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A knotty problem of a central venous catheter

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Introduction

A knot formation is a potential complication that may occur with any type of intravascular catheter, though the incidence is rare. Numerous articles have documented knotting of a flow-directed pulmonary artery catheter [1–5]. Knotting of a pulmonary artery catheter around the other central venous catheter is also reported [6,7]. To our best knowledge, there are no reports concerning knot formation of a central venous catheter alone. We report a case in which a knotty problem with a central venous catheter alone developed and an attempt was successful in unknotting.

Case Report

In a 46-year-old woman with a ruptured aneurysm of the right internal carotid artery, emergency clipping of the aneurysm was scheduled. After induction of general anesthesia and tracheal intubation, a 14-gauge 7-cm steel needle with an over-the-shaft Teflon cannula Argyl, Medicut Catheter Kit, Tokyo, Japan) was inserted into the left femoral vein and a 16 gauge catheter was inserted into the inferior vena cava to monitor central venous pressure. Although slight resistance was encountered when the catheter was advanced about 15 cm, the catheter was inserted about 40 cm. During the operation in the supine position, central venous pressure was from 6 cm H_2O to 8 cm H_2O. After completion of the operation, we attempted to withdraw the catheter. When the catheter was pulled out 20 cm, resistance to further withdrawal was encountered. An abdominal X-ray revealed knotting of the catheter in the iliac vein (Fig. 1). Under fluoroscopy, a straight wire guide (Cook, Wire Guide TSF28, Bloomington, IN, USA) was inserted into the catheter but the guide wire could not be passed through the knot. The knotted catheter was pushed in the inferior vena cava from the iliac vein. By pushing the guide wire in the catheter several times, the guide wire passed through the knot. The knot was untied by pulling the catheter and pushing the guide wire in the catheter gently. The catheter and the guide wire could be pulled out completely.

Discussion

In this case, the knot was probably formed when slight resistance was encountered during the introduction of the catheter. The loose knot might have been tightened at the point of narrowing of the iliac vein during the withdrawal. We did not try to untie the catheter blindly because blind manipulation might have ruptured the iliac vein. It was fortunate that the knot could be untied by a straight wire guide.

When a knotted catheter is confirmed, the clinician should select the best approach for percutaneous unknotting the catheter. Knots in subclavian or jugular catheters usually can be untied by the femoral approach [8]. Useful equipment includes a straight or hook-shaped Teflon catheter, guide wires, deflecting wires, and catheters strengthened by a guide wire [8]. If the knotted catheter in the subclavian vein or the superior vena cava is carelessly pulled out, hemothorax may result. One can bring the knotted catheter down to the groin by using a deflecting wire via the femoral approach and then try to untie the catheter [9]. If the knot

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Fig. 1. The knotted catheter is seen in the left iliac vein

cannot be untied, one can use a Teflon catheter sheath, pull the knot against the sheath to reduce the size of the knot, and then remove the knotted catheter from the puncture site together with the sheath set [1,5]. If this maneuver fails, surgical removal is recommended.

Monitoring of central venous pressure has been widely used for surgical patients. However, one should be careful of knot formation whenever resistance to insertion is encountered on introduction of any type of intravascular catheter.

References

1. Daum S, Schapira M (1973) Intracardiac knot formation in a Swan-Ganz catheter. Anesth Analg 52:862–863
2. Pace NL (1977) A critique of flow-directed pulmonary artery catheterization. Anesthesiology 47:455–465
3. Fibuch EE, Tuohy GF (1980) Intracardiac knotting of a flow-directed balloon-tipped catheter. Anesth Analg 59:217–219
4. Lubliner Y, Miller HI, Yakirevich V, Vidne B (1984) Knotting of a Swan-Ganz catheter in the right ventricle. Heart Lung 13:419–420
5. Böttiger BW, Schmidt H, Böhrer H, Martin E (1991) Non-surgical removal of a knotted pulmonary artery catheter. Anaesthesist 40:682–686
6. Swaroop S (1972) Knotting of two central venous monitoring catheters. Am J Med 53:386–388
7. Wilson J, Freeman R (1993) A knotty problem with two central venous catheters. Anaesthesia 47:815
8. Cho SR, Tisnado J, Beachley MC, Vines FS, Alford WL (1983) Percutaneous unknotting of intravascular catheters and retrieval of catheter fragments. AJR 141:397–402
9. Dach JL, Galbut DL, LePage JR (1981) The knotted Swan-Ganz catheter: new solution to a vexing problem. AJR 137:1274–1275