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Technical Notes

Layered Sheath-Assisted Dissection and Retrieval of Stuck Port Catheters: A Single-Center Experience

Nityanand Jain[1,2], Piyush Chaudhary[2], Amit Shrivastava[2], and Ravul Jindal[2]

[1]Faculty of Medicine, Riga Stradinš University, Riga, Latvia, [2]Department of Vascular Surgery, Fortis Hospital Mohali, Punjab, India

Chemoports are often required for oncological patients requiring repeated blood draws and long-term drug therapy. However, complications such as dislodgement, fracture, thrombosis, and venous occlusion may occur if the ports remain unremoved when not in use. Nonetheless, existing techniques require multiple accesses or release of the stuck catheter tip to retrieve the catheter, making the procedure inconvenient. We present our experience with a technique using the Bard Denali inferior vena cava filter retrieval kit to remove a stuck or fractured chemoport catheter through a single vascular access. The technique was performed in two female patients with satisfactory results (complete retrieval of broken chemoports) and an event-free follow-up period. The entire procedure was completed within 15-30 minutes with fluoroscopic time under two minutes. The technique allows for better case management by simplifying the procedure, reducing radiation, and improving workflow efficiency in the operating room.

Key Words: Adhesion, Broken, Chemo port, Central venous catheters, Interventional radiology

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Corresponding author: Nityanand Jain
Faculty of Medicine, Riga Stradinš University, 16 Dzirciema Street, Kurzemes rajons, Riga 1007, Latvia
Tel: 371-67060897
E-mail: nityapkl@gmail.com
https://orcid.org/0000-0002-7918-7909

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INTRODUCTION

Implantable vascular access devices or ports provide significant comfort and convenience for chronically ill patients by reducing the need for repeated venipunctures, which are often necessary for frequent blood draws and long-term medication administration [1]. Additionally, the subcutaneous location of these devices reportedly lowers infection rates, increases compliance, and improves quality of life [2,3].

Although easy to place and operate, port maintenance is critical to avoid complications with nearly 15% of patients developing a complication related to the port [2,4]. For this reason, the guidelines recommend proper port maintenance, including heparinization after each use and removal during prolonged periods of inactivity. The latter is required as during long term inactive periods, a fibroblastic sleeve forms around the outside of the catheter, adhering it to the surrounding tissue [5].

Surgical approaches, including venotomy and median sternotomy, are no longer recommended for stuck port retrieval due to their invasive nature. Currently, endovascular retrieval is the preferred procedure, including techniques such as using a guidewire to exert direct force on the catheter by applying a combination of 'pull-out' and 'push-in' forces along a guidewire, pushing the catheter via a dilator during snaring, utilizing a pigtail catheter with a snare, and endoluminal dilatation with a balloon [6-9].

However, these techniques have known limitations and make the procedure inconvenient to perform. For example, with the simple snare technique, slippage of the catheter occurs frequently. In alternative methods like ballooning [9], patients may experience severe pain and discomfort (despite sufficient management), and cardiac arrhythmias are com-

monly observed.

Additionally, the two-step retrieval procedure and its modified versions all carry the risk of the free end of the dislodged catheter passing into the heart, making it impossible to retrieve the entire catheter [8]. Furthermore, in techniques that involve squeezing forces, the use of excessive force may lead to further fracture of the dislodged catheter or puncturing of the vessel wall [6]. Finally, most of the procedures described require multiple access points, which is associated with prolonged hospital stays, higher costs, and increased risk of infection.

Herein, we present our experience with a technique that does not require loosening the stuck catheter tip to capture the catheter. Furthermore, the technique requires only a single vascular access for the removal of the stuck or broken chemoport catheter. The Institutional Review Board (IRB) requirement was waived by the institutional IRB. Written informed consent was obtained from all participants for publication of the results and participation in the study.

TECHNIQUE

We used the Bard Denali inferior vena cava (IVC) filter retrieval kit, a triple assembly of 6 French Snare Catheters, 9 French Retrieval Sheaths, and 11 French Access Sheaths [10]. The 6F introducer sheath was inserted through the right common femoral vein under local anesthesia and ultrasound guidance. A guidewire (0.035 inches) was advanced to the IVC-right atrium junction using a 5F Judkins Right support catheter. The guidewire was removed and replaced with a stiff wire. The support catheter and the 6F sheath were then removed over the wire. At the IVC-right atrium junction, an 11F access sheath was placed over the stiff wire, and a 9F retrieval sheath was inserted into it.

The broken chemoport was secured with the snare loop after removing the stiff wire (Fig. 1). Chemoport catheter traction was performed with the snare wire followed by adhesion dissection with a 9F sheath. Dissection was done along the chemoport catheter tract until the whole stuck or fractured chemoport was freed and contained within both sheaths. The snare catheter and 9F sheath were removed and a venogram was taken from the 11F sheath to assess procedural complications. The sheath was removed, and manual compression was applied for five minutes to achieve hemostasis at the access site. 5000 IU heparin was administered intraoperatively.

Herein, we share our experience with this technique with two patients (Fig. 2). The first is a 43-year-old female patient who underwent chemoport placement in 2018 at our institute via left internal jugular vein access for breast carcinoma. In 2022, the port was found to be malfunctioning, and palpation of the port catheter at the neck suggested a partially broken catheter. These findings were confirmed by a chest X-ray. The patient was referred to our department for port removal. With a small incision in the left neck, an attempt was made to grasp the partially broken catheter. However, we were unsuccessful due to adhesions. Hence, through the right femoral vein, the stuck catheter was grabbed with a snare, followed by slow dissection in the catheter line with a 9F sheath as described. After removing the catheter, an incision was made on the port side, and the port and part of the catheter were removed. The entire procedure was completed in 15 minutes. Fluoroscopic time was approximately 1 minute and 25 seconds. The patient was discharged in stable condition after four hours of observation.

The second patient is a 70-year-old female patient who underwent chemoport placement using left subclavian access for breast carcinoma in 2018 at our institute. In 2022, an unsuccessful attempt (due to adhesions) was made to remove the port in another department. The patient was then referred to our department for port removal. An incision was made over the chemoport insertion site, a 0.035 inches guidewire was placed in the catheter, and the port was removed. The right femoral access was obtained, and the removal assembly was placed as described. The snare catheter was used to grab part of the stuck catheter, followed by slow dissection along the line of the catheter by 9F sheath. The entire procedure was completed in 25 minutes. Fluoroscopic time was approximately two minutes. The patient was observed for 24 hours and discharged in stable condition.

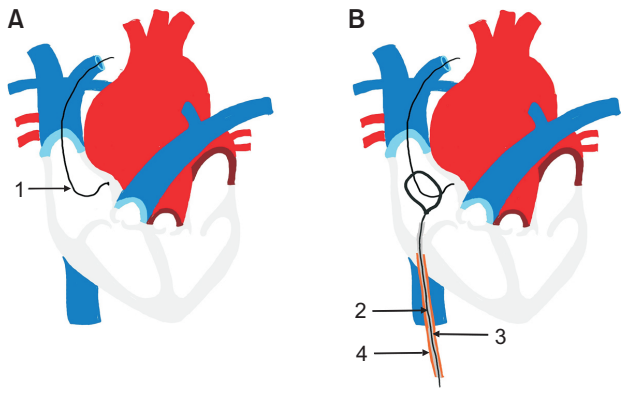

Fig. 1. (A) Dislodged chemoport in the right atrium (number 1); (B) the retrieval technique using 6F snare wire (number 2), 9F retrieval sheath (number 3), and 11F access sheath (number 4) from the Bard Denali inferior vena cava filter retrieval kit.

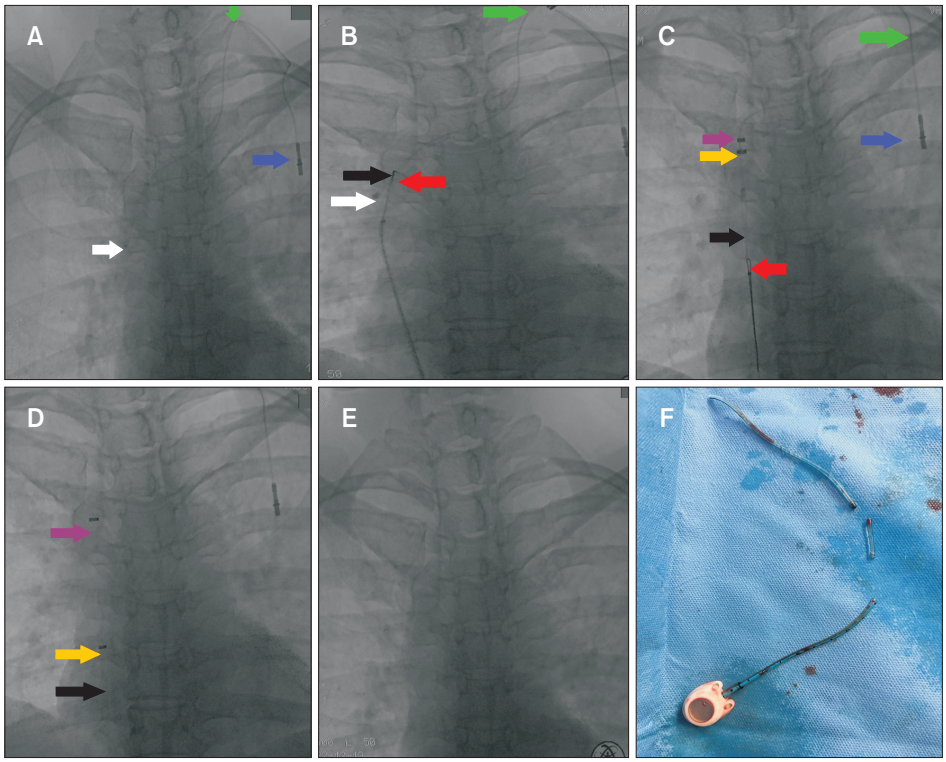

Fig. 2. Fluoroscopic image showing step by step illustration of the procedure in a 43-year-old female patient. (A) Visualization of the broken chemoport catheter; (B-D) securing the free tip of the port catheter with the snare loop and containment within both sheaths; (E) post-procedural fluoroscopic image showing complete removal and no complications; (F) retrieved broken port. Note the chemo port (blue arrow), broken part of catheter (green arrow), free tip of the catheter (white arrow), grabbed portion of catheter (black arrow), snare (red arrow), 9F sheath (violet arrow), and the 11F sheath (yellow arrow).

DISCUSSION

Several techniques have been described for the retrieval of stuck or broken chemoports. The need for multiple access or the release of the stuck part of the catheter to be caught in the snare for removal make the procedure inconvenient and high-risk. A single-center study reported that around 16% of patients develop complications during removal of the stuck port. Among them, complete port retrieval was not possible in 1%-2% of patients despite venous access incision [11]. In such cases, although the port can be left in situ, doing so is concerning due to limited long-term follow-up data on complications and quality of life issues [12].

Our technique offers multiple advantages in comparison to the previously described techniques in the following ways: (1) it allows adhesions to be dissected with a 9F sheath along the line of the snare catheter, eliminating the need to take another dilator access and reducing the number of access-related complications like bleeding and infection; (2) there is no need to grasp the free end of a broken or stuck chemoport catheter, eliminating the need for another avenue of access for the pigtail. Once any part of the catheter is grasped by the snare, even if the catheter is looped, it is large enough to effectively minimize the chance of displacement; (3) squeezing or crushing forces do not need to be applied; this prevents fracturing of the catheter or puncturing into the vessel wall or heart tissue; (4) the procedure can be performed under local anesthesia and is less time-consuming, thereby reducing radiation exposure and improving the operating room or Cath-lab workflow; and (5) all assembly can be managed by a single operator for better workflow and staffing.

Nonetheless, our experience with this technique remains limited with a small number of cases. Over the past year, we have followed this technique in over 20 other patients and have achieved the desired clinical outcomes in all cases. However, the technique has some limitations that should be considered. Firstly, it needs to be performed in an Interventional Radiology Suite, limiting its utility in low-resource settings. Secondly, in cases of venous stenosis, a second access might be required to retrieve the port. Thirdly, in cases where a chemoport catheter is dislodged without a free end available to grasp with a snare, the technique might require modification. In such a situation, the guidewire needs to be passed with another catheter below the chemoport so that the snare can be caught around the catheter. Next, since most of the broken chemoport catheters have broken ends inside the vein, passing the internal wire of the chemoport catheter may prove challenging. This may present a risk of catheter fracture due to mismatched direction while pushing the 9F sheath for dissection. Finally, as with other conventional techniques, there is a small risk of emboli, perforation, and loosening of the sheath.

CONCLUSION

Our experience with the Bard Denali IVC filter retrieval kit has largely been positive, with fewer post-operative complaints and superior surgeon and patient comfort. This technique will enhance the management of complex cases before deciding to leave the catheter in place. Future trials to investigate the technique's efficacy and safety should be conducted.

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CONFLICTS OF INTEREST

The authors have nothing to disclose.

ORCID

Nityanand Jain
https://orcid.org/0000-0002-7918-7909
Piyush Chaudhary
https://orcid.org/0000-0001-8481-0518
Amit Shrivastava
https://orcid.org/0000-0003-3328-4911
Ravul Jindal
https://orcid.org/0000-0003-2339-9627

AUTHOR CONTRIBUTIONS

Concept and design: RJ. Analysis and interpretation: NJ, RJ, PC. Data collection: RJ, PC, AS. Writing the article: RJ, AS, NJ. Critical revision of the article: all authors. Final approval of the article: all authors. Statistical analysis: NJ. Obtained funding: NJ, RJ. Overall responsibility: NJ, RJ.

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