



Retrieval of Migrated Guidewire Extending From Right Ventricular Apex to the Inferior Vena Cava via Pigtail-Assisted Snaring

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Abstract

Intravascular embolisation of foreign bodies (FB) is a rare, serious complication that may occur during central venous line insertion. A 39-year-old male in a critical condition presented to casualty department with a through-and-through chest gunshot wound. Chest X-ray showed left haemothorax; an urgent chest tube was introduced and central venous access was introduced via the right femoral vein. The guided wire used in the procedure was unintentionally pushed to reach the right ventricular apex. Echocardiography confirmed FB location. Once stabilised, the patient was referred to Iraqi Centre of Cardiac Diseases, where transcatheter retrieval was performed. To stabilise the FB, a 6F pigtail catheter was used to create a U-shaped loop in the guided wire body, coupled with successful snaring. By strategic planning and effective teamwork, retrieval of FB was safely accomplished using a standard catheterisation tool from a high-risk anatomical site without complication.

Key words: Intravascular; Foreign bodies; Guidewire; Snare kit; Catheter, pigtail; Medical errors.

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Introduction

Iatrogenic missed foreign bodies (FB) in the systemic circulation, although rare, is a serious problem. Those FB that almost settled in the venous circulation might be less clinically significant than those in the arterial circulation.¹ Once FB migrates into the circulation, it can cause thrombosis, infection, arrhythmia and vascular perforation.² Open surgery was the standard approach; however, there is a shift to a more conservative approach via a minimally invasive percutaneous approach, which showed good ef-

ficacy and safety.³ Gooseneck snares were most frequently used, but retrieval can be challenging, especially in sensitive areas.⁴ For such scenarios, adjunct tools, such as a pigtail catheter, may be used to help in the traction or reposition of FB.⁵ Herein it is discussed a case where a patient presented with missed guide wire that extended from the right ventricle of the heart downward to the right-sided femoral vein, focusing on how to handle critically located FB in the cardiac catheterisation laboratory.

Case history

A 39-year-old male from Kirkuk government, previously healthy but a chronic smoker, presented with a gunshot in his chest (through-and-through wound). The case was immediately transferred to the Emergency room in a critical state and he was conscious (Table 1).

Table 1: Summary of the case condition and intervention upon arrival at the casualty unit

Category	Details
Presentation	Conscious 39-year-old male with a through-and-through gunshot, pulse rate 187 beats/min, blood pressure 65/40 mm Hg. The extremities were cold.
Investigation	Blood grouping and Rh, blood preparation Chest radiograph showing left-sided hemothorax
Intervention	Emergency blood transfer of two units Chest tube placement to drain 450 cc of fresh blood Foley catheter inserted Rt femoral vein central venous access placement using a guided wire that, unfortunately, was pushed too much and migrated to the circulation Echocardiography: a guided wire was visualised within the right heart

Initial resuscitation was done, blood was prepared and a Foley catheter was inserted. Blood was withdrawn and a chest X-ray was done, which confirmed left-sided haemothorax, for which a chest tube was inserted, draining 450 cc of fresh blood. During resuscitation, one of the junior doctors attempted a right femoral vein central venous line aiming for haemodynamic monitoring; using a guide wire 0.35 mm, 110 cm length. Unfortunately, during this procedure, the guide wire was pushed so deeply that it reached the right ventricular apex. After flushing the double lumen using saline, the guide wire was pushed further to migrate into the circulation beyond control.

After seven hours, blood pressure increased to 90/65 mm/Hg with a reduction in the pulse rate to 110 bpm and the extremities were getting warmer. Urine output was 320 cc of normal-coloured urine. Given the complications and since the patient's status began to stabilise, the medical team decided to transfer the patient to the Medical City Complex for further care and to remove the missed guide wire.

Upon arrival, the patient was admitted to the cardiothoracic surgery department for three days. When his condition improved, with a chest tube drain of less than 20 cc per day, he was transferred to the Iraqi Centre for Cardiac Disease to address the guide wire issue. At that time, he was haemodynamically stable. His pulse rate was 73 bpm, regular with good volume and his blood pressure was 110/85 mm Hg. All necessary investigations have been completed, including echocardiography, which showed the guide wire inside the right side of the heart.

Atrial of transcatheter snaring in the cardiac catheterisation laboratory was planned with a cardiac surgeon on standby to deal with any complications that may develop. Before start strategy of missed guide wire snaring was discussed:

The guide wire has two ends: the soft one (J-tip), which is the best site for snaring - now in the right ventricular apex. Snaring in this area is contraindicated since the apex is contractile and cardiac perforation might occur easily. The other end was too rigid, though it was accessible; pulling it might cause vascular dissection. That's why focus was on snaring the middle part of the wire.

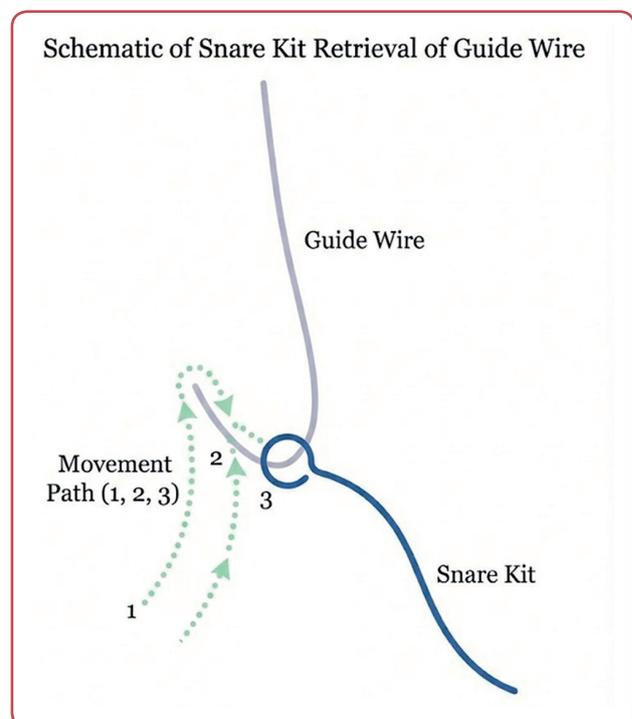


Figure 1: Schematic representation of how the guided weir was retrieved, where the pigtail catheter was introduced via a push-pull technique to entrap the missed guide wire and form a U-shaped invagination around the that section of the guide wire, immediately after the hard end, to fix the guide wire in place.

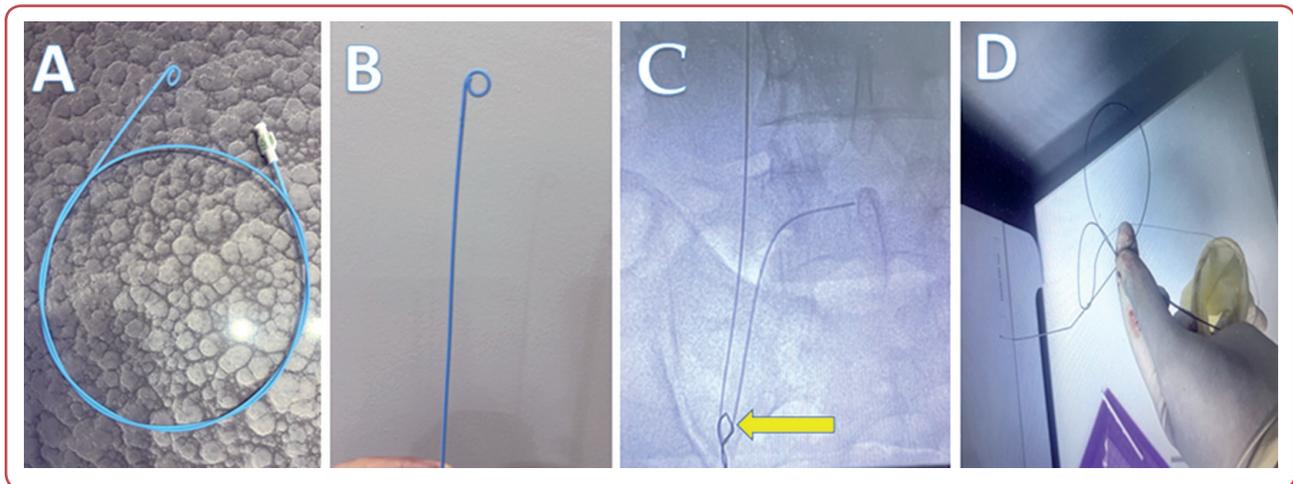


Figure 2: (A) Shows the pigtail catheter use. (B) Describes that U-shaped invagination (yellow arrow) in the missed guide wire was created. (C) Describes how the snare approaches the bottom of the already created U-shaped invagination (yellow arrow) in the missed guide wire. (D) The missed guide wire almost snared the patient's circulation.

Under local anaesthesia with 10 cc of xylocaine infiltration, the right femoral vein was accessed using a 6F Sheath. Then a 6F pigtail catheter was introduced just to encircle the missed guide wire distal to the expected hard end, using push-pull technique of the circular part of pig tail catheter to entrapped the missed guide wire after several trials to create a U-shaped invagination around the that part of the guide wire, just after the hard end, to secure the guide wire in position (Figure 1) Used catheter is shown in Figure 2 A, B. Then, after inserting a 6F snare kit, the catheter was advanced via the same access (the femoral vein) and carefully maneuvered the snare to wrap around the invaginated segment, ensuring not to tighten the loop permanently once in position at the base of the U-shaped bend of the pigtail catheter. The snare was closed and it successfully retrieved the missed wire from its stiff end (Figure 2 C, D). The patient was kept in the Iraqi Centre for Cardiac Disease and monitored overnight to be discharged home the next day in a stable condition.

Discussion

Minimally invasive procedures for FB retrieval have significantly replaced other surgical methods. Most commonly used devices for retrieval include snare, balloon catheter and pigtail catheter. The choice of the device depends on FB features, anatomical location and the available resources. The loop snare remains the most frequently used due to its widespread use and efficacy.⁴⁻⁶

The use of a pigtail catheter in FB retrieval is not new; it is easy to use and affordable in low settings. When FB has no free end, as in the current case, it presents a retrieval obstacle. Here, a hybrid approach was applied by engaging a loop with a snare after a 6F pigtail catheter was applied to create a U-shaped invagination to the mid-section of the migrated guided wire. Using the mid-wire section reduced the traction on both ends of the wire, ultimately reduced the risk of heart perforation and vessel injury. Ribeiro et al described the use of a pigtail catheter to retrieve FB in five haemodialysis patients.⁵

Their cases required a surgical approach, while presented case adopted a percutaneous approach entirely; moreover, the migrated wire was retrieved softly and incident-free within 6 days after the migration, followed by 24-hour discharge to home patients. This case described a novel and safe use of a commonplace instrument (pigtail) as a fixator and deflection tool.

Another case by Mohandes et al⁷ reported that percutaneous retrieval of FB was successfully accomplished by the use of a pigtail catheter in combination with a snaring kit. Their case described a 63-year-old female with a history of breast cancer who received adjuvant chemotherapy and radiotherapy after surgery. A port catheter was used to deliver chemotherapy via the left subclavian vein, which was complicated by thrombosis, urging its removal. Years later; the female suffered dyspnoea and during chest radiograph, a retained FB fragment was spotted in the right cardiac chamber, which was challenging to snare

owing to the bilateral impacted ends against the heart chambers. The decision was to use a pigtail catheter, which allowed gentle mobilisation and repositioning of the FB to be retrieved by a snaring kit without complication. The authors discuss that catheter use was simple, minimally traumatic and highly efficient as an adjunct to snaring in difficult situations.⁷

Insertion of a central venous catheter in a severely injured patient is used for early detection of any haemodynamic derangements. This case underscores the importance of prompt recognition and management of procedural complications in high-pressure settings, especially by junior doctors, errors can happen in these settings, acknowledging and taking action in a structured team-based approach can create learning opportunities and convert the challenges.⁸

The approach adopted are both simple and reproducible in a limited-resource setting and yielded successful outcome without surgery, with the advantage of a shorter hospital stay and rapid discharge to home. This reinforces a critical principle: success is achieved by an integrated approach that combines anatomical understanding and problem-solving rather than highly sophisticated tools. The use of a pigtail catheter for invaginating and stabilising FB enabled safer snaring, signifying that standard equipment can effectively manage high-risk complications.^{9,10}

Conclusion

Pigtail catheter use in FB retrieval is a simple, affordable and effective adjuvant strategy, especially when conventional snaring fails. It has the advantage of gentle mobilisation and repositioning of impacted FB, thus enabling safe extraction without surgical intervention. Early recognition of procedural errors, coordinated teamwork and a structural approach play a pivotal role in success. This case reinforces that sound judgment, collaboration and the resourceful use of standard tools are crucial factors in complex and challenging FB retrieval and are as effective as advanced technology in achieving safe and successful patient outcomes.

Ethics

The Ethics Committee of Mustansiriyah University issued the study approval with a number IRB 69, dated 13 September 2024. A written informed consent for anonymised patient information to be published in this article was obtained from the patient.

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Conflicts of interest

The authors declare that there is no conflict of interest.

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Data access

The data that support the findings of this study are available from the corresponding author upon reasonable individual request.

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