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Case Report / Olgu Sunumu

Use of detachable balloon in the treatment of arteriovenous fistula at a teenage case

Genç bir hastada arteriyovenöz fistülün tedavisinde ayrılabilir balon kullanımı

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In this article, we present a teenage female with a traumatic, distal femoral arteriovenous fistula (AVF). She was admitted to our cardiovascular clinic with the complaints of swelling, pain, cyanosis and ulceration at her right lower extremity. She had a history of gun shot injury 10-years ago. A skin scar was observed at this region due to surgery. Physical examination revealed swollen superficial varicose veins and ulceration of the right lower extremity. Heart failure was absent. We suspected an AVF with clinical findings. The high-flow fistula was diagnosed using multi-dedector computed tomography and confirmed on angiography. The fistula was successfully embolized with the detachable balloon technique.

Key words: Arteriovenous fistula, detachable balloon; embolization.

Bu yazıda distal femoral, travmatik arteriyovenöz fistülü (AVF) olan genç bir bayan hasta sunuldu. Hasta sağ alt ekstremitesinde şişlik, ağrı, siyanoz ve ülserleşme şikayetiyle kardiyovasküler kliniğimize başvurdu. Hastanın 10 yıl önce silah ile yaralanma öyküsü vardı. Ayrıca yaralanma bölgesinde cerrahi izi vardı. Fizik muayenede sağ alt ekstremitede yüzeysel varikoz venlerde şişlik ve ülserleşme saptandı. Kalp yetmezliği mevcut değildi. Hastada klinik AVF bulgularından şüphelenildi. Yüksek akımlı fistül çok kesitli bilgisayarlı tomografi ile saptandı ve anjiyografi ile doğrulandı. Fistül ayrılabilir balon tekniğiyle başarıyla embolize edildi.

Anahtar sözcükler: Arteriyovenöz fistül; ayrılabilir balon; embolizasyon.

An arteriovenous fistula (AVF) is defined as an abnormal connection between an artery and a vein. These lesions are usually caused by blunt or penetrating trauma, such as femoral catheterization of iatrogenic origin. The endovascular approach as an alternative to surgery is a safe and effective therapy method. In this case report, we present the successful embolization of the distal femoral AVF in a young patient who had a gun shot injury which she experienced 10 years ago. This lesion was treated by a detachable balloon.

CASE REPORT

A 14-year-old female was admitted to a cardiovascular clinic complaining of swelling, pain, cyanosis, and ulceration in her right lower leg. She had a history of a gun shot injury from 10 years ago. Physical examination revealed swelling, superficial varicose veins, and ulceration of the right lower extremity. Additionally, a skin scar was observed at this region due to surgery. Heart failure was not noted. We suspected an AVF with the presented clinical findings. Multidetector computed tomography (MDCT) angiography showed an AVF between the distal portion of the right superficial femoral artery (SFA) and superficial femoral vein (SFV). Venous engorgement was detected at the right crural and popliteal region due to occlusion of the SFV (Figure 1a). The distal SFA, proximal to the fistula, was enlarged due to the previous vascular surgery. After consulting with the referring physician, endovascular treatment was ordered. A 5 F introducer sheath was placed at the right common femoral artery via an antegrade route. Diagnostic angiography confirmed the findings of the MDCT angiography (Figures 2a, b). A 4 F hydrophilic vertebral catheter was placed into the fistula, and a 2.7 F microcatheter was used in a coaxial fashion. We tried to occlude the fistula with coils, but they passed into the venous system due to their instability and were suspended there. Then we used a detachable balloon for embolization. The introducer sheath was exchanged for a 6 F long

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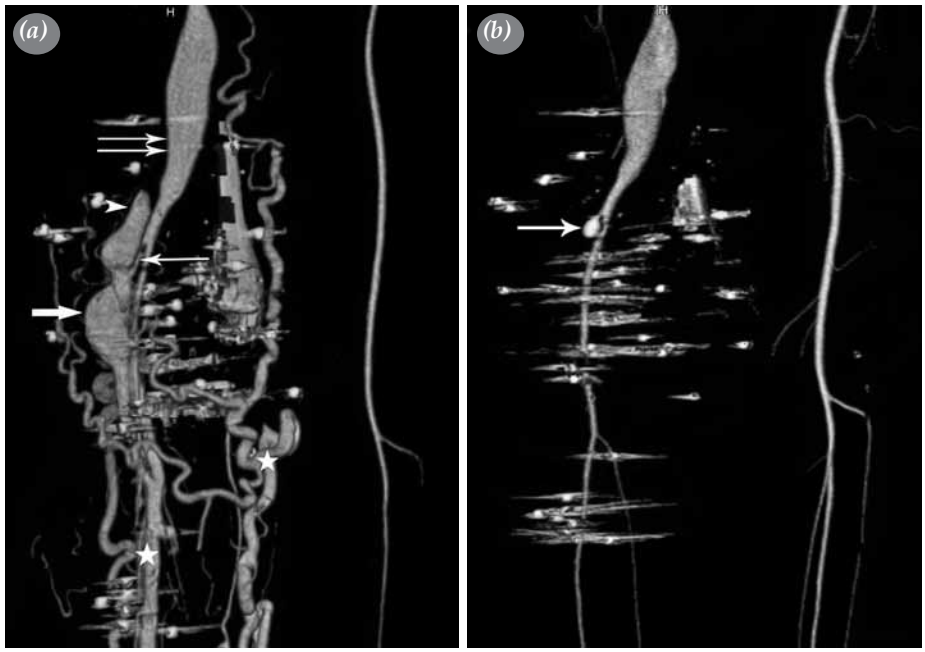

Figure 1. Multi-dedector computed tomography angiography volume-rendered technique images. **(a)** The preembolization image shows the superficial femoral artery (double arrow) feeding the fistula (arrow) and draining the superficial femoral vein (thick arrow). Venous engorgement (asterix) was seen due to the occlusion of the draining vein (arrow head). **(b)** The postembolization six-month control image shows the occluded fistula.

vascular sheath (Destination, Terumo, Tokyo) via a stiff guide wire. We positioned and detached the balloon (Goldballoon, 8x11 mm; Balt, Montmorency, France). Postembolization angiography showed total occlusion of the fistula (Figures 2c, d). Swelling and venous engorgement of the right lower extremity improved immediately. The postembolization course of the patient was uneventful, and six-month follow-up

Figure 2. (a, b) Preembolization angiography shows a high-flow, but not a large, fistula (arrow) between the SFA (double arrow) and SFV (thick arrow). Venous engorgement (black arrowhead) was also seen due to the occlusion of the draining vein (arrow head). **(c, d)** Postembolization angiography reveals the total occlusion of the fistula with the detachable balloon (black arrow).

MDCT angiography showed occlusion of the fistula (Figure 1b).

DISCUSSION

Arteriovenous fistulas are a direct communication between an artery and a vein. These lesions are common complications of vascular trauma, such as stab or gunshot wounds, or have an iatrogenic origin, such as catheterization, surgical procedure, or biopsy. The most common clinical features of AVFs include hemorrhage, swelling, thrill, and high-output cardiac failure, especially with large AVFs. Venous hypertension may also occur due to abnormal venous drainage.[1,2] In our case, cardiac failure was not seen because the draining vein was occluded by the surgical procedure. Moreover, congestion of the superficial veins and venous ulcerations were seen at the crural and popliteal region due to the occluded vein.

Arteriovenous fistulas can be demonstrated by Doppler ultrasound which reveals the increased flow in the feeding artery and arterialized flow in the draining vein. Multi-detector computed tomography and magnetic resonance angiography facilitate preoperative imaging to define the complicated angioarchitecture of these lesions and tailor the surgical or endovascular treatment to the patient's individual needs.[2,3] In our patient, both MDCT angiography and conventional angiography demonstrated the fistula between the distal portion of the SFA and SFV.

In the treatment of AVFs, transarterial embolization is an alternative to surgery, but it is relatively more invasive.[4] Coils have also been used frequently for the endovascular treatment of AVFs.[2] Particulates and liquid agents are not routinely used for large lesions due to the risk of paradoxical embolization.[5] Recently, covered stent implantations have been used cumulatively, especially proximal to large lesions. Less commonly, a detachable balloon or the Amplatzer vascular plug may be used for AVFs, particularly for large lesions. These agents can be positioned optimally and controlled while detached.[3] In our case, we tried to occlude the fistula with coils first. Unfortunately, the coils were not stable and passed into the venous system due to the high flow rate. We believe that a covered stent could have disadvantages for younger patients with a long life expectancy, as was the case with our patient.[6] Additionally, in our patient, the proximal of the fistula was deemed to be unsuitable for covered stent SFA since it was enlarged due to her previous surgery. Therefore, we embolized to the fistula by detachable balloon rather than by covered stent.

In conclusion, percutaneus embolization should be the treatment of choice and the primary modality for AVF. In the case of a high-flow AVF, a detachable balloon can be used as an embolic agent instead of coils or a covered stent in teenage patients.

Declaration of conflicting interests

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