



Successful Retrieval of a Partially Cut and Embolized Peripheral Intravenous Catheter from Cephalic Vein

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Authors' contributions

This work was carried out in collaboration among all authors. Author MR designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors CKPK and TPR managed the analyses of the study. Authors MR and TPR managed the literature searches. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Placements of peripheral intravenous (IV) catheters are very common in hospital admitted patients. Rarely, fracture or accidental cutting can lead to embolization of the distal segment. Difficult decision-making situations can arise while considering between open surgical or interventional procedures for retrieval, which, largely depends on the position, physical features of the embolized segment, and morbidity of the procedure. We report a case of successful retrieval of an embolized fragment of an IV catheter lodged in the cephalic vein with an interventional procedure. We illustrate detailed step-wise techniques applied for percutaneous retrieval of foreign body, using simplified tool with different interventional possibilities. All procedures were performed safely and without difficulty. No complication was noted during or after these procedures.

Keywords: Cardiovascular; embolization; interventional procedure; retrieval of foreign body; safety.

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1. INTRODUCTION

The introduction of devices, located completely or partially inside the body, is always associated with the risk of malpositioning and embolization. Common examples include venous catheter fractures, coronary stents, broken guide wires, and occluder devices. Peripheral venous catheters are widely used, although, are more commonly fractured due to their prolonged use. The inadvertent fracture and embolization of the fragment, despite advanced technique, may lead to serious complications [1].

2. CASE REPORT

A 35-year-old man was admitted to the emergency department with abrasions on the right elbow and hand following a road traffic accident. On arrival, he was conscious, cooperative with stable vital signs. There was no immediate evidence of head, chest or abdominal trauma. As a routine practice during observation,

a 16 gauge peripheral intravenous (IV) catheter (BD Venflon Pro, Becton Dickinson Infusion Therapy, Helsingborg, Sweden) was placed on his left forearm in cubital vein. While removing the hair on the forearm with a razor, proximal part of the peripheral intravenous catheter was accidentally cut leaving the distal portion inside. A tourniquet was immediately placed just above it to prevent distal embolization and surgery consultation was planned for retrieval options. Unfortunately, inadvertent removal of the tourniquet led the migration of the cut catheter further distally, and it was no more to be palpated.

Since the patient was admitted with trivial complaints, open exploration and, removal was not considered, as it would have increased the patient's morbidity. Accordingly, percutaneous removal was planned for retrieval. Fluoroscopy in the cardiac catheterization lab revealed the cut part of a catheter lodged in the left cephalic vein. (Fig. 1A)

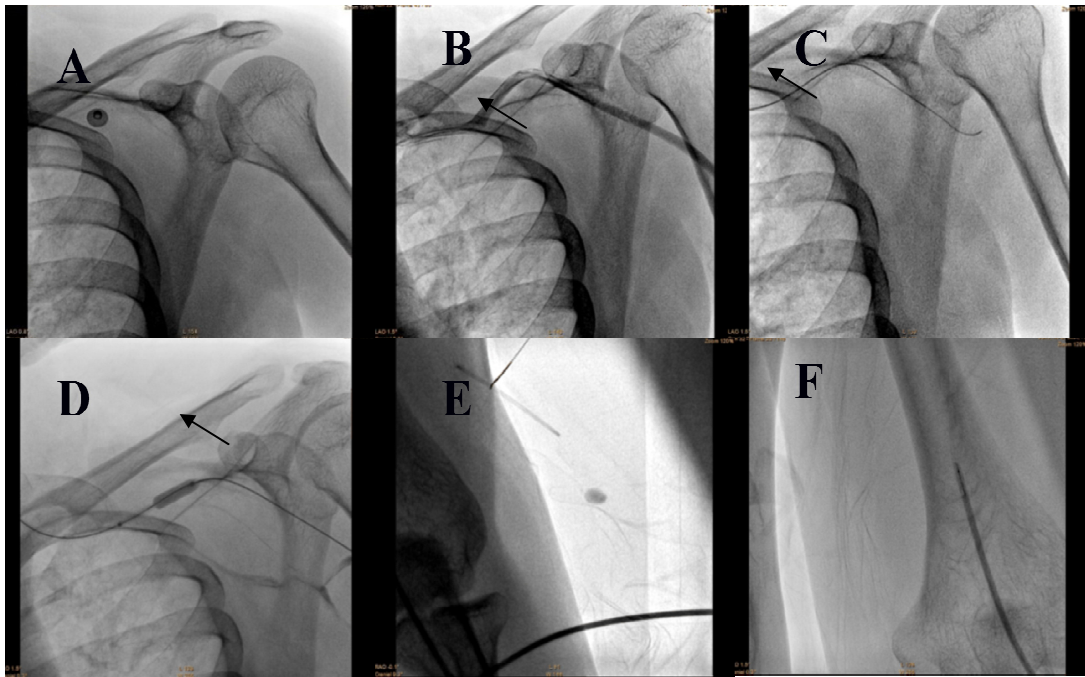


Fig. 1A: Fluoroscopy showing the cut portion of catheter in cephalic vein; B: Venogram showing cut catheter before the bend in the cephalic vein; C: A 150 cm angled 0.035" hydrophilic guide wire being passed through an introducer sheath inserted via left internal jugular vein; D: Peripheral balloon kept inflated at cephalic vein adjacent to subclavian vein to prevent the cut catheter from slipping forward; E & F: Foreign body snared with a micro snare passed through left antecubital vein

A venogram through another 16-gauge peripheral IV catheter (same manufacturer), placed in the left wrist, confirmed the position of the cut catheter in the cephalic vein. However, it was unable to pass the curve just before the joining left subclavian vein. (Fig. 1B).

First, the steps to prevent the distal migration of the catheter were taken by occluding the subclavian vein with a balloon. For that, Left Internal Jugular Vein (LIJV) was punctured, and a 6 French introducer sheath (Input introducer sheath, Medtronic Inc., Minneapolis, MN USA) was inserted so that the tip of the sheath is in subclavian vein. A 150 cm angled 0.035" hydrophilic guide wire (Radifocus® guide wire standard M type, Terumo Corp.) was passed through the introducer sheath into the left cephalic vein without disturbing the foreign body. (Fig. 1C).

Subsequently, a 6 X 20 mm peripheral balloon (Admiral Xtreme OTW 0.035", Medtronic Inc.) was passed over the Terumo wire and left inflated in the cephalic vein at the joining of the subclavian vein, to prevent the catheter from up migration (Fig. 1D).

A 6 F introducer sheath (Input introducer sheath, Medtronic Inc.) was inserted through the left antecubital vein. A check angiogram was done through the sheath to confirm that, there was no forward contrast flow when the balloon was inflated, eliminating the chance of further migration. A micro snare (Amplaz goose neck snare, 4 mm, ev3 Inc., Plymouth, MN, USA) was passed through the sheath and manipulated to the distal end of the embolized catheter. After a few attempts, it was caught by first encircle with the snare. Then, the catheter was advanced to close the loop. The snare along with the caught foreign body was pulled back into the sheath and finally outside the vessel led to the complete retrieval (Figs. 1E & F).

3. DISCUSSION

Placement of central venous access is a common practice in emergency department, additionally, embolization of these catheters or their parts is rare, constituting only about 1% of such complications. However, because of the number of procedures performed, central venous accesses are responsible for the majority of intravascular foreign bodies [1,2].

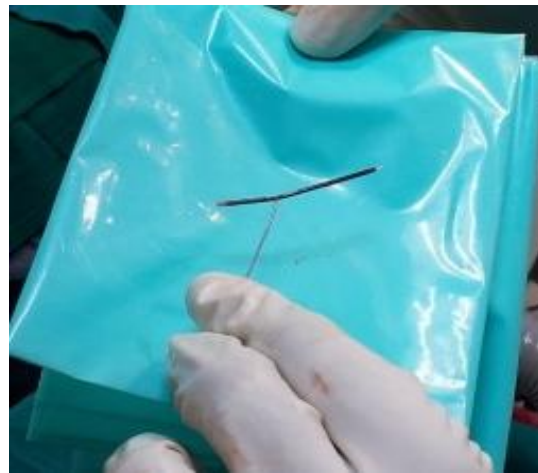


Fig. 2. The cut catheter

Device losses during the procedures do happen in spite of improvement in technology, causes being multifactorial –procedure- related, patient-related, and hardware- related. The embolized fragments, if left un-retrieved, can cause serious complications including pulmonary embolism, infection, obstruction of blood flow, cardiac perforation, and death [3,4,5], with a mortality rate between 24 and 60% [6,7]. Hence, the extraction of these foreign bodies is always recommended even in asymptomatic patients. There are different ways for removal of intravascular foreign body [8]. Percutaneous retrieval with low surgical and anesthetic risk has become a frequently used technique since it was first described 40 years ago, now largely replacing open surgical removal [9]. It is considered a gold standard treatment because it is a minimally invasive, relatively simple, safe procedure, with low complication rates compared to conventional surgical treatment [10].

An intravascular snare is one of the most commonly used devices to retrieve intravascular foreign body [11]. This technique is particularly useful when at least one free end of a fractured catheter is accessible. Although similar success rates have been obtained using the Dormia baskets or forceps, they are more rigid, need more expertise to use, and are associated with an increased risk of vascular damage [12].

There were some unique features in our case. The patient was admitted for trivial trauma and unfortunate events led to the embolization of peripheral IV catheter, leaving us with interventional options for retrieval. In addition, the capricious position of the cut catheter inside the

cephalic vein forced us to consider a balloon occlusion distally, as any manipulations here could have displaced the catheter further towards the heart. Hence, we used two access sites – the left jugular vein for the balloon occlusion, and the cephalic vein at the antecubital fossa for the sheath insertion, through which, the misplaced catheter was successfully snared out.

4. CONCLUSION

Foreign body embolism is rare but well known complications during medical procedures. This article illustrates detailed step-wise techniques applied for percutaneous retrieval of foreign body, using simplified tool with different interventional possibilities. Percutaneous retrieval has now become a frequently used technique for removing embolized catheter fragments.

CONSENT

As per international standard or university standard, patient's consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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