

Transluminal Removal of a Fractured and Embolized Indwelling Central Venous Catheter in the Pulmonary Artery

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Vascular catheters are associated with complications such as infection, thrombosis and stenosis. The embolization of a venous catheter fragment is a rare complication. A 39-year-old woman underwent placement of a totally implantable venous access device for chemotherapy to treat a recurrent liposarcoma of the left thigh. The "pinch-off sign" was noted on a routine chest X-ray but that was ignored. Three-months after implantation of the intravenous access device, the indwelling central catheter was fractured and embolized to the pulmonary trunk. The catheter in the pulmonary trunk was successfully removed through a percutaneous femoral vein approach using a pigtail catheter and goose neck snare.

Key Words : Catheter, Indwelling, Complications, Embolization, Foreign-body migration

INTRODUCTION

In 1984, Aitken and Minton were the first to document a case of catheter fracture and embolization secondary to a pinching effect between the clavicle and the first rib¹. Distal embolization of a fractured indwelling venous access catheter is a known, but rare, complication associated with these commonly used devices². We present a case of catheter fracture as a consequence of the pinch-off syndrome; this was successfully treated using a transluminal approach, in the pulmonary artery, with a goose neck snare and pigtail catheter.

CASE REPORT

A 39-year-old woman with a 10-year history of liposarcoma had an implantable intravenous access devices (Celsite ST 201,

8.5 Fr, B/Braun medical Inc, France) placed in the left subclavian area, using the standard technique, to allow the administration of adjuvant chemotherapy. Three-months after implantation of the intravenous access device, the patient complained of chest and jaw pain for several days; she denied palpitations, dyspnea and syncope. There was no jugular venous distension. Cardiac auscultation revealed a regular rate and rhythm without any murmur, gallops or rubs; a normal S1 and S2 was present. The chest X-ray two months prior to presentation showed a grade two "pinch-off sign" (Figure 1) and the chest X-ray on admission showed a fractured and embolized catheter in the pulmonary artery (Figure 2). Several days later, transesophageal echocardiography was performed and revealed no thrombus and spontaneous echo contrast in the right side of the heart and pulmonary artery. Computed tomography of the chest confirmed the catheter artifact in the pulmonary artery (Figure 3).

First a retrieval of the fractured fragment of the catheter was

• Received : November 28, 2005

• Accepted : March 23, 2006

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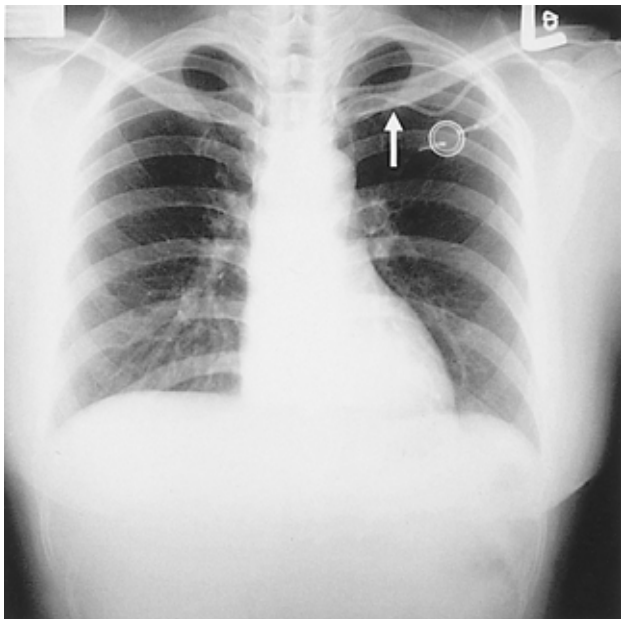


Figure 1. Chest X-ray shows minimal luminal narrowing of the catheter (arrow).

attempted via the right femoral vein with a goose neck snare (10 mm loop, er3, USA) an H1 catheter (5 Fr, Cook, USA). Although we could grasp the foreign body using a snare, it was impossible to retrieve it; the patient continued to complain of severe chest and jaw pain. We, therefore, changed the catheter with a pigtail catheter (5 Fr, Cook, USA). With accompanying fluoroscopic monitoring, we were able to successfully grasp the fragmented catheter (Figure 4) and to retrieve it (Figure 5).

At a Three-month follow up the patient was doing well without any complication detected.

DISCUSSION

An implanted central venous access device is frequently used for the administration of chemotherapy or parental nutrition. Most of the associated complications can be avoided by a careful approach to implantation and subsequent management⁴. The complication rate has been reported to decrease as experience with this device increases⁴; it has been reported to be 12~14% in studies with large numbers of patients^{5, 6}.

Catheter fracture is a rare complication associated with these devices, with an estimated rate of 0.1~1%^{7, 13}. Implantable central venous access devices placed via the subclavian vein may become obstructed by thrombosis, impingement against a vein wall, or a compression between the clavicle and first rib⁶. The latter has been referred to as the pinch-off syndrome¹. Chronic intermittent compression of the catheter between the

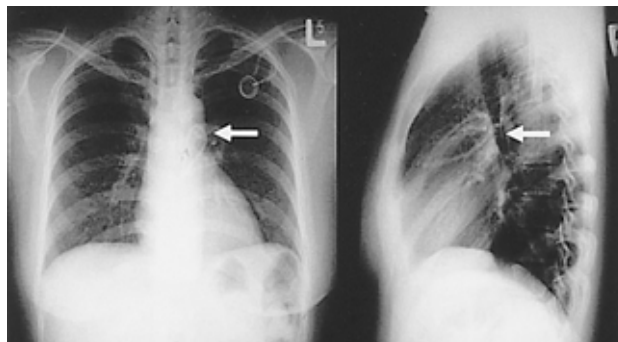


Figure 2. A. Fracture of the catheter over the first rib and beneath the clavicle (arrow), B. Fractured and embolized catheter in the pulmonary artery (arrow).

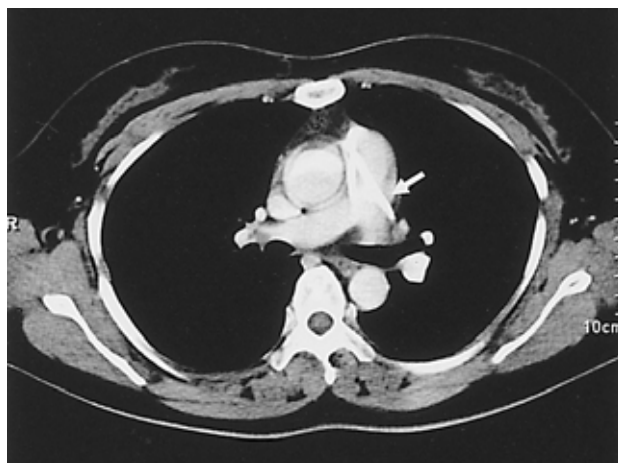


Figure 3. Computed tomography of the chest confirmed the catheter artifact in the pulmonary artery (arrow).

clavicle and the first rib, which can occur when the catheter has been inserted too far medially, can lead to catheter erosion and fracture (pinch-off syndrome)^{1, 8, 9}. At catheter insertion, the angle between the clavicle and the first rib is wide; the catheter can pass through this area, medial to the vein, before entering the subclavian vein. When a patient is in the upright position, the angle narrows and leads to a mechanical compression of the medially positioned catheter¹. When the catheter is inserted, by puncture of the subclavian vein using the Seldinger technique, the pinch-off sign is observed in 1.1~5.0% of cases⁹⁻¹¹.

A radiologic scale of catheter distortion was defined by Hinke and colleagues⁹; a grade zero refers to no compression and distortion, a grade one refers to an abrupt change in direction but no luminal narrowing, grade two indicates some degree of luminal narrowing, and grade three defines complete catheter fracture. In cases of catheter narrowing, patients should be followed carefully by chest radiography every four weeks, and

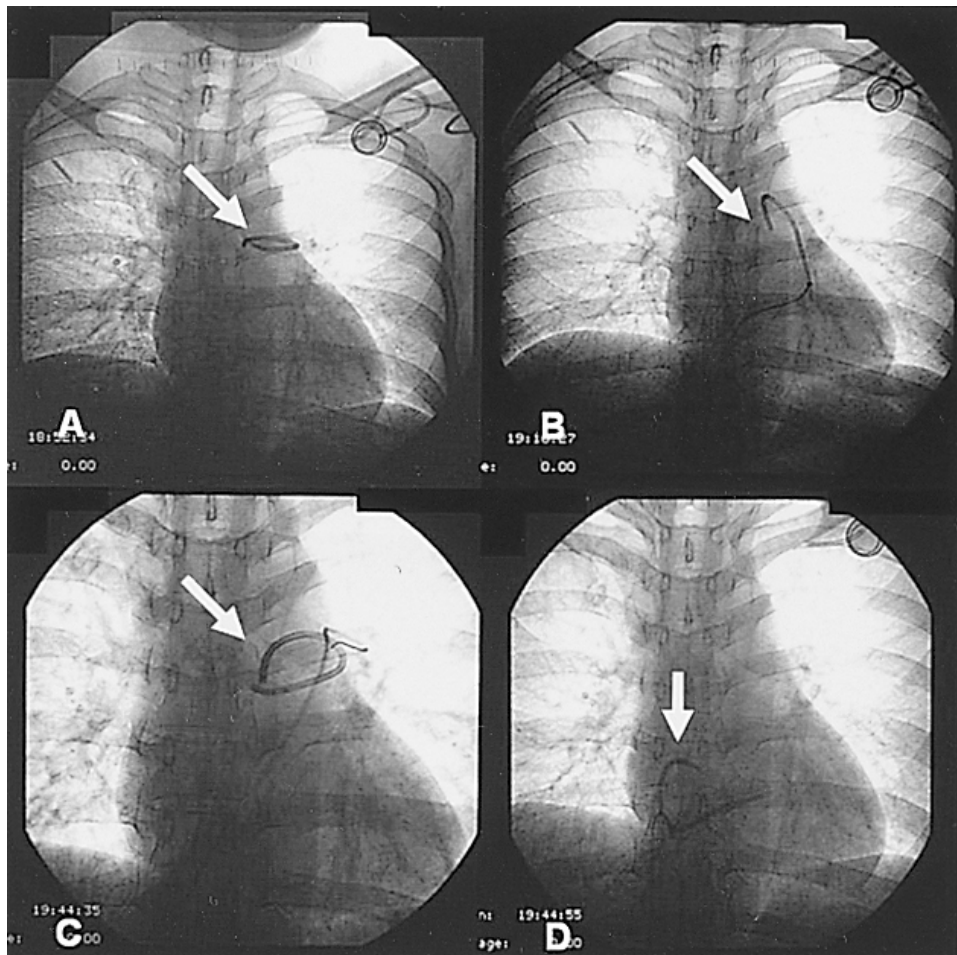


Figure 4. Successful grasping and retrieval of the venous catheter fragment. (A) Fragmented catheter in the pulmonary artery (arrow). (B) Failed retrieval of the fragment using a H1 catheter and snare (arrow). (C) and (D) Successful grasping and retrieval of the fragment using a pigtail catheter and snare (arrow).

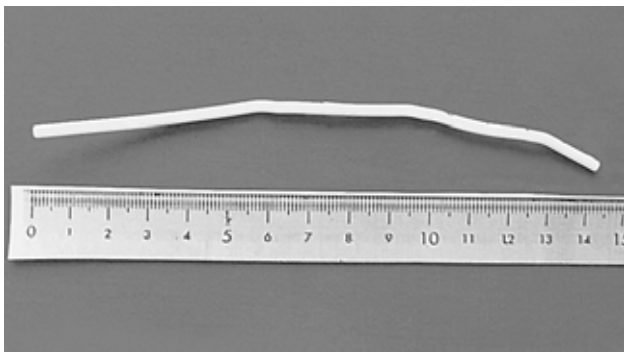


Figure 5. The 15 cm sized fragmented catheter after successful retrieval.

the catheter should be removed within six months following insertion¹¹. The presence of a fragmented central venous catheter should lead to immediate removal to prevent

thromboembolic events¹³. With the goal of avoiding such fractures, insertion of the catheter lateral to the mid-clavicular line is recommended. This technique ensures that the catheter, when crossing the critical point, is then located within the vein which provides some protection¹.

Denny and Frank reviewed 42 cases of fragmented central venous catheters from the surgery, radiology and oncology literature. Only two cases (5%) presented with symptoms described as “chest discomfort” in one case and “sudden onset of bilateral chest pain” in the other². The catheter fracture and embolization, in the asymptomatic patients, were identified on routine chest radiographs. By contrast, our patient presented with chest and jaw pain for several days; these symptoms were likely secondary to the mechanical irritation of the pulmonary artery by the embolized catheter.

Percutaneous removal of the catheter, and guide wire fragment, is generally a safe procedure. Several devices are

available for transcatheter retrieval, including grasping forceps and urinary stone baskets. But the most popular device is the goose neck snare⁸⁾. If the migrated catheter adheres to the myocardium, an open thoracotomy would be required for retrieval; an alternative approach without retrieval would be a course of warfarin administration⁸⁾.

In conclusion, radiological evaluation of an indwelling catheter, in any case of catheter malfunction, to rule out fragmentation is mandatory. Precautions to avoid the "pinch-off syndrome" are important. Retrieval of the fragments with angiographic intervention is a reliable procedure generally without complication.

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