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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 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 the 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 an access from the right femoral artery. The sheath was advanced via the aorta and

brachiocephalic trunk towards 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. 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 The sleeved catheter was withdrawn towards the subclavian artery and the whole tube was pulled out through the radial access.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 NIHSS = 4 (slight paresis of the left upper limb, drooping corner of the mouth). CT revealed 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 afterwards.

There are various methods of removing knots, involving intravascular catheter maneuvering, passing by with the wire to straighten it, or use of grasping forceps or snare device to immobilize the catheter over the knot [1, 2]. Surgical removal of the catheter after relocating it to 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 and even impossible to straighten it without the use of 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 in the treatment of possible complications.

Article information

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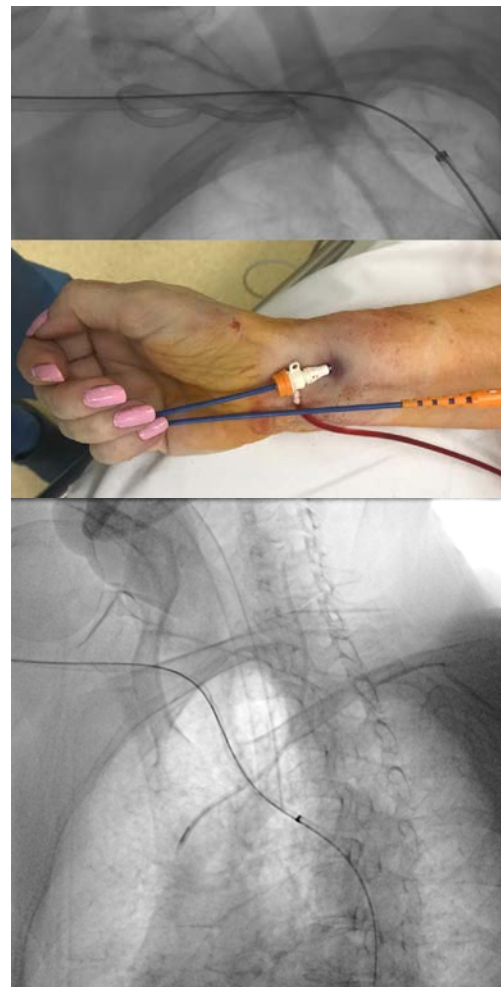
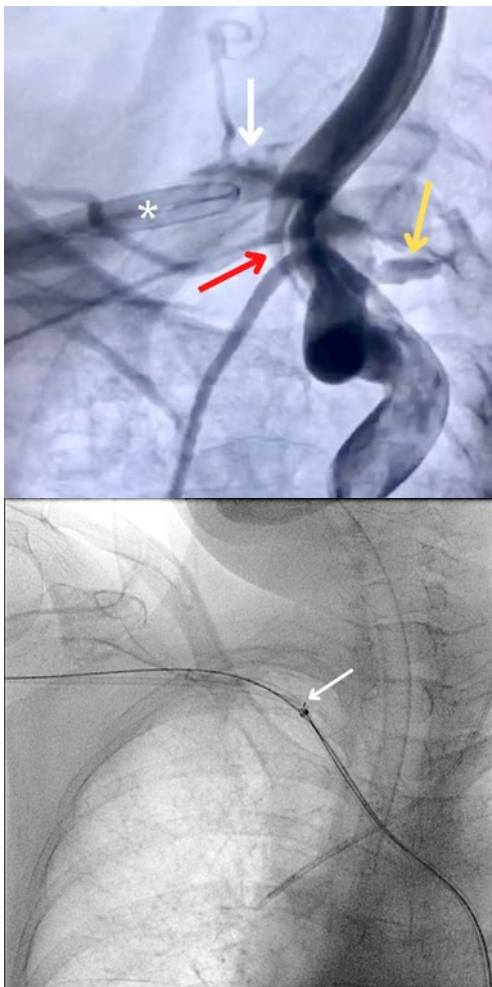
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REFERENCES

1. Gupta PN, Praveen GK, Ahmed SZ, et al. Knots in the cath lab, an embarrassing complication of radial angiography. *Heart Asia*. 2013; 5(1): 36–38, doi: [10.1136/heartasia-2012-010194](https://doi.org/10.1136/heartasia-2012-010194), indexed in Pubmed: [27326071](https://pubmed.ncbi.nlm.nih.gov/27326071/).
2. Meister SG, Furr CM, Engel TR, et al. Knotting of a flow-directed catheter about a cardiac structure. *Cathet Cardiovasc Diagn*. 1977; 3(2): 171–175, doi: [10.1002/ccd.1810030209](https://doi.org/10.1002/ccd.1810030209), indexed in Pubmed: [872209](https://pubmed.ncbi.nlm.nih.gov/872209/).
3. Altıntaş G, Diken Aİ, Ulaş MM, et al. Surgical removal of a knotted and entrapped subclavian hemodialysis catheter guidewire. *Ann Vasc Surg*. 2012; 26(3): 421.e17–421.e19, doi: [10.1016/j.avsg.2011.06.016](https://doi.org/10.1016/j.avsg.2011.06.016), indexed in Pubmed: [22284774](https://pubmed.ncbi.nlm.nih.gov/22284774/).



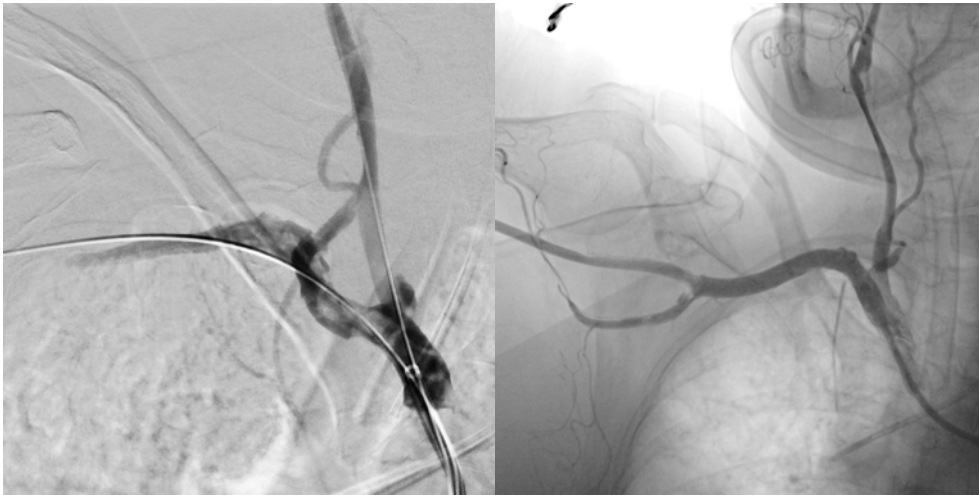


Figure 1. A. Initial situation — an angiography performed at the initial center revealed a knotted catheter (white asterisk) and dissection of right common carotid artery (red arrow). True and false channels are visible. The yellow arrow indicates a damaged right vertebral artery and white arrow the right subclavian artery. **B.** 7.5 F Sheathless Eaucath (Asahi Intecc, Irvine, CA, US) knot 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 vascular retriever snare. **D.** The knotted catheter was straightened after sliding it 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