NEGLECTED RETAINED CENTRAL VENOUS CATHETER GUIDEWIRE COMPLICATED WITH GUIDEWIRE RUPTURE DURING RETRIEVAL PROCESS AND ITS BAILOUT TECHNIQUE

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ABSTRACT:
Central venous catheter insertion is a commonly performed procedure. This catheter is used to administer drugs and fluid, especially in critically ill patients, and monitor central venous pressure. We present a case of a retained guidewire for 17 months which was found incidentally from the abdominal and chest radiograph. We retrieved the retained J-tip guidewire using four loops retrieval snare. The retrieval process was complicated with the rupture of the guidewire, causing the unwinding of its outer sphere, leaving the inner monofilament dangling in the heart chamber. In this case report, we would like to describe the initial retrieval technique, which was failed and its bailout procedure.

Keywords: Guidewire retention, Intravascular, Intracardiac, Foreign body, Fracture guidewire, Retrieval technique, Bailout procedure.

INTRODUCTION:

A retained guidewire is not an uncommon condition. Usually, it is detected immediately during insertion and urgently retrieved. In certain situations, the retained guidewire is remained unnoticed and detected incidentally during later imaging. The neglected guidewire needs to be removed immediately to avoid guidewire-related complications [1, 2]. Endovascular intervention is a method of choice for removing the guidewire as it is highly advantageous for both the patient and the surgeon [3]. Although endovascular guidewire retrieval is a simple procedure, the complication may occur, especially in inexperienced operators.

CASE PRESENTATION:

A 34-year-old lady with underlying Type 2 Diabetes Mellitus and dyslipidemia presented with abdominal pain and prolonged fever was admitted for recurrent multiple splenic abscesses. During admission, a J-tip guidewire was noticed on her chest and abdominal radiograph (Figure 1). She had a similar presentation to a district hospital 17 months ago, during which a femoral venous catheter was inserted for long-term intravenous antibiotics administration. She was discharged well after the completion of antibiotics. She otherwise has no other symptom related to the neglected guidewire.

The patient was referred to the interventional radiology team to retrieve the retained guidewire. Ultrasound assessment of the femoral and internal jugular vein was performed and showed no evidence of thrombosis. The right femoral vein was used as the venous access.

Guidewire Retrieval

The retained guidewire was retrieved using a 6Fr snare loop catheter (CloverSnare^{TM}, 4 loops

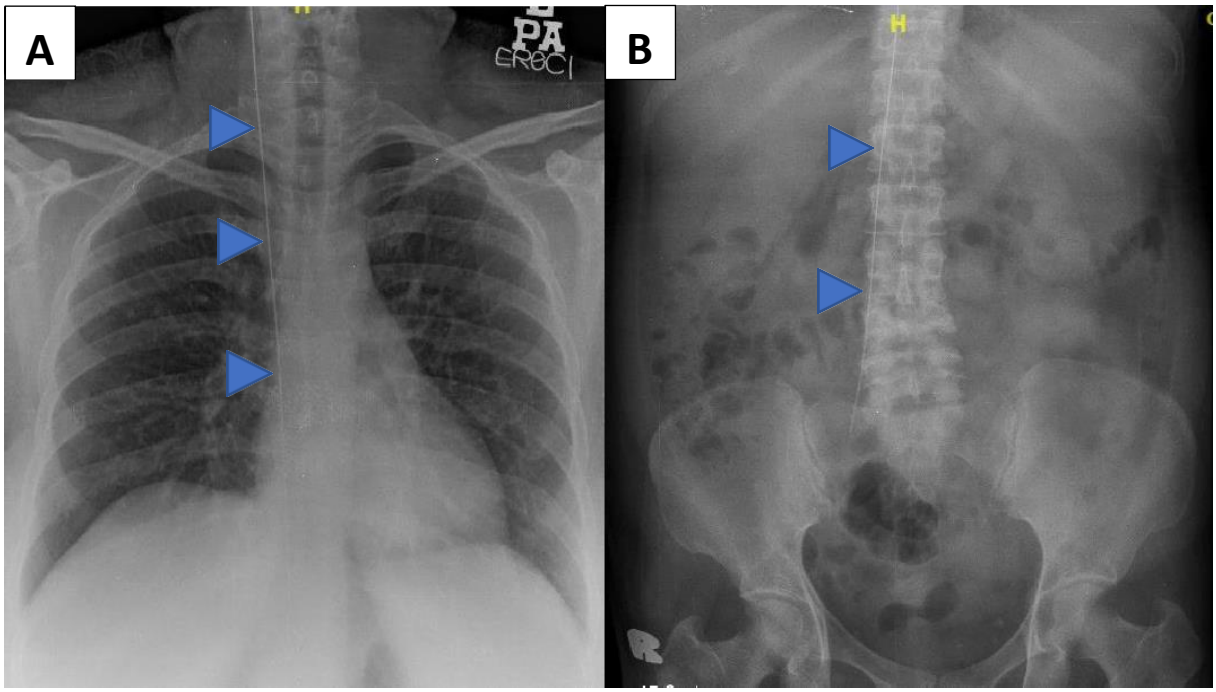

Figure 1: Figure 1: The chest (A) and abdominal (B) radiograph show the neglected J-tip guidewire (arrowhead) likely in the right internal jugular vein extending to the inferior vena cava (IVC).

vascular retrieval, Cook Medical USA). This retrieval system consists of a four-loop snare catheter with 8Fr and 10Fr sheaths (Figure 2).

The snare catheter was used only with the 8Fr inner sheath. The initial attempt to grasp the distal tip of the retained guidewire in the right common iliac vein was failed, likely due to the tip embedded in the vessel wall. Then, a decision was made to snare the proximal tip in the right internal jugular vein. The floppy J-tip part of the guidewire was able to catch using the snare. A resistance was felt during the attempt to retract the snare and the guidewire into the sheath. Force was used, and the floppy part of the guidewire was snapped during the manoeuvre (Figure 3). The snare catheter and its inner sheath were removed as a whole to recover the broken guidewire segment, leaving its main bulk and inner monofilament floating in the right internal jugular vein.

A subsequent attempt was made to snare the remaining guidewire. The unwinded guidewire and the monofilament were gripped using the snare and were engaged with the sheath. The system was slowly withdrawn. However, the monofilament was stretched and dislodged during this manoeuvre, causing dangling of the unwinded outer spiral and inner filament of the catheter in the right atrium (Figure 4).

Another attempt was made to snare this dislodged guidewire and monofilament. It was difficult to snare the monofilament due to the constant motion in the heart chamber. The snare was placed adjacent to the filament as a solution, and a twisting motion was performed to entangle it. The snare then was engaged with the inner sheath (8Fr), and some traction was applied. The bigger (10Fr) outer sheath was used this time. This sheath was advanced beyond the inner sheath and distally over the rest of the guidewire. The snare, inner sheath and the guidewire were removed as a whole, leaving the outer sheath in the vena cava (Figure 5). Post-procedural angiographic run and radiograph showed no remaining foreign body.

DISCUSSION:

Central venous catheterisation is a commonly performed procedure. The central venous catheter is used mainly for administering intravenous medications, fluids and parenteral nutrition. It is also used for hemodialysis and monitoring haemodynamics variables [4].

The most common reported guidewire related complications are cardiac dysrhythmias, cardiac conduction abnormalities, and, perforation of the vessels or heart chamber, kinking, looping and knotting of the wire, breakage of the tip of the guidewire and also complete loss of the guidewire within the vascular system [1, 2]. Broken guidewires can migrate intravascularly and cause fatality in up to 20% of the cases [5]. In our case,

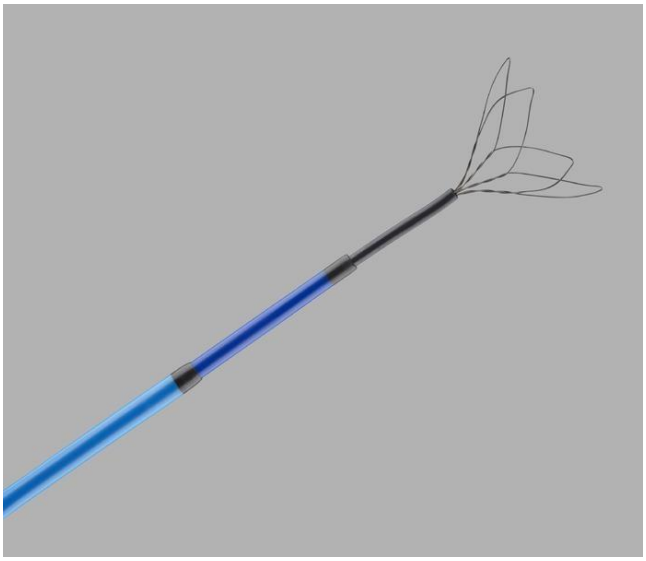

Figure 2: CloverSnareTM, 4 loops vascular retrieval system with 6Fr nitinol snare (black), 8Fr inner (dark blue) and 10Fr outer (light blue) introducer sheaths.

The guidewire remained unnoticed for almost17 months. It has not been detected because the patient did not have any symptoms and had no admission to the hospital. The guidewire consists of inner single filament core wire, covered by surrounding coiled wire. The attachment site of the core and outer wire is only at its two ends—no other attachment point between the coiled and core wire [6]. Hence, when the tip of the guidewire is fractured, it may unwind the whole outer sphere (Figure 6 and 7).

Many factors can increase the risk of retention of the guidewire. Some examples that usually occur in clinical practice include distraction during a procedure, high workload of the operator, lack of experience, and lack of supervision. Among these, lack of supervision is the main risk factor usually among trainee doctors [7].

A retained guidewire can be removed either by open surgery or endovascular intervention. The latter is highly advantageous for both the patient and the surgeon [3]. Removing the guidewire can be difficult if it has been epithelialised and fixed. Manoeuvres performed in such cases are the main factors for success. Despite lower risk in endovascular, serious complications still can happen. Therefore, close haemodynamic monitoring is essential with the presence of a surgical standby team is required during a procedure [3]. Surgical removal is indicated when the percutaneous approach is unsuccessful and unavailability of such facilities [5].

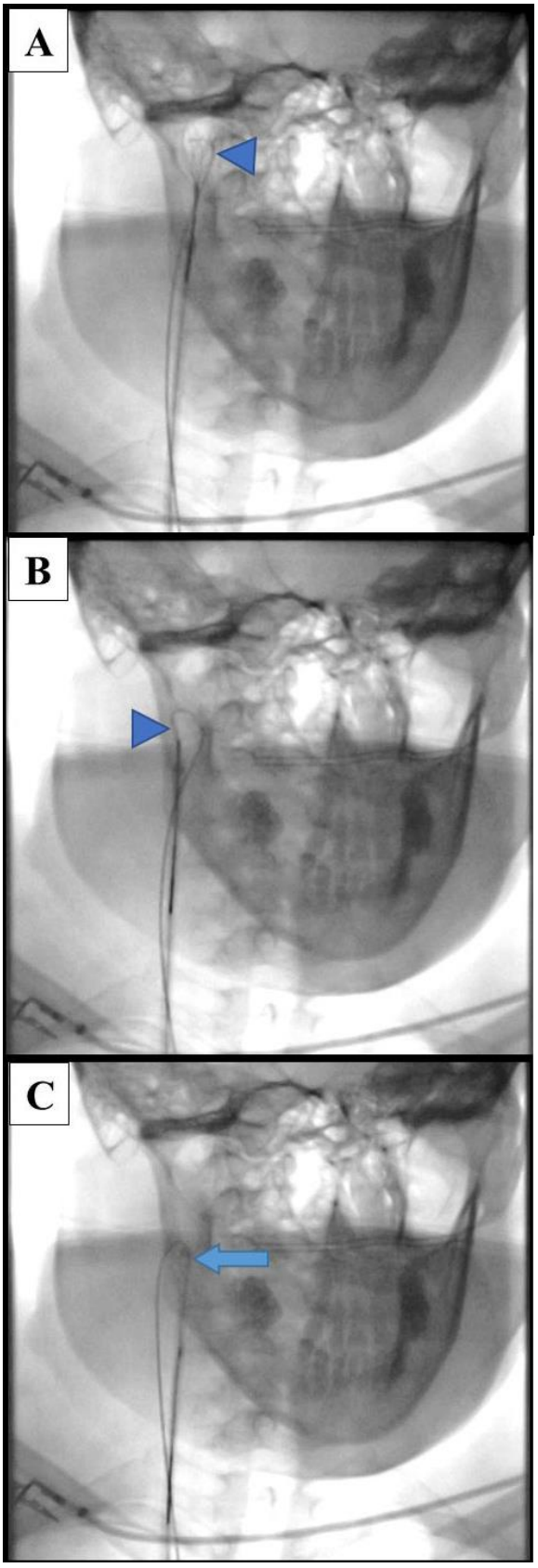

Figure 3: Initial attempt of snaring from the proximal part of the retained guidewire inside the internal jugular vein. (A, B) The floppy tip of the guidewire (arrowhead) was gripped using the snare. (C) The J tip was ruptured during the attempt to retract it into the sheath (solid arrow).

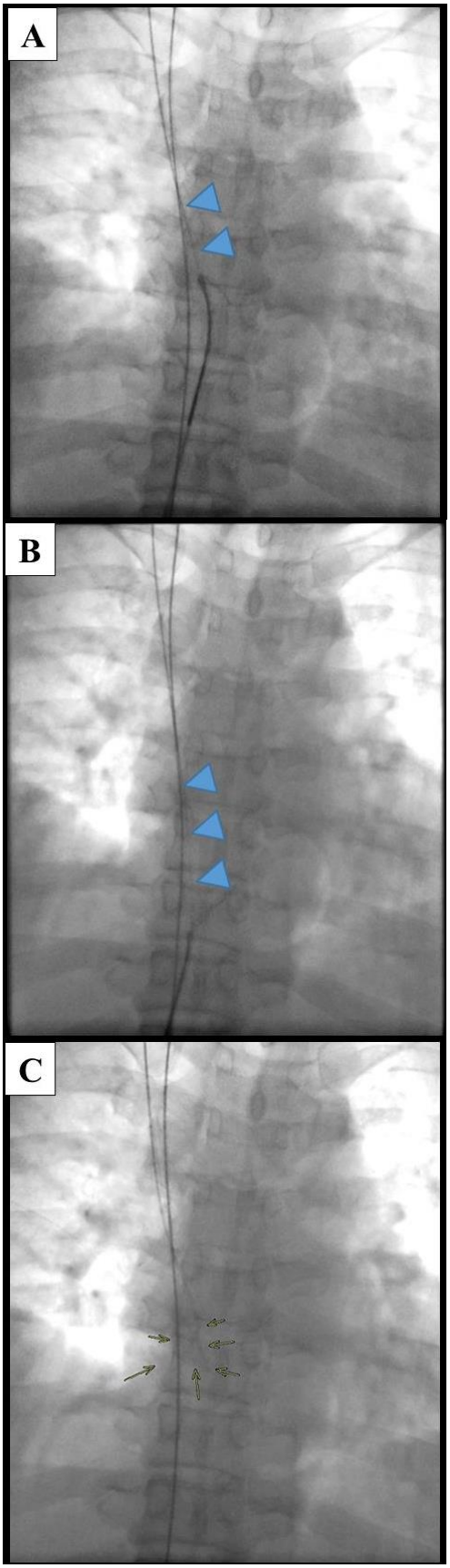

Figure 4: (A, B) Maneuver to bring the dislodged guidewire proximally causes stretching of the monofilament (arrowhead). (C) Dislodged snare results in the proximal guidewire dangling inside the right atrium (yellow arrows).

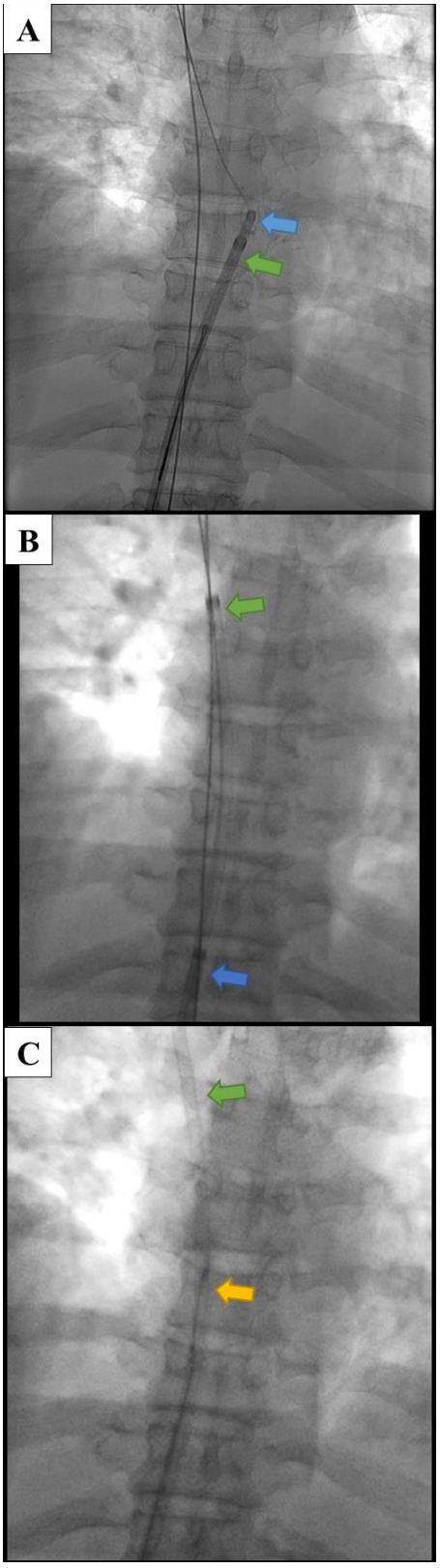

Figure 5: (A-C) The unwinded guidewire and monofilament were captured using snare and engaged into the inner sheath (blue arrow). The outer sheath (green arrow) then moved distally to cover the whole length of the guidewire. The snare, inner sheath and guidewire (yellow arrow) were retracted as a whole.

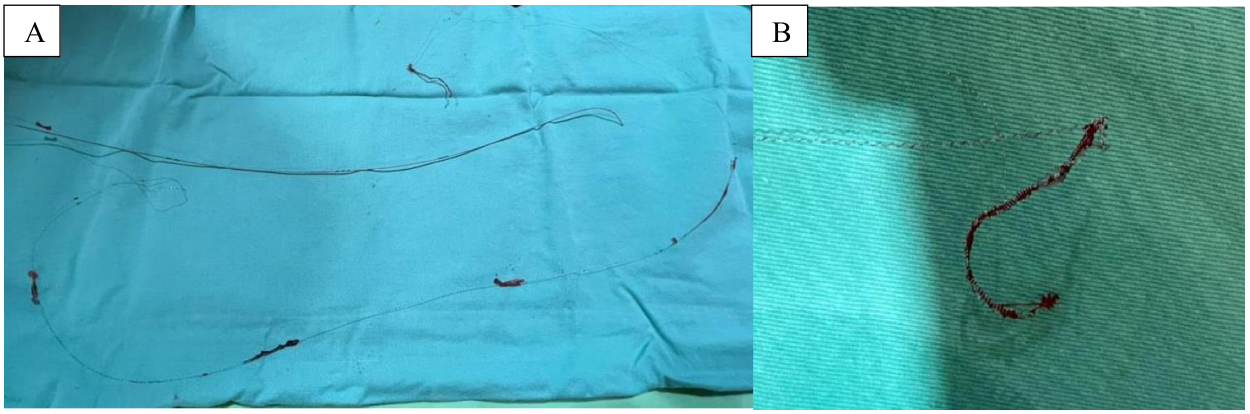

Figure 6: (A) A close-up image of the tip of the unwinding J-tip guidewire after removal. The end of the catheter was twisted and entangled during the retrieval process. (B) The unwinding elongated guidewire was removed as one part.

The basic technique in using a snare is the proximal grab technique [8]. An appropriate sized snare is delivered via the straight guide catheter or sheath. The snare is advanced adjacent to the intravascular foreign body. The outer catheter is withdrawn, allowing the snare to open fully. Then the outer catheter is again advanced to trap the guidewire tightly. Afterwards, the whole system, including the foreign body, is retrieved back into the sheath.

The snare catheter system used in our case consists of two sheaths, 8Fr and 10Fr, respectively. Only the 8Fr sheath was used initially. We were able to catch and pull the proximal part of the guidewire. However, we forcefully retracted it into the sheath, causing its rupture. The larger outer 10Fr sheath should be used to cover the foreign body and the inner sheath as recommended by the manufacturer. If the foreign body is not fit in the sheath, once the snare is tightened, the snare and sheath system should be retracted at once as a whole.

Since the incidence of guidewire fracture during angioplasty is rarely reported, evidence-based approaches for managing such incidence are not available [9]. Therefore, we tried a few manoeuvres to catch the dangling part of the guidewire. Fortunately, we were able to catch the guidewire with twisting motion as been described above and pulled everything out successfully.

CONCLUSION:

The snare catheter system is primarily designed to retrieve IVC filters; however, it can be used in other intravascular foreign bodies. Long-lasting neglected intravascular guidewire might be difficult to retrieve, and difficulty should be expected. An inexperienced operator should familiarise himself with a new or different catheter system, and supervision is necessary during the procedure to avoid life-threatening complications.

STATEMENT OF ETHICS:

Informed consent was obtained from the patient for the publication of this work.

CONFLICTS OF INTEREST:

We have no known conflict of interest to disclose.

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DATA AVAILABILITY STATEMENTS:

Data used for this work can be accessed at https://interventionjournal.padimedical.com/external/osimis/14b5f4fe-b0c5c84e-66678d3c-8e65f25e-5d998cca. The access code can be retrieved from the corresponding author upon reasonable request.

REFERENCES

1. Srivastav R, Yadav V, Sharma D, Yadav V. Loss of guide wire: a lesson learnt review of literature. J Surg Tech Case Rep. 2013;5(2):78-81.
2. Khasawneh FA, Smalligan RD. Guidewire-Related Complications during Central Venous Catheter Placement: A Case Report and

Review of the Literature. Case Reports in Critical Care. 2011;2011:1–4.
3. Can Sevil F. Successful percutaneous removal of retained J-tip guidewire: A report of two cases. Turkish Journal of Vascular Surgery. 2020;29(1):66–9.
4. Gunduz Y, Vatan MB, Osken A, Cakar MA. A delayed diagnosis of a retained guidewire during central venous catheterisation: A case report and review of the literature. BMJ Case Reports. 2012;4–7.
5. Rani A, Malik PK, Report C. An Avoidable Iatrogenic Complication. Indian Journal of Critical Care Medicine. 2019;23(8):382–3.
6. Park SK, Yi IK, Lee JH, Kim DH, Lee SY. Fracture of the j-tipped guidewire during central venous catheterisation and its successful removal under fluoroscopic guidance: A case report. Korean Journal of Anesthesiology. 2012;63(5):457–60.
7. Arnous N, Adhya S, Marof B. A Case of Retained Catheter Guidewire Discovered Two Years After Central Venous Catheterization. Am J Case Rep. 2019;20:1427-1433
8. Woodhouse JB, Uberoi R. Techniques for intravascular foreign body retrieval. Cardiovasc Intervent Radiol. 2013;36(4):888-897.
9. Patil S, Ramalingam R, Kharge J, Nayak M, Manjunath CN. Successful Retrieval of Uncoiled Coronary Guidewire Using Simple Balloon Method. J Clin Diagn Res. 2015;9(10):OD01-OD3