

Uncommon complication of a common procedure

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Catheter knotting is an uncommon complication in the Angio suite. Even the simplest endovascular procedures can cause serious consequences if the equipment is not managed properly. This case demonstrates the importance of being well-equipped and skilled in dealing with possible complications.

A 68-year-old woman with a history of hypertension and chronic three-vessel coronary disease had percutaneous coronary intervention performed via radial access. A complication of the procedure was a 7.5 F SheathLess Eucath guiding catheter (Asahi Intecc, Irvine, CA, US) knotted at the level of the right subclavian artery. Initial attempts to untie the knot, including pushing and pulling the catheter, failed and resulted in the iatrogenic dissection of the right subclavian, right common carotid artery, and brachiocephalic trunk (Figure 1A). Moreover, because of catheter-related thrombosis, the right upper limb became acutely ischemic.

The patient was transferred to the Department of Interventional Radiology and Neuroradiology for endovascular treatment. The catheter retrieval procedure began with access from the right femoral artery. The sheath was advanced *via* the aorta and brachiocephalic trunk toward the knot. The distal part of the embedded catheter was gripped with a vascular retriever snare (Figure 1C). The knot was then tightened, making it smoother to slide it out through the brachiocephalic trunk. Once slipped into the aorta, the knotted catheter was unclamped by being pulled with the vascular retriever and the proximal part of the catheter. The sheath inserted through the femoral artery was slipped over the straightened catheter (Figure 1D). The sleeved catheter was withdrawn toward the

subclavian artery, and the whole tube was pulled out through radial access.

Subsequently, stents were placed in the right subclavian and right common carotid arteries to treat the vascular dissection (Figure 1E, F). Thrombectomies were performed using a Fogarty catheter and remaining blood clots in the branches were aspirated using Penumbra's Indigo system.

After the procedure, the circulation and sensation in the right upper limb returned. After approximately 7 hours, the patient presented mild symptoms of a stroke (National Institutes of Health Stroke Scale, 4 — slight paresis of the left upper limb, drooping corner of the mouth). Computed tomography showed a small ischemic focus in the distal part (M4) of the middle cerebral artery which was beyond the range of mechanical thrombectomy methods. After a few days, the patient returned to the previous hospital and was discharged without symptoms shortly afterward.

There are various methods of removing knots, involving intravascular catheter maneuvering, passing the wire to straighten it, or use of grasping forceps or snare devices to immobilize the catheter over the knot [1, 2]. Surgical removal of the catheter after relocating it to a safe site is also possible but is preferred in cases without extra dissection of vessels [3]. The most important aspect is careful handling of the catheter. A kinked catheter makes it significantly more difficult or even impossible to straighten it without using additional tools such as a loop. It is important to remain calm and take deliberate steps to straighten it. Every center performing endovascular procedures should have additional equipment and appropriate training for treatment of possible complications.

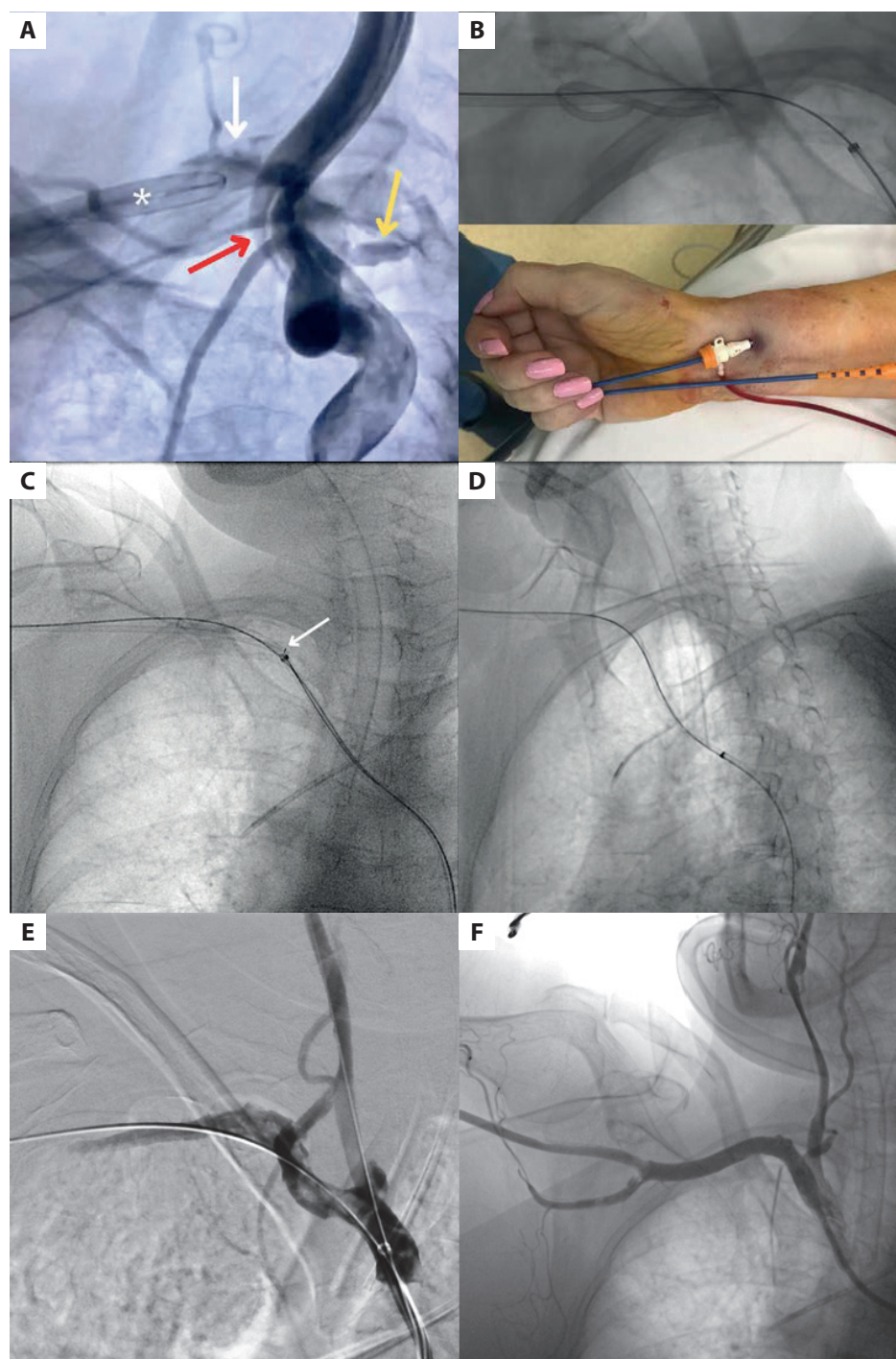


Figure 1. **A.** Initial situation — angiography performed at the initial center showed a knotted catheter (white asterisk) and dissection of the right common carotid artery (red arrow). True and false channels are visible. The yellow arrow indicates a damaged right vertebral artery, and the white arrow indicates the right subclavian artery. **B.** 7.5 F Knot on SheathLess Eaucath (Asahi Intecc, Irvine, CA, US) formed during attempted radial coronary angiography at the level of the right subclavian artery blocking blood flow to the right upper limb. Below is a photo of a wedged catheter in the patient's ischemic forearm. **C.** The distal part of the catheter was gripped by a vascular retriever loop — MultiSnare Dual-Plane Retrieval System 15–20 mm (B. Braun International Systems Inc., Bethlehem, PA, US). The white arrow indicates the vascular retriever snare. **D.** The knotted catheter was straightened after being slid into the aorta. An 8 F × 70 cm Flexor Check-Flo Introducer Sheath (Cook Medical, Bloomington, IN, US) was slipped over the catheter. **E.** Access to the true canals of the dissected right subclavian artery and the right common carotid artery was secured using two guidewires. **F.** Stents were placed in the right subclavian and right common carotid arteries. Return of proper blood flow is visible

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