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Case Report

Iatrogenic femoral artery pseudoaneurysm complicating vascular access for haemodialysis in a patient with end-stage renal disease; unexpected occurrence after a common procedure

Chimezie Godswill Okwuonu, Odigie Ojeh-Oziegbe¹, Oluwaseyi Adejumo¹, Ikponmwosa Iyawe¹

Department of Internal Medicine, Nephrology Unit, Federal Medical Center, Umuahia, Abia State, ¹Department of Internal Medicine, University of Benin Teaching Hospital, Benin City, Nigeria

Abstract

Pseudoaneurysm is a collection of blood formed as a result of a vascular injury and retained in the tissues surrounding the vessel breached. There is a complete rupture through the three walls of the artery: The intima, media, and adventitia are compromised. In the femoral region, the escaping blood pools as a well-circumscribed mass and is constrained by the surrounding soft tissues. Pseudoaneurysms can develop following penetrating trauma or arterial catheterization. It can uncommonly complicate procedures in the femoral region. Ultrasound-guided compression repair, minimally invasive percutaneous treatments, and surgical repair are the three therapeutic options. We present a 58-year-old woman with end-stage renal disease who developed a pseudoaneurysm of the femoral artery caused by inadvertent puncture of the artery in an attempt to catheterize the femoral vein for an emergency hemodialysis. The pseudoaneurysm was treated by ultrasound-guided compression. It is important to recognize the indications for surgery to avoid delay in the management of this potentially limb- or life-threatening condition.

Key words: End-stage renal disease, femoral artery, hemodialysis, pseudoaneurysm, vascular access

Introduction

Femoral artery pseudoaneurysms (FAPs) are usually caused by punctures of the femoral artery which are too distal, that is, at the level of bifurcation of the femoral artery or below.^[1]

The incidence of after-procedure pseudoaneurysm is increasing with the development of cardiac or peripheral vascular procedures.^[2] Iatrogenic pseudoaneurysms form when an arterial puncture site fails to seal, allowing arterial blood to jet into the surrounding tissues and form a pulsatile hematoma.^[3] These lesions lack a fibrous wall and

are contained by a surrounding shell of hematoma and the overlying soft tissues. It can present as a new thrill or bruit, pulsatile hematoma, or marked pain or tenderness. Duplex scanning along with pulsed and color Doppler flow mapping has been the mainstay in diagnosing FAPs. Even though the femoral artery is not used as vascular access for hemodialysis, it may be inadvertently punctured due to its proximity to the femoral vein, which is commonly used. Complications of pseudoaneurysms include rupture, distal embolization, local pain, neuropathy, and local skin ischemia.^[3]

Case Report

The index patient was a 58-year-old woman diagnosed with end-stage renal disease (ESRD) from chronic

Address for correspondence:

Dr. Chimezie Godswill Okwuonu, Department of Internal Medicine, Nephrology Unit, Federal Medical Center, Umuahia, Abia State, Nigeria.

E-mail: getchimezie@yahoo.com

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glomerulonephritis. She was irregular with maintenance hemodialysis due to financial constraints. She had been counseled earlier concerning the treatment options for ESRD and referred to the vascular surgeons for an arteriovenous (AV) fistula creation. She however declined, believing that the disease will abate over time with medications and few sessions of hemodialysis. She presented to the dialysis unit with a history of a mass in the left femoral region which developed 48 h after the last session of hemodialysis. It was sudden in onset with associated sharp severe pain which was continuous and nonradiating. There was no history of skin discoloration, numbness, tingling, or loss of voluntary movement of the left lower limb. There was no previous history of swelling or bleeding after dialysis and this was the first episode of such an occurrence.

On physical examination, a pulsatile mass was noted in the left femoral region, measuring 9 cm × 8 cm, soft, nontender, no differential warmth or discoloration of the skin [Figure 1]. Also, there was no attachment to overlying skin or underlying structures. There was a systolic bruit over the mass. The popliteal artery and dorsalis pedis pulsation of the foot of same limb were present with normal volume. The patient was hemodynamically stable, and other systemic examination findings were unremarkable.

Duplex ultrasound examination of the mass confirmed a left femoral artery pseudoaneurysm located anterior to the femoral vessels in the femoral triangle. The lesion had a well-defined sac, measured 7 cm × 5 cm, with a neck of 4 mm and a systolic flow rate of the blood jet of 88 cm/s. There was no AV fistula, retroperitoneal blood collection, or erosion of underlying structures [Figure 2]. Other laboratory investigations including complete blood count and clotting profile were unremarkable.

Due to the small size of neck, an ultrasound-guided compression repair (UGCR) was attempted using the ultrasound transducer to compress the neck of the pseudoaneurysm. The pressure was applied for 2 min before releasing; the procedure was repeated 12 times. Thereafter, the site sealed completely. There was absence of the pulsatility of the mass noted previously. The patient went home after 24 h of observation.

A repeat ultrasound done 2 days later showed a sealed arterial cavity with some scattered surrounding hematomas [Figures 3].

The patient latter opted for the AV fistula after this episode and continued maintenance hemodialysis thereafter.



Figure 1: Picture of the index patient showing swelling at the left femoral region



Figure 2: Duplex ultrasound of the patient's left femoral artery showing the pseudoaneurysm from the superficial femoral artery (SFA). CFA - Common femoral, artery; DFA - Deep femoral artery



Figure 3: Duplex ultrasound of the patient's left femoral artery 5 days after ultrasound-guided compression, showing occlusion of the neck and absence of flow through the pseudoaneurysm

Discussion

Femoral Artery Pseudoaneurysm is a troublesome groin complication related to the femoral vascular access site used for invasive cardiovascular procedures^[1] and

hemodialysis. It may occur under certain circumstances which include postarterial catheterization (in 0.05–1% of diagnostic angiograms and 0.8–6% following interventional procedures),^[4] at the site of native artery and synthetic graft anastomosis (e.g., aortofemoral bypass graft), posttraumatic, and infection (e.g., mycotic pseudoaneurysms),^[5] and may be spontaneous.^[6] The index patient developed pseudoaneurysm of the femoral artery from trauma inadvertently caused by the wide-bore needle used during femoral vein cannulation for hemodialysis vascular access. This is possible due to the proximity of the femoral artery to the femoral vein in the femoral sheath. An earlier report from Nigeria by Musa *et al.* was of a 23-year-old male patient with ESRD on hemodialysis who developed false external iliac artery aneurysm following infection of an infected cannulation site.^[7] The aneurysm ruptured with exsanguinations bleeding but this was surgically corrected. Doiz *et al.* reported the case of a male who, after practicing full-contact karate, experienced pain and edema in the right thigh. The ultrasound scan and the arteriography showed the presence of a pseudoaneurysm in a branch of the deep femoral artery.^[8] Yetkin *et al.* reported eight cases of pseudoaneurysms following gunshot injuries of the lower limbs, two of these been in the femoral region. Aneurysmal resection was done for all the patients, and all were treated with optimal revascularization procedure.^[9] The index patient presented with pain and swelling at the groin 48 h after a procedure was performed. Painful pulsatile swelling is a sine qua non for pseudoaneurysm and there may be associated bruising.^[4] The diagnosis was confirmed with a quick duplex ultrasound examination of the femoral artery. Duplex ultrasonography has a 95–98% sensitivity and specificity in identifying FAPs.^[4]

Several therapeutic strategies have been developed to treat this complication. They include ultrasound-guided compression repair, surgical repair, and minimally invasive percutaneous treatments (thrombin injection, coil embolization, and insertion of covered stents).^[2] UGCR, as done in this index patient, has become the first-line treatment of pseudoaneurysms at many institutions.^[2] It has been shown to be a safe and cost-effective method for achieving pseudoaneurysm thrombosis. Drawbacks to this procedure include long procedure time, discomfort to patients, and a relatively high recurrence rate in patients receiving anticoagulant therapy (as high as 25–35%).^[3] Contraindications to this technique include inaccessible site, limb ischemia, infection, large hematomas with overlying skin ischemia, compartment syndrome, and prosthetic grafts.^[5] There are situations when surgical treatment may be necessary and these include failed percutaneous intervention, mycotic or infected aneurysms,

compromised soft tissue viability, and rapid expansion of the pseudoaneurysm.

Conclusion

We reported the case of a 58-year-old woman diagnosed with ESRD and on maintenance hemodialysis who presented with FAP caused by inadvertent puncture of femoral artery in attempt to create femoral vein vascular access. Physicians caring for patients requiring procedures in the groin (interventional cardiologists, interventional radiologists, and nephrologists) need to be aware of this complication to enable prompt detection and institution of appropriate care. It is also important to recognize the indications for surgery to avoid delay in the management of this potentially limb- or life-threatening condition. Other complications of femoral vein catheterization include infections, hematoma, vascular aneurysms, fibrosis, and thrombosis.^[10]

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Conflicts of Interest

There are no conflicts of interest.

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