INTRODUCTION

The majority of traumatic acquired arteriovenous fistulas are caused by penetrating injuries such as stab or gunshot wound, but a few cases can be caused by blunt injuries or trauma. Iatrogenic arteriovenous fistulas can be frequently developed after vessel related invasive procedures and rarely developed after total knee replacement or lumbar disc surgery [1-3]. Herein, we report an unusual case of arteriovenous fistula combined with deep vein thrombosis developed by blunt trauma.

CASE

A 39-year-old woman arrived at our emergency department, complaining of severe pain and swelling of her left leg. She had slipped down stairs and injured on her left leg about 3 months ago. Computed tomography angiography showed left distal superficial femoral artery’s pseudoaneurysm with arteriovenous fistula and thrombotic occlusion of left common iliac vein. We decided to do endovascular intervention due to severe venous hypertension and chronic inflammation around the fistula. The femoral arteriovenous fistula was closed via stent-graft (7 mm×5, 9 mm×5 cm) deployment. The occluded left iliac vein was reopened by nitinol metal stenting (12 mm×4 cm, 14 mm×4 cm). The authors report a very rare case of femoral arteriovenous fistula combined with iliac vein thrombosis developed after a blunt trauma.

Key Words: Fistula, Thrombosis, Trauma, blunt
due to severe swelling and chronic inflammation around the fistula. Endovascular intervention was performed in angiosuit. First, right common femoral artery was punctured and a guiding sheath was crossed to the left side. After deploying the 7 mm×5 cm sized stent-graft, significant amount of contrast media leakage was observed and additional 9 mm×5 cm sized stent-graft was further needed to repair. The left femoral arteriovenous fistula was successfully closed through deployment of two stent-grafts (7 mm×5 cm, 9 mm×5 cm) (Fig. 2A). After that, left common femoral vein was punctured under ultrasound guide and the occluded left common iliac vein was reopened through catheter aspiration of thrombus and deployment of self-expandable nitinol metal stents (12 mm×4 cm, 14 mm×4 cm) (Fig. 2B).

After the intervention, swelling and pain in the left leg gradually improved and the color of the leg was also recovered. In the twelfth hospitalization day, a small sized pseudoaneurysm on femoral artery puncture site was found, but it was diminished by bed rest and compression. She was discharged from hospital on 19th hospitalization day. Anticoagulation therapy using low molecular weight heparin and warfarin was done during the hospitalization.

Fig. 1. Computed tomography angiography shows (A) left distal femoral artery’s pseudoaneurysm with fistula connection and occlusion of left common iliac vein. (B) Partial thrombus (white arrow) in pseudoaneurysm. (C) Thrombosis in left common iliac vein.

Fig. 2. Intra-interventional angiography. (A) Distal femoral arteriovenous fistula was completely closed after two stent-graft (7 mm×5 cm, 9 mm×5 cm) deployments. The pseudoaneurysm was partially filled with thrombus (arrow). (B) Thrombotic occlusion of left iliac vein was recanalized via thrombus aspiration and overlapped self-expandable nitinol stents (12 mm×4 cm, 14 mm×4 cm) deployment.

Fig. 3. Three year post intervention computed tomography angiography shows patent left femoral artery but somewhat intra-stent restenosis is also observed.
days. Upon discharge, 20 mg of rivaroxaban was prescribed for six months and was replaced by low dose aspirin and 50 mg of mesoglycan sodium afterwards.

About three years after intervention, the follow-up CT angiography showed good patency of left superficial femoral artery and left iliac vein, but some intra-stent restenosis was observed within the femoral arterial stent-graft (Fig. 3). Until now she has not experienced any swelling or pain of the leg.

**DISCUSSION**

About two-thirds of patients with traumatic arteriovenous fistulas are diagnosed within one week of injury, but some patients may present months to years after the injury [2–5]. Chronic traumatic arteriovenous fistula can lead to complications such as edema, ischemia, ulcerations and high-output heart failure [1,6,7]. Our case was presented with severe swelling and warmth in the leg, three months after the initial trauma. It was different to usual signs of deep vein thrombosis of lower extremities.

It is suggested that pseudoaneurysm or local hematoma produced after an arterial injury may compress the adjacent vein and damage the vein wall to rupture, resulting in fistula [1]. In our case, we suggested that stretching injury of the leg caused partial rupture and formation of pseudoaneurysm on femoral artery. The pseudoaneurysm containing hematoma could make arteriovenous fistula. The origin of the thrombosis of left iliac vein was not clear, but we assumed that some thrombus in the pseudoaneurysm could have migrated into iliac vein or injury of the iliac vein had occurred at the time of blunt trauma.

Treatment indications of traumatic arteriovenous fistula are distal arterial ischemia (steal phenomenon), venous hypertension causing symptoms and high-output heart failure. If an asymptomatic arteriovenous fistula has high potential of enlargement, early treatment is more beneficial as chronic cases are more difficult to treat. Treatment options of traumatic arteriovenous fistula depend on locations, duration or preservation of injured arteries. Surgical repair, stent-graft or embolizations can be chosen to isolate and close the site of arteriovenous communication [1,3]. Surgical approaches to treat chronic traumatic arteriovenous fistula include ligation, resection with end-to-end anastomosis, lateral suture and artificial graft or vein graft interposition [8]. In our case, we chose endovascular intervention, because surgical repair may lead to massive bleeding, difficulty in dissections and higher post-operative wound complications. Our patient maintained good patency of femoral artery and iliac vein without any recurring symptom or complication for 3 years.

In conclusion, endovascular treatment in traumatic arteriovenous fistula is promising and is increasingly used, but long-term follow-up will be required to determine the durable patency.

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