretty common pattern, and in many cases, surgery is the treatment of choice. Despite the frequency of those injuries, pseudoaneurysms of the arteries around the ankle are a rare complication. The vulnerable arteries are the anterior tibial, posterior tibial, dorsalis pedis, peroneal artery and the perforating branches, and medial plantar artery. Most of the cases have been strongly related to an injury or postoperative complications of a procedure. To date, anterior tibial artery pseudoaneurysms are those most commonly reported, possibly owing to the greater incidence of ankle injury and anterior ankle surgery (1).

A major predisposing factor of the condition is typically low energy trauma. A likely mechanism of pathogenesis could be the arterial damage at the time of injury from the sharp fracture ends, breaking the integrity of the intimal wall (2). In the absence of a traumatic event, contact of the vessel with bony exostoses can generate arterial pseudoaneurysm (3–5). During surgical management of ankle fractures, tissue dissection and manipulation of the fracture during reduction can also lead to intimal wall injury. The appearance of late pseudoaneurysm—months or even years after the injury or surgery—can be attributed to prominent hardware (plates or screws), which causes attrition injuries to vascular structures (6).

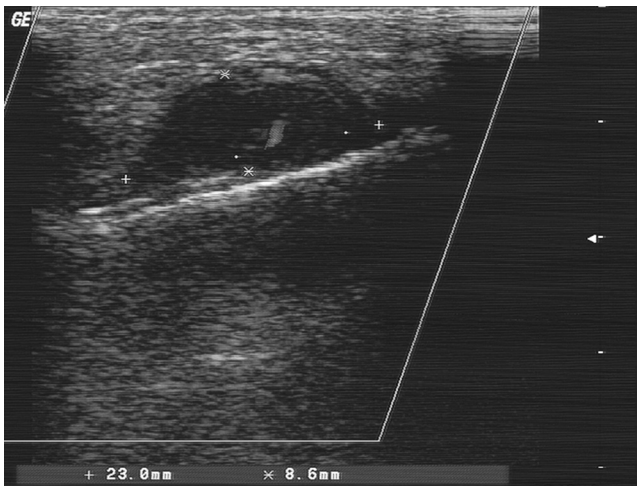

Fig. 2. Arterial duplex scan of the perforating peroneal artery showing the pseudoaneurysm.

Fig. 4. Photograph of the patient's foot at the last follow-up examination. The incision scar is obvious, and anteriorly a small redness is present in the thrombin injection area. The pulsatile mass has disappeared.