Case Report

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Iatrogenic Iliofemoral Vein Dissection: A Rare Complication of Femoral Artery Puncture

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Abstract

Iatrogenic iliac vein dissection secondary to femoral artery puncture is a rare complication that has not yet been documented. A 55-year-old woman presented to our institution with acute right iliofemoral thrombosis 2 weeks after transfemoral cerebral angiography. She was previously healthy and was not taking any medication. Right iliofemoral vein dissection was diagnosed by computed tomography angiography and confirmed by conventional venography. The patient was treated endovascularly with stent insertion, and the venous outflow was patent on the 6-month follow-up computed tomography angiogram.

Keywords

deep vein thrombosis, dissection, endovascular procedure

Introduction

The transfemoral approach is routinely used in interventional procedures worldwide. Common puncture-related complications include groin hematoma, pseudoaneurysm, arteriovenous fistula (AVF), retroperitoneal hemorrhage, dissection/occlusion, and branch injury.[1-3] Vein wall dissection has been sporadically reported during puncture of an AVF for hemodialysis[4,5] or of the jugular vein for central line insertion.[6,7] One study of AVF reported a vein dissection rate of 1.7% after angioplasty using cutting balloon.[8] This complication usually self-resolves without further management. To the best of our knowledge, dissection of a large and healthy iliofemoral vein after common femoral artery (CFA) puncture has not yet been documented in the literature. We describe a case of iliofemoral vein dissection complicated by flow obstruction and deep vein thrombosis (DVT). The patient was treated endovascularly, and the venous flow was patent on the 6-month follow-up computed tomography angiogram (CTA).

Case Report

Based on our institutional policy, institutional review board approval is waived for case reports. A 55-year-old woman was referred to our hospital for further investigation of a suspected intracranial aneurysm. A transfemoral cerebral angiography was indicated and performed by an experienced neurointerventionist. The right CFA was punctured by palpation using an 18-Gauge entry needle (Radifocus; Terumo, Tokyo, Japan) and standard Seldinger technique. The procedure was finished uneventfully. The patient was discharged shortly thereafter with a negative finding of aneurysm. However, she presented again 2 weeks later with chief complaints of right leg swelling and mild groin pain that began 3 days before. On admission, her vital signs were within normal ranges. No other remarkable abnormalities were noted on physical examination except for swelling of her right leg. She was previously healthy and was not taking any medication. She denied past history of surgery, allergy, smoking, alcohol consumption, hypertension, and diabetes mellitus. Blood analysis revealed a raised D-dimer level of 0.64 μg/mL, while other parameters were within normal limits. A urinary test was negative.

The CTA demonstrated a subtle hematoma at the posterior aspect of the right CFA and the common femoral vein (CFV; Figure 1A). On the venous phase, a focal acute thrombosis of the right iliofemoral vein was evident. Surprisingly, the venous wall from the proximal CFV to the proximal common iliac vein was extensively thickened compared to the contralateral side (Figure 1B). The dissection entry site into the anterior and posterior venous walls was noted at the distal CFV,

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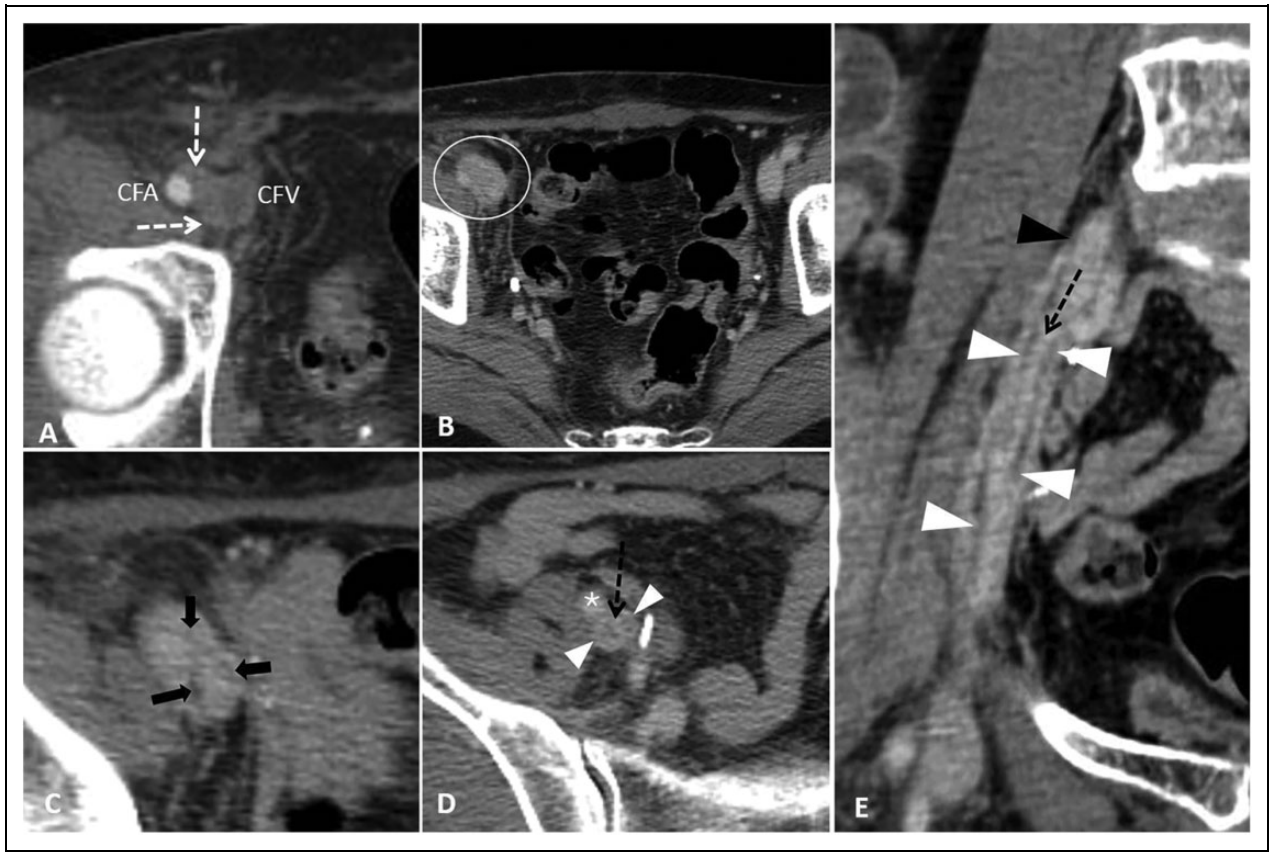

Figure 1. Computed tomography angiogram (CTA) of an iliofemoral vein dissection. A, On arterial phase, a subtle hematoma (white-dotted arrow) was seen between the right CFA and the CFV. B, On venous phase, the vein wall was extensively and irregularly thickened compared to the contralateral side. Note the presence of acute intraluminal thrombi (circle). C, Black arrows indicating the entry site of dissection into bilateral wall of the CFV. D, E, The true lumen (black-dotted arrow) was encircled between the thrombosed false lumens (white arrowhead) and markedly collapsed. Asterisk indicates the CFA. Black arrowhead indicates the dissection closure at the level of the common iliac vein. CFA indicates common femoral artery; CFV, common femoral vein.

corresponding to the previous puncture site of the CFA (Figure 1C). An intimal flap was not seen because the double false lumens were filled with thrombi. The true lumen was occluded caudally by acute DVT and severely compressed by thrombosed false lumens cranially (Figure 1D and E). No other abnormalities were seen on the CTA.

Clexane (Enoxaparin; Sanofi-Aventis, Paris, France) 120 mg/d was administered along with painkiller and prophylactic antibiotics. The patient was referred for endovascular treatment after a multidisciplinary discussion. A bolus of intravenous heparin (20 000 IU) was given, and intravenous heparin (25 000 IU) was continuously infused during the procedure. In prone position, the right popliteal vein was punctured under ultrasound guidance (UG). An 8F sheath was introduced, and a venogram was obtained from a 5F diagnostic catheter (Cobra 5F, Cook, Bloomington, Indiana). An occlusion was noted extending from the proximal CFV to the external iliac vein with poorly established transpelvic collaterals (Figure 2A). A 0.035″ guidewire (Radifocus) was successfully negotiated through the occluded segment to the true lumen. Next, balloon angioplasty (Armada 8 mm × 100 mm; Abbott Vascular, Santa Clara, California) was performed to dilate the dissected segment (Figure 2B). However, the result was suboptimal despite repeated inflation up to the burst pressure (Figure 2C). Thus, a 10 mm × 100 mm self-expandable stent (Absolute Pro; Abbott Vascular) was eventually implanted to ensure patency of the venous flow. Completion venogram demonstrated direct flow to the inferior vena cava (Figure 2D). The patient's symptoms were significantly relieved the next day, and she was discharged 3 days after admission. Clexane was then substituted with Xarelto (Rivaroxaban; Bayer HealthCare AG, Berlin, Germany) 15 mg twice daily. After 6 months, she remained asymptomatic and follow-up CTA demonstrated patency of the iliofemoral vein stent (data not shown).

Discussion

Dissection of a healthy iliofemoral vein after transfemoral arteriography is a rare complication compared to a similar entity that occurs more frequently with AVF puncture.[4,5,8] The rarity of this complication is probably due to unintentional puncture of a healthy vein that is totally different from an arterialized vein in AVF. We present the first report of iliofemoral vein dissection, which was diagnosed by CTA and conventional venogram

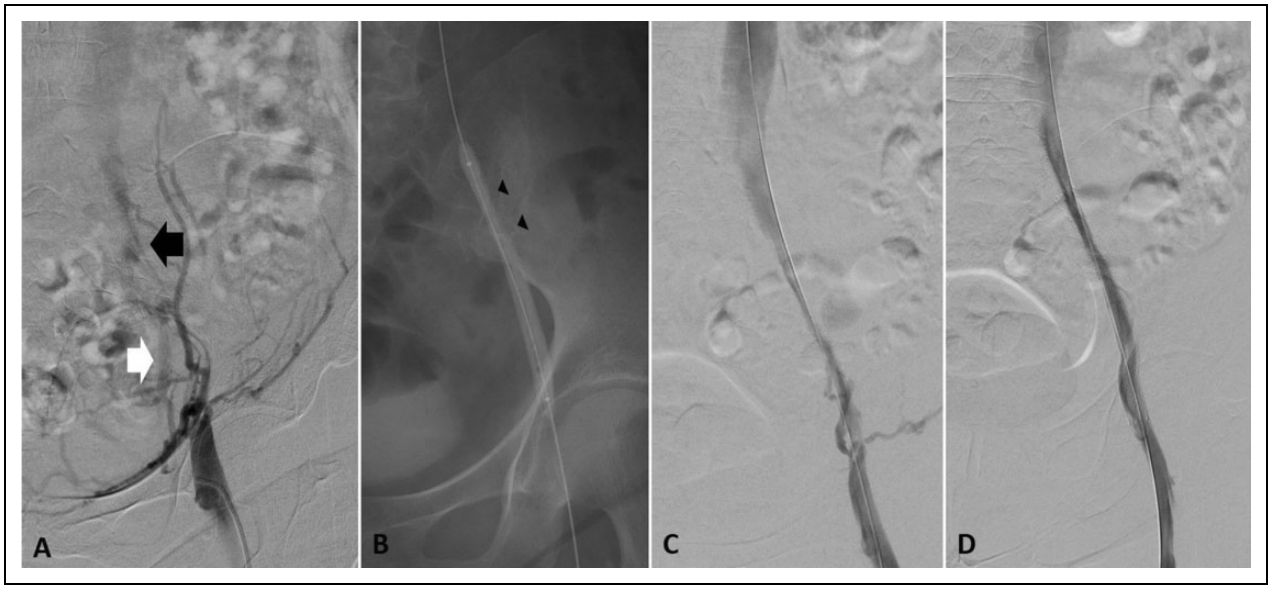

Figure 2. Venogram of an iliofemoral vein dissection. The patient was in prone position. A, The entry site of the dissected segment was at the proximal CFV, corresponding to the previous puncture site of the right CFA. The true lumen was occluded caudally and reconstituted cranially (black arrow) at the level of the common iliac vein. The false lumen (white arrow) was faintly opacified. B, High-pressure balloon angioplasty was performed after a guidewire was successfully passed the true lumen. Waists were observed alongside the dissected segment (arrowhead). C, However, the finding of postballooning was unsatisfying despite evidence of direct flow to the inferior vena cava and disappearance of transpelvic collaterals. D, A self-expandable stent was thus implanted to fully restore the venous outflow. CFA indicates common femoral artery; CFV, common femoral vein.

and treated endovascularly. It is evident that UG improves the first pass success and reduces number of attempt and time to vascular sheath placement compared to anatomical landmark approach for femoral artery access.[9] Routine use of UG is protective against groin hematoma for both modifiable and nonmodifiable patients and procedural characteristics.[3] Although UG does not lower the rate of composite of immediate procedural outcomes and assess site outcomes at day 1, it significantly reduces bleeding events, number of venipuncture, and attempts.[10] However, present data are not homogeneous and do not warrant a systemic use of UG for femoral artery access due to increased setup time, extra cost, and training.[9]

Although the vein wall is thinner than that of an artery, it also consists of 3 distinct layers: intima, media, and adventitia.[11,12] Theoretically, venous dissection can refer to detachment of either the intima or adventitia.[5] The mechanism and progression of dissection in our case can be briefly described as follows. The CFA was punctured by palpation using double wall puncture technique. The CFV locates posterior medially to the CFA. When the needle traversed the posterior wall of the CFA, its bevel also penetrated and embedded in the wall of the CFV. The vein layers were then disrupted by misplacement or rotation of the needle bevel. A layer gap was created, allowing an antegrade dissecting column originated and extended. Thrombi gradually formed in the false lumens, resulting in severe compression of the true lumen, followed by the development of DVT.

Venous dissection usually results from trauma (cannulation, percutaneous angioplasty) or, more rarely, develops spontaneously in the setting of degenerative venous wall changes due to connective tissue disorders. Inflammation has also been recognized as a risk factor.[4,8] On-site ultrasound has been widely used to diagnose venous dissection and distinguish it from thrombosis or stenosis, a process that is essential for determining the appropriate therapeutic approaches. In the present case, findings of venous dissection were very suggestive on CTA and venogram. Previous case reports advocate conservative management of this complication since it is limited to peripheral venous access.[4,5] Nevertheless, our patient presented with acute iliofemoral thrombosis and a markedly collapsed true lumen that required more aggressive management to prevent the risk of postthrombotic syndrome afterward. Anticoagulation was given as a standard treatment for DVT. Balloon angioplasty and stenting were indicated to completely restore the venous flow.

In conclusion, we report the first case of iatrogenic iliofemoral vein dissection secondary to routine CFA puncture in a healthy woman. The diagnosis was made by CTA and confirmed by venography. The patient was successfully treated by endovascular intervention. This case report adds to the literature a rare, but potential, complication of CFA puncture.

Declaration of Conflicting Interests

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