

INTRAVENOUS CATHETER FRAGMENTS: ENDOVASCULAR RETRIEVAL*

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Abstract

OBJECTIVE: Central venous access is an increasingly frequent procedure and intravenous catheter fractures and fragments embolization, although being rare, correspond to the most common intravascular foreign bodies. This study purpose is to show our experience in the removal of these foreign bodies employing endovascular techniques. **MATERIALS AND METHODS:** Retrospective analysis of ten consecutive cases in the last five years, including patients with ages ranging from 9 months to 67 years. **RESULTS:** The procedure was successfully performed in all the cases by means of different techniques and with no complication. Most common fragments lodgement sites were: right atrium, superior vena cava and left pulmonary artery. The retrieval of these foreign bodies by means of endovascular techniques is a relatively simple procedure when compared to the surgical alternative, and has been safely and successfully performed in countless patients. The available devices have proven quite effective and, among them, the loop snare is the most versatile. **CONCLUSION:** The high success rate with few complications reported, even in children, allows us to say that, whenever possible, intravascular foreign objects percutaneous extraction should be performed.

Notwithstanding, familiarization with the several techniques available is essential, allowing combinations and modifications, according to each situation.

Keywords: Vascular access ports; Foreign bodies; Embolism.

INTRODUCTION

The placement of central venous access is an increasing practice in medicine and embolization of these catheters or fragments is rare, representing only about 1% of complications⁽¹⁻³⁾. Despite this low incidence, the great number of central venous accesses makes them responsible for the great majority of intravascular foreign bodies⁽¹⁾.

The present study objective is to demonstrate our experience in the removal of intravascular foreign bodies by means of endovascular techniques in the last five years (ten patients).

MATERIALS AND METHODS

In the period between 1999 and March 2004, a group of ten consecutive patients with ages ranging between 9 months and 67 years (Table 1) received central venous access devices. All the procedures for placement of the catheter were performed by surgeons without imaging guidance.

The catheter fracture usually occurs during its insertion, but we had one case during a catheter removal (Table 1 – patient 8; Figure 3). Once the fracture was noticed and confirmed by a chest X-ray, the patient was immediately referred to our service of interventional radiology in an emergency character.

RESULTS

All the procedures were performed in an angiography facility and under anesthesia. By means of a percutaneous femoral venous puncture (right or bilateral), a 8F introducer (French) permitted the handling of the different materials required for the procedure. A 5F catheter and an exchange guide-wire (260 cm) were conducted until the guide-wire was positioned adjacent to the catheter fragment (foreign body). Then, the 5F catheter was removed and the desired device — basket (Figure 1) or loop snare (Figure 3) — was introduced on the guide-wire. At that moment, the intravenous foreign body was captured by the device, and then grasped and removed.

In all of the cases, the procedures were technically successful, with no complications. None of the procedures has taken more than 40 minutes, between puncture and retrieval.

In two patients (Table 1 – patients 5 and 9; Figures 2 and 4), due to the absence of a free end of the fragment, its initial mobilization by means of a pig-tail catheter was necessary, bringing the fragment to a more favorable position and allowing its removal by means of a loop snare (Snare Amplatz; Microvena, White Bear Lake, MN).

DISCUSSION

Fracture of central venous access catheter is a rare although serious complication that may lead to thromboembolism, sepsis, cardiac arrhythmia, pericardial effusion, myocardial lesion and bacterial endocarditis. Unretrieved intravascular foreign bodies may cause severe or life-threatening complications in up to 71% of patients⁽¹⁾, with mortality ranging between 24% and 60%⁽⁴⁾. Notwithstanding some patients remain completely asymptomatic, the risk of such complications always makes removal desirable.

The percutaneous retrieval of intravascular foreign bodies is a relatively simple process, when compared to the surgical alternative, and has proven to be a safe and effective procedure for countless patients, including children and preterm neonates⁽¹⁻¹¹⁾. The most usually reported incident occurring during this procedure is cardiac arrhythmia that is always of transitory nature and related to intracardiac manipulation. These fragments usually can be atraumatically and successfully removed, the loop snare being recognized as the most effective and preferred device for this purpose⁽¹⁻¹³⁾. Initially, our group opted for the basket (Figure 1) when industrially produced loop snares were not available. Since 2000, when they become available, it has been easy to note a change preference (Table 1) and currently the loop snare is our first option (Figure 3).

Most common fractured catheters lodging sites are the right atrium, the superior vena cava and the left pulmonary artery⁽¹⁻⁴⁾, the two first ones being most frequently observed in this series (Table 1). We have always been utilizing a 5F diagnostic catheter and a long guide-wire to reach the intravascular foreign body and then, by means of the guide, placing the device (loop snare or basket) into the position desired. Once the fragment is captured and, for being flexible and foldable, it may be removed through the 8F introducer sheath. When the fragment is lodged in a distant position (Figure 4) or with both extremities in contact with the vessel wall (Figure 2), it is very difficult or even impossible to capture it only with a loop snare. In this case, a 5F pig-tail catheter may be employed to enfold the fragment and bring it to a better position (Figures 2 and 4). With these approaches we were able to successfully remove all the fragments, but, if necessary, other techniques may be employed.

The interventional techniques for intravascular foreign bodies extraction have undergone significant changes over the years. Presently there is an array of devices available, like loop

snare, baskets, balloons, forceps, molded catheters, directable guide-wires and magnets. All these devices have proved quite effective in certain situations, the loop snares being the most versatile ones⁽¹⁻¹³⁾. The loop is at a right angle to the catheter (90°) and there is an array of snares sizes for an ideal adjustment to the vessel⁽¹²⁾.

CONCLUSION

The high rate of success and the low rate of complications, even in children, allow us to affirm that intravascular foreign bodies must be extracted whenever possible by means of percutaneous techniques. For this purpose, the availability of materials as well as the familiarization of the operating physician with the various techniques and materials are fundamental, permitting combinations and modifications to adapt them to the situation. Notwithstanding, sometimes creativity is an essential skill.

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CATETERES INTRAVENOSOS FRATURADOS

Tabela e Figuras

Table 1 Chronological order of ten consecutive patients included in this study and submitted to percutaneous retrieval of fractured venous catheter fragment.

No.	Sex	Year	Age	Catheter insertion	Intravascular foreign body lodging	Access/retrieval	Device(s)
1	M	1999	63 years	Right subclavian	Superior vena cava, right atrium	Right femoral	Basket
2	M	1999	67 years	Right subclavian	Right subclavian, superior vena cava	Right femoral	Basket
3	F	1999	51 years	Right subclavian	Superior vena cava, right atrium	Right femoral	Basket
4	M	2000	60 years	Left subclavian	Left subclavian, superior vena cava	Right femoral	Basket
5	M	2000	9 months	Right jugular	Superior vena cava, right atrium	Bilateral femoral	Pig-tail and loop-snare
6	F	2001	49 years	Left subclavian	Left subclavian, superior vena cava	Right femoral	Loop-snare
7	F	2002	41 years	Right jugular	Superior vena cava, right atrium	Right femoral	Basket
8	F	2002	2 years	Left subclavian	Superior vena cava, right atrium	Right femoral	Loop-snare
9	F	2003	58 years	Right subclavian	Right ventricle, right pulmonary	Bilateral femoral	Pig-tail and loop-snare
10	M	2004	32 years	Right jugular	Right pulmonary	Right femoral	Loop-snare

M, male; F, female.

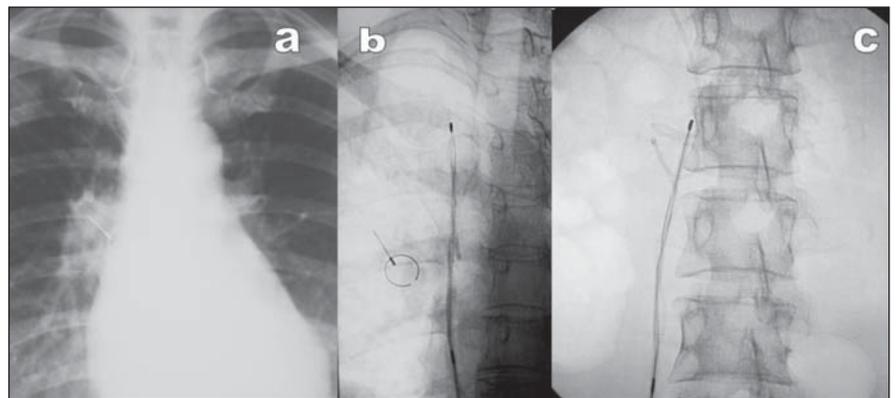


Figure 1. Chest X-ray showing port to the right and the free catheter on the right subclavian vein, superior vena cava and right atrium topography (a). A basket was utilized for capturing the catheter in the right atrium (b), the kit being extracted (c) through the right common femoral vein.

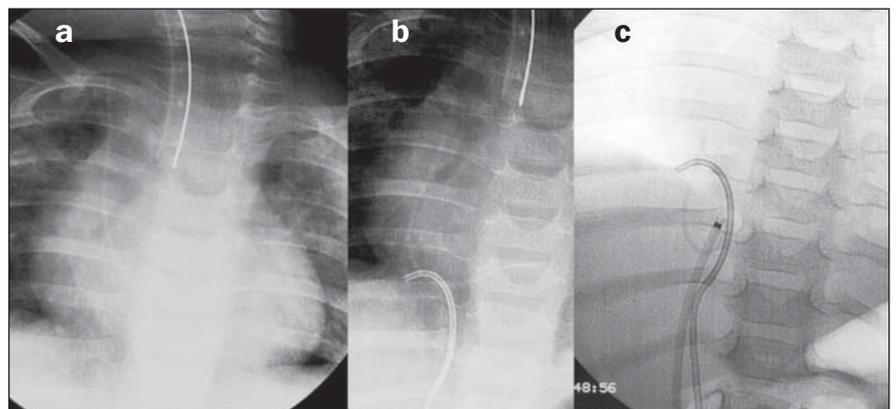


Figure 2. A catheter fragment is visualized on the right brachiocephalic venous trunk and superior vena cava topography (a). By means of an access through the right femoral vein, a 5F pig-tail catheter was engaged in the fragment and tractioned, bringing the fragment into the inferior vena cava (b), where a free end was grasped by a snare (c).

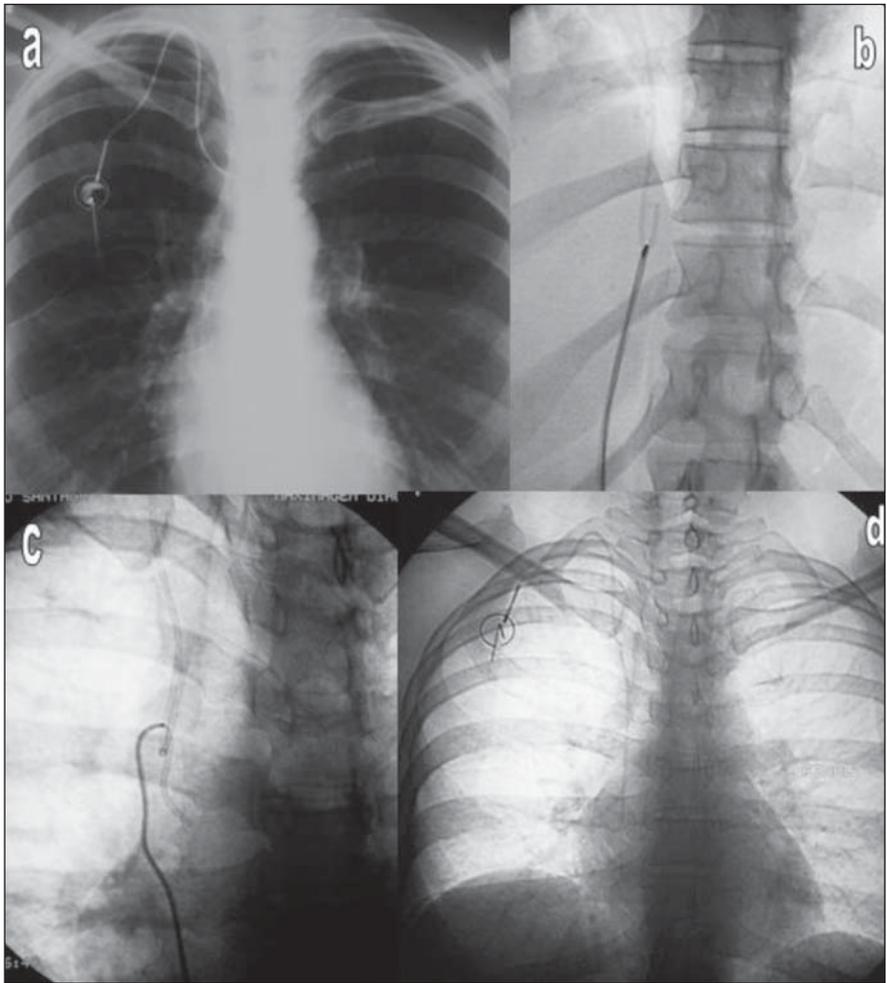


Figure 3. The patient was submitted to a port-type catheter exchange from the left subclavian to the right jugular. The surgeon has referred the patient to us because the left catheter had not been removed. The chest X-ray with contrast injection into the right port shows the catheter in the left brachiocephalic venous trunk and a foreign body in the superior vena cava (**a**). A loop-snare was employed to grasp and remove the foreign body (**b**). With a Mikaelson 5F catheter (**c**), the ill-positioned catheter was placed on the adequate positioning (**d**).

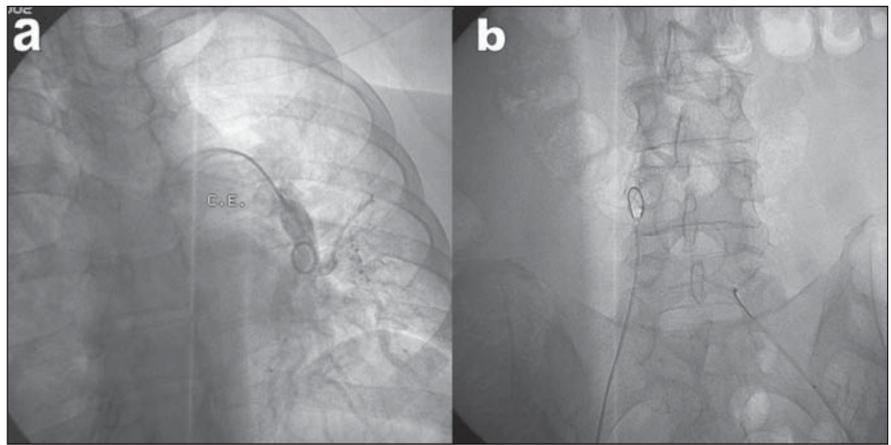


Figure 4. There is a catheter fragment in the left pulmonary catheter where a pig-tail 5F is being utilized for enfolding the foreign body and bringing it into the inferior vena cava (**a**). At this moment, a snare introduced through the contralateral femoral is utilized for grasping and removing it (**b**).