

Percutaneous Removal of Intracardiac Retained Hemodialysis Catheter: A Rare Complication of a Commonly Used Procedure

Clinical Medicine Insights: Case Reports
Volume 15: 1–3
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DOI: 10.1177/11795476221078650



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ABSTRACT: Hemodialysis catheter fracture with distal embolization is a rare complication. The natural process of retained asymptomatic hemodialysis is unclear. This is a report of an iatrogenic fracture of the tip of the hemodialysis catheter in an adult patient who was successfully retrieved using an image-guided endovascular technique. In the event of catheter fracture with distal embolization, percutaneous retrieval is the treatment of choice.

KEYWORDS: Hemodialysis units, hospital, central venous catheter, asymptomatic diseases

RECEIVED: October 5, 2021. **ACCEPTED:** January 19, 2022.

TYPE: Case Report

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Introduction

Hemodialysis catheters are the most common vascular access for hemodialysis. Removal of these catheters is not without complications. Forced withdrawal of the catheter can cause it to break with subsequent distal embolization. Embolized foreign bodies are associated with a high incidence of complications. Mechanical complications related to removal are minimized if the surgeon is familiar with the proper technique. According to these facts, the described procedure is very sensitive and it is very important to avoid aggressive catheter removal to prevent complications. Percutaneous removal of an embolized catheter is a safe procedure with a high success rate.

Case Report

A 45-year-old man with diabetic nephropathy was on chronic hemodialysis 3 days a week using an 11-Fr double-lumen tunneled Hemo-Cath® (MedCOMP®, Harleysville, PA, USA), inserted into the right internal jugular vein. After 3 months of treatment, it was decided to remove the catheter due to the maturation of the arteriovenous fistula. The catheter was removed by a general surgeon at another center. He was asymptomatic when a routine chest radiograph, performed before a live donor kidney transplant was planned after 6 months, revealed embolization of a fractured catheter tip in the right atrium and ventricle (Figure 1). He was admitted to the cardiovascular surgery department of our hospital for the removal of the fractured catheter. The patient was transferred to the angiography unit for possible percutaneous retrieval. We administered intravenous heparin at a dose of 70 U/kg during the procedure and continue intravenously at a

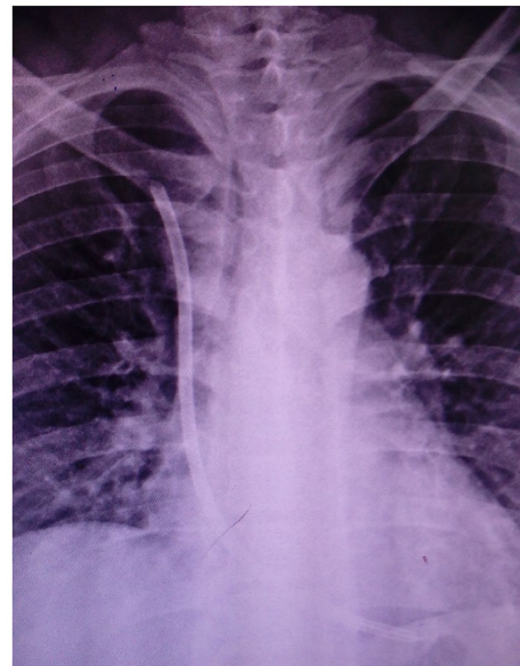


Figure 1. Chest radiograph showing catheter in the right atrium and ventricle.

dose of 5000 U every 6 hours until discharge. The right common femoral vein was accessed and an 18-F introducer sheath was inserted. Through the sheath and over a guidewire, a 6-F, 25 mm diameter Amplatz Goose Neck snare (Microvena, White Bear Lake, MN) was advanced over the distal tip of the catheter. The intravascular catheter fragment was then pulled down to the common femoral vein sheath (Figure 2).



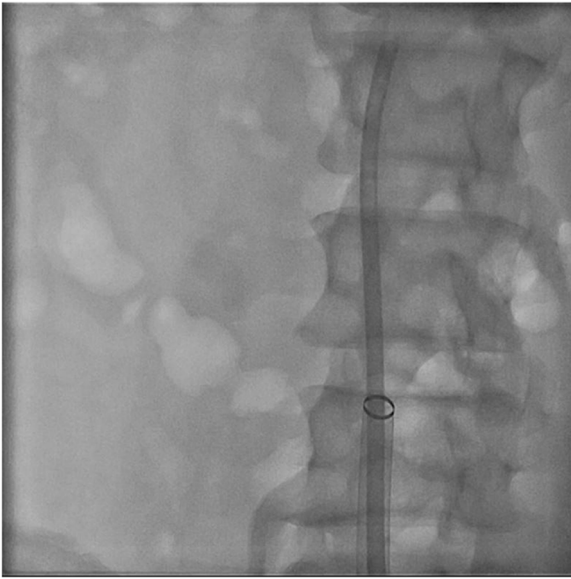


Figure 2. The catheter was extracted with a snare catheter after insertion of 18 French sheaths via the right femoral vein.



Figure 3. Catheter fragment.

The length of the broken catheter was 23 cm (Figure 3). He was discharged the day after the intervention and was well in the first month of follow-up control.

Discussion

Vascular access is an important aspect of treatment in patients with chronic renal failure. Catheter fracture and dislocation is an uncommon but life-threatening complication with an estimated rate of 0.1%.¹ Embolization of a catheter fragment was first described in 1954.² Forced manipulation or cutting a catheter by mistake during removal can result in a residual fragment inside the cardiovascular system. The potential complications of a retained catheter fragment include infection, thrombosis with potential embolization, mechanical valvular dysfunction, and arrhythmia. In terms of location with respect to the heart, mortality is the highest with embolized fragments located in the right atrium (RA)/right ventricle (RV), slightly

lower with embolized fragments located in the vena cava, and the lowest in the pulmonary artery.³ Perforation of the caval vein and migration of the catheter tip into the lung or mediastinal structures have also been reported.⁴ A catheter fragment in the heart may remain asymptomatic for years.⁵ Our patient was asymptomatic and the fractured catheter and distal embolization only became apparent on a routine preoperative chest radiograph. Catheter fracture and embolization can occur if the catheter is removed against resistance. The catheter should be withdrawn in a slow constant motion (no resistance should be felt). The physician should inspect the catheter for completeness. If the catheter is not intact, request urgent portable chest radiography to detect remnants of the catheter. We advocate that retrieval of the broken catheter be attempted to prevent possible complications. Interventional radiological techniques (using loop snares, hooked guidewire, and Fogarty balloon catheters) are used to retrieve the catheter and, in rare cases, surgical intervention may be necessary. However, there are potential risks of valve damage and fatal tachycardia during catheter retrieval. Physicians should be aware of these complications. Other potential causes of catheter fracture include traumatic catheter fracture⁶ and difficult removal of catheters that are trapped in the formation of fibrosis around the catheter. Additionally, fatigue of the catheter material from prolonged use contributes to in situ fracture, fragmentation, and distal embolization.⁷ The advantages of interventional techniques are significant in patients with comorbidity, who have recently undergone surgery, pediatric, or aging. Endovascular procedures for removal of the foreign body are highly effective, safe, and simple with a low rate of complications and minimal morbidity. However, the endovascular approach is the first-line treatment; surgery is usually proposed as a second option, because the endovascular approach may not always be appropriate or possible in retrieving the foreign body.

Conclusions

Our patient highlights a rare complication of removal of the hemodialysis catheter that could potentially lead to devastating sequences for the patient. It is important that surgeons are aware of this complication to facilitate its diagnosis and treatment. The most important take-home message behind this case is that these procedures should only be performed by properly trained physicians, be they surgeons or interventional nephrologists.


Author Contributions

All authors reviewed and approved the final manuscript.

Informed Consent

Written informed consent was obtained from the patient for the publication of this report.

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