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Case Report

Femoral Arteriovenous Fistula Following Removal of Femoral Vein Catheter: A Case Report

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Abstract

A 42-year-old male patient underwent intracranial aneurysm clipping surgery following subarachnoid hemorrhage. On the fourth day, oozing at the catheter site raised concerns of a femoral arteriovenous fistula, which was confirmed by ultrasound. Compression therapy was applied for four additional days, and the fistula resolved by the ninth day. The patient showed no neurological deficits and no fistula on follow-up examination after 30 days. This case further demonstrates that ultrasound-guided venous puncture can prevent similar complications and provide enhanced safety.

Keywords: *Femoral Arteriovenous Fistula; Femoral Vein Catheter; Compression Therapy; Central Venous Pressure (CVP)*

Case in Belief

A 42-year-old male patient with an intracranial aneurysm presented to the operating room for intracranial aneurysm clipping following subarachnoid hemorrhage. The procedure was performed under general anesthesia, with the insertion of an arterial line for invasive arterial blood pressure monitoring and a femoral vein line for central venous pressure (CVP) monitoring and rapid infusion following significant blood loss. The femoral vein cannulation was done using a 16-gauge, single-lumen vein catheter, following the standard routing protocol: insertion of an 18-gauge needle 1.5 cm medially to the femoral arterial pulse in the groin region under suction pressure. Confirmation of successful femoral vein puncture was obtained by aspirating venous blood with low resistance and injecting fluid into the syringe. A guide wire was subsequently inserted into the femoral vein, and the catheter was placed at a depth of 15 cm from the skin. Another check was performed to ensure proper deep venous catheterization. The procedure was completed after 3 hours with a blood loss of 400 ml, and the patient was transferred to the neurology intensive care unit (ICU). A total of 2500 ml of fluids were infused, including 2000 ml of lactated Ringer's solution and 500 ml of polygeline. The femoral vein line remained in place for fluid management and other venous therapies until it was removed on the fourth day after surgery. On the fourth day, a nurse noticed oozing at the site of catheterization, which was reported to the attending doctor. The venous catheter was subsequently removed, and the wound was covered with cotton pads. The following morning, a pulsatile mass was observed at the catheter insertion site, along with audible murmurs upon auscultation, leading to suspicion of a femoral arteriovenous fistula. This suspicion was confirmed via ultrasonic diagnosis. The wound was then com-

pressed with a saline-soaked gauze pad at the leaking site for an additional four days. On the ninth day after surgery, the arteriovenous fistula was no longer detectable on ultrasonic examination. Pressure applied to the wound dressing was gradually reduced until it was completely removed on the twelfth day. Thirty days after the surgery, the patient exhibited no neurological deficits in the right leg, and no arteriovenous fistula was detected on an ultrasonic examination.

Discussion

Arteriovenous fistulas can be congenital [1] or acquired. They can occur due to skin-penetrating injuries [2], such as gunshot or stab wounds in areas where veins and arteries are in close proximity. Congenital arteriovenous fistulas result from improper development of arteries and veins during fetal development. Genetic conditions, like Osler-Weber-Rendu disease, can cause pulmonary arteriovenous fistulas, characterized by irregular blood vessels in the lungs [3]. Additionally, dialysis-related surgeries may create arteriovenous fistulas in the forearm of individuals with advanced kidney failure to facilitate dialysis procedures [4]. This is a procedure-related arteriovenous fistula, which may have occurred due to minor injury to the femoral artery during femoral vein puncture. As we know, the femoral vein (FV) was cannulated for various therapeutic purposes, including fluid management, blood transfusions [5], dialysis [6], etc. In some cases, the femoral artery (FA) was also cannulated [7]. Anatomically, the FV is located medially to the FA above the level of the inguinal ligament (Figure 1a), but occasionally it can be found below the FA, approximately 2 cm below the inguinal ligament [4] (Figure 1b). Without the assistance of ultrasound guidance [8], simultaneous puncture of the FA and FV may occur, especially when a retrograde suction technique is employed. Prolonged indwelling of a venous catheter can result in tissue injury and the formation of a fistula [9], In our case, the arteriovenous fistula may have developed due to delayed healing of the vessel wall after catheter removal, and this could have been prevented with an appropriate strategy, such as applying pressure to the site for 24 - 72 hours. Due to the lack of ultrasound guidance during FV catheterization and inadequate assessment during catheter removal, we were unaware that the FA had been punctured and failed to apply adequate pressure. An unexpected femoral arteriovenous fistula can lead to increased right heart preload and pulmonary hypertension, requiring prompt treatment. Auscultation, palpation, and ultrasound imaging can all be used to diagnose femoral arteriovenous fistulas, with ultrasound being the preferred method [8,10].

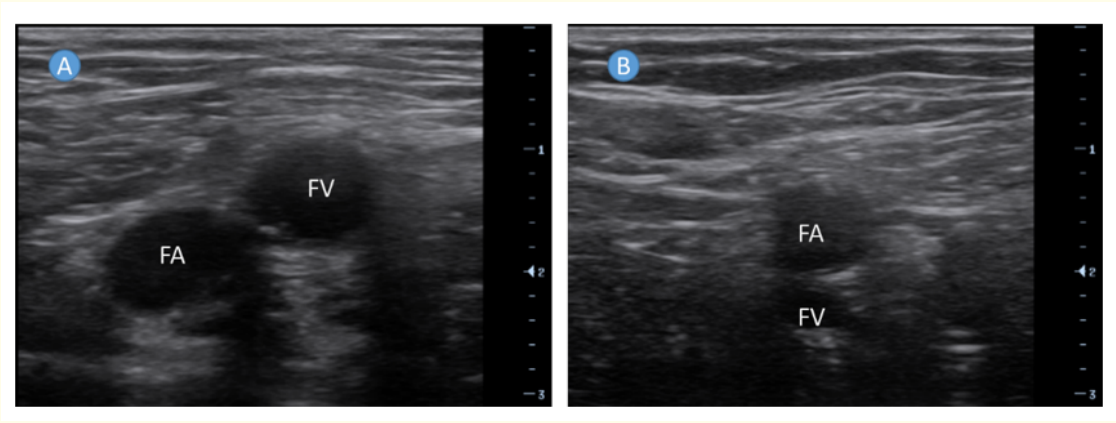

Figure 1: *The adjacent of FV and FA under ultrasonic A) 1 cm above the inguinal ligament level; B) 2 cm under the inguinal ligament level. FA: Femoral Artery; FV: Femoral Vein.*

Conclusion

This case further demonstrates that ultrasound-guided venous puncture can prevent similar complications and provide enhanced safety, and applying pressure to the wound for more than 24 hours after femoral venous catheter removal is necessary, especially in cases with prolonged catheterization without the ultrasound-guiding.

Declarations of Interest

The authors declare that they have no conflicts of interest.

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