Percutaneous Retrieval of an Intracardiac Migrated Nitinol Stent with Endovascular Biopsy Forceps

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Abstract
Intracardiac stent migration is a rare but potentially fatal complication of endovascular stenting. A patient was referred for right brachiocephalic vein stenting for dialysis access venous stenosis. The stent migrated to right atrium upon deployment. Stent extraction was attempted with gooseneck snares but failed. Two endovascular biopsy forceps were then introduced and fractured the stent into two parts for removal. The patient was stable during the procedure and was subsequently discharged. No adverse cardiovascular event occurred. This case report demonstrates the usefulness of the strong gripping capability of endovascular forceps to retrieve a migrated stent that could not be approached by snare technique.

Case Report
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ABBREVIATIONS
SVC: Superior Vena Cava; IJV: Internal Jugular Vein; CFV: Common Femoral Vein; ECG: Electrocardiograms

INTRODUCTION
There is an increasing role of endovascular stenting in maintenance of vascular access patency for chronic hemodialysis. However, such technique is not without risks. Stent migration is one of the reported complications. Snare technique has been widely described as a safe and effective method for percutaneous retrieval of endovascular foreign bodies [1-6]. The use of endovascular forceps as the primary instrument for migrated stent removal was not as commonly reported in literature. We report a case of successful percutaneous extraction of an intracardiac migrated self-expandable nitinol stent with the use of endovascular biopsy forceps. Institutional review board approval and inform consent are not required for case reports at the performing institution. The report was performed according to the World Medical Association Declaration of Helsinki.

CASE PRESENTATION
A 52-year-old female patient was referred for right brachiocephalic vein stenting. She suffered from recurrent stenosis of the vein despite multiple balloon angioplasties. She had been on hemodialysis via right arm arterio venous fistula for 10 years due to chronic renal failure, with underlying systemic lupus erythematosus and membrano-proliferative glomerulonephritis.

Diagnostic right subclavian venogram before the procedure demonstrated a tight occlusion at the junction of superior vena cava (SVC) and right brachiocephalic vein (Figure 1). Attempt to cannulate the obstruction from femoral approach was unsuccessful. Balloon angioplasty with a 10mm balloon was therefore performed via right cephalic vein. The stenotic part measured 9mm in caliber on post-angioplasty angiography. A 12mm x 40mm self-expandable nitinol stent (SMART, Cordis endovascular, Warren, NJ, USA) was deployed through the same approach (Figure 2a). However, the stent jumped forward upon release and migrated to right atrium (Figure 2b). A 0.035-inch angled hydrophilic guide wire (Glidewire, Radifocus, Terumo

Figure 1 Right subclavian venogram before balloon angioplasty. Occlusion was noted at the junction of right brachiocephalic vein and superior vena cava (arrow). SVC could not be opacified. There were dilated collaterals (arrowheads).

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Submitted: 13 June 2017
Accepted: 28 June 2017
Published: 30 June 2017
ISSN: 2333-7095
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OPEN ACCESS
Keywords
• Percutaneous retrieval
• Stent migration
• Intravascular objects
• Forceps
Medical, Tokyo, Japan) was immediately applied across the stent to prevent further stent migration into right ventricle and pulmonary arterial system (Figure 2c).

16Fr introducer sheaths were inserted to right internal jugular vein (IJV) and right common femoral vein (CFV) respectively. Stent extraction was attempted by using 6Fr 20mm gooseneck snare catheters (Amplatz, EV3 Endovascular, Plymouth, MN, USA), which were introduced from the venous sheaths. However, the snares failed to pass over the ends of the stent because of its large size. Its position was unfavorable, with no free edges available in right atrium. 7Fr standard biopsy forceps (Cordis, Johnson and Johnson, NJ, USA) were then introduced to grasp the ends of the stent through the venous sheaths. Attempts for repositioning of the stent with the forceps were unsuccessful. Therefore, the stent had to be torn into two parts by the two forceps and retrieved through the venous sheaths (Figures 3a,3b). No residual foreign body was detected.

Patient remained asymptomatic and stable during the procedure. Serial electrocardiograms (ECG) and troponin I levels were normal. No adverse cardiovascular events occurred. Patient was discharged uneventfully.

DISCUSSION

The role of metallic stent in maintaining patent hemodialysis access has been increasing. The occurrence of related complications such as stent migration is likely to rise consequently. Although intracardiac migration of endovascular stent is uncommon, potentially catastrophic complications...
Intrinsic weakness of the stent, relating to its open-cell structure, has previously been reported. It was explained by the inability of the stent to follow the endovascular curvature [3], thus it is less traumatic to vascular wall. However, a snare does not possess gripping ability. It can be difficult for the loop to pass over an object that gooseneck snares failed to extract. Force can be stored at the stent delivery system when it encounters acute turn, such as at the junction of subclavian vein and brachiocephalic vein in this case. The force might push the stent into the right atrium during deployment. Therefore, femoral approach, which is relatively straight, would be safer and more stable for the delivery system. Also, with femoral approach, the direction of forward jumping would be away from right atrium [5].

In summary, a case of successful percutaneous extraction of an intracardiac migrated nitinol stent by endovascular biopsy forceps was reported. The grasping ability of endovascular forceps made it useful in retrieving an object that gooseneck snares failed to extract.

REFERENCES


Cite this article