



FOREIGN BODY RETRIEVAL FROM THE RIGHT ATRIUM WITH A LOCALLY-MADE LOOP SNARE

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ABSTRACT

The presence of 'foreign bodies' inside the heart chambers poses a risk of potentially life-threatening complications, and immediate removal is always advised regardless of the presence or absence of symptoms and the duration of retention. The percutaneous method of extraction is currently advocated, but the low availability and high cost of extraction devices in developing countries make the consideration of surgical intervention and conservative management practice alternatives with higher risks. There are existing reports of the use of locally made loop snares to extract 'foreign bodies' from the heart chambers, particularly in India, but no such reported case in Nigeria. This is a case of a 52-year-old Nigerian female with right breast cancer who was receiving her chemotherapeutic medications through a venous access port (chemoport). She suffered a catheter fracture with the migration of the dislodged portion to her right atrium. She presented for extraction, and due to the unavailability of commercial extraction devices, a loop snare was constructed from an angiographic guide-wire by folding the guide-wire into two and passing the looped end through a guide catheter. The loop was then used to extract the fractured catheter from the right atrium without complications. Percutaneous extraction of intra-cardiac foreign bodies is safer and should be attempted despite the unavailability of standard extraction devices. This is the first case to be reported of such a procedure done successfully in Nigeria, and secondly, it also buttresses the fact that percutaneous extraction of intra-cardiac foreign bodies with devised materials can equally be successful.

Keywords: Chemoport, foreign body, guide-wire, loop snare, right atrium, venous catheter.

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INTRODUCTION

'Foreign bodies' within the cardiac chambers are rare and most of them are iatrogenic. These objects get into the heart directly by penetration due to local trauma or during medical procedures where equipment can migrate to the heart or are left in the heart after the procedure. Shrapnel and bullets are the most commonest 'foreign bodies' to get to the heart (Lemaire *et al.* 2022). There has been increasing use of endovascular devices and intravascular procedures with the improvement in medical technology, which can be complicated by the loss of foreign bodies in the vasculature (Carroll *et al.*, 2013). An awareness of this possibility is required to promptly identify complications of indwelling catheters such as fracture and migration. There are reports of various objects including pacemaker leads, catheter tips, vena cava filters, guide wires, acupuncture needles, and stents lost in the vascular system (Sheth *et al.*, 2007). Non-iatrogenic cases are usually associated with penetrating chest injuries which can lodge 'foreign bodies' into the heart chambers (Sheth *et al.*, 2007).

Removal of intra-cardiac 'foreign bodies' was traditionally done through surgical intervention; however, recently percutaneous approaches are widely being advocated as a first-choice intervention (Nguyen & Nguyen, 2022). The first non-invasive trans-luminal removal of a cardiovascular 'foreign body' was done in 1964 by Thomas who removed a steel spring that migrated to the right atrial chamber of the heart using bronchoscopic forceps (Kamal & Yadav, 2011). Since then, several commercial foreign body retrieval devices have been invented, broadly categorized as forceps, snares, and basket devices. These devices are however not readily available or affordable in the developing parts of the world hence the need for locally-made snares.

The aim and objectives of this case report are to buttress the fact that using a locally-made loop snare can equally be as successful as the use of commercial retrieval devices in retrieving 'foreign bodies' from the heart, which should discourage the option of surgery even in the absence of the standard retrieval devices.

CASE REPORT

This case is of a 52-year-old Nigerian female who was diagnosed with an Invasive ductal carcinoma of the right breast about a year before her presentation. Ten weeks after the diagnosis, she was commenced on the following chemotherapeutic agents, perjeta, herceptin, carboplatin, and docetaxel, which was delivered through a chemoport. This device was inserted under the skin of her right upper chest, with the catheter passing through her right subclavian vein which delivered her chemotherapeutic agents into her superior vena cava. After her 16th cycle of chemotherapy regimen, she started experiencing palpitations associated with a 'funny sensation' in her chest. A catheter break was suspected and the chemoport was removed, but it was discovered that a significant length of the catheter had broken off into her right atrium, hence she was referred to our facility for removal of the 'foreign body'.

She presented to Cardiocare Multispecialty hospital Abuja, and was wheeled into the cardiac catheterization laboratory; a cine acquisition was done which showed the 'foreign body' in her 'right atrium' with a shape consistent with the catheter-end of the chemoport device. It was lodged in the 'right atrium' with its tip extending into the 'right ventricle'. A commercial loop snare was not available, so we planned to retrieve the 'foreign body' with a locally-devised snare made from an angiographic wire.

The right femoral vein was chosen as the access site, and it was cleaned before she was draped. Local anaesthesia was used to infiltrate the area and a 9Fr Femoral sheath was used to cannulate the vein. A JL4 guide catheter was then passed through the femoral sheath and advanced to the 'right atrium' where it was used to pull the 'foreign body' from the 'right atrium' into the 'inferior vena cava' (Figures 1 and 2).

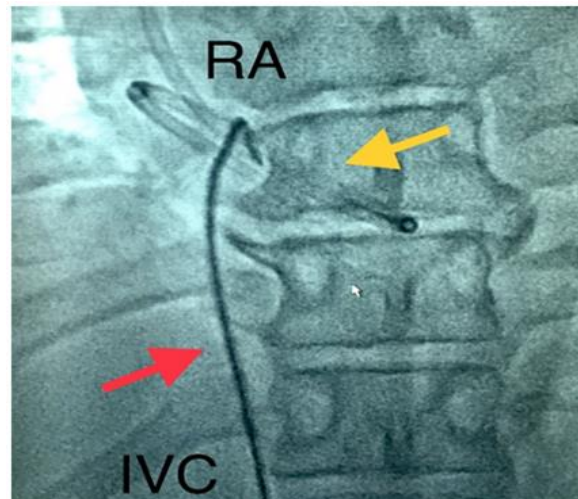


Figure 1: Guide catheter (red arrow) in the 'inferior vena cava' (IVC) extending to the 'foreign body' (yellow arrow) in the 'right atrium' (RA).

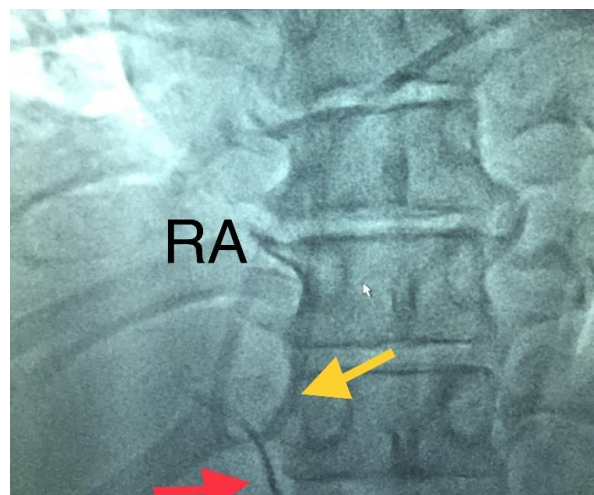


Figure 2: Guide catheter (red arrow) pulling the 'foreign body' out of the 'right atrium' (RA), and through the 'inferior vena cava'.

Then a Terumo angiographic guide wire 0.035 in x 150 cm was used to construct a loop snare, and it was passed into the 'Inferior vena cava' through the guide catheter and used to entrap the free end of the 'foreign body' (Figure 3).

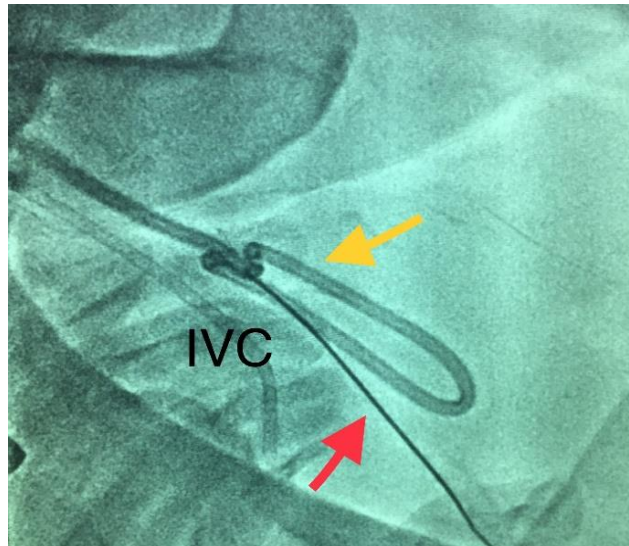


Figure 3: Angiographic guide-wire constructed into a loop-snare (red arrow) entrapping the 'foreign body' (yellow arrow) in the 'inferior vena cava' (IVC).

The 'foreign body' was grasped with a pullback technique of the loop snare and stabilized on the guide catheter, after which it was pulled out through the 'inferior vena cava' to the femoral vein (Figure 4), and then eventually extracted of the body.

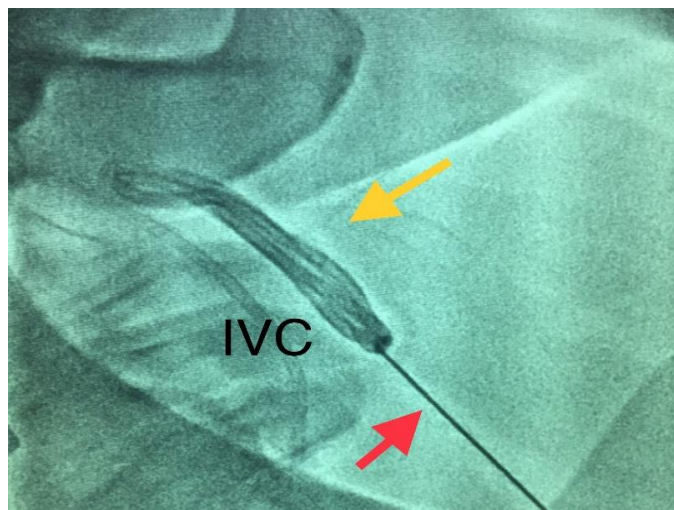


Figure 4: Extraction of the entrapped 'foreign body' (yellow arrow) through the 'inferior vena cava' (IVC) towards the 'femoral vein'.

RESULTS

The 'foreign body' was successfully extracted, measured, and discovered to be 27 cm in length. There were no surrounding clots (Figure 5).



Figure 5: Extracted foreign body measuring 27 cm in length.

The total procedure time was 35 minutes, after which she was connected to a cardiac monitor, and observed for about an hour. Her vital signs remained stable during and while on the monitor. She was later discharged that same day on a direct oral anticoagulant and has remained without complications to date.

DISCUSSION

This case highlights the successful management of iatrogenic foreign body migration to the heart. As medical care has advanced, the rate of invasive diagnostic and therapeutic procedures with their accompanying risk of complications has also increased. Chemoport is an implantable venous access port that greatly reduces chemotherapy-related venous access problems in patients who have cancer. One of the risks associated with its use is catheter breaks and fracture, which produces parts that can embolize. Indeed, there have been several reports on migrated implanted venous access devices. Contributing factors responsible for migration include robust movements of the upper arms or neck, and change in the thoracic pressure that occurs with coughing and vomiting (Binnebosel *et al.*, 2009). The pinch-off syndrome has been described in which the clavicle and the first rib compress the catheter and may lead to its breakage (Nace & Ingle, 1993). Catheter fracture has also been reported during difficult removal of adherent ports. No specific predisposing factor could be identified in this patient.

More commonly reported sites of migration include; 'the vena cava', 'right atrium', 'right ventricle', or the 'pulmonary artery' (Carroll *et al.*, 2013). Such foreign bodies are usually asymptomatic or may present with subtle non-specific symptoms, and foreign bodies can be harbored for years in the heart (Lemaire *et al.* 2022). Symptoms including dyspnea, chest pain, palpitations, and heart murmurs have been reported (Tang, Xiu & Han, 2016). This case highlights the non-specific nature of the presentation of a foreign body in the right heart necessitating a high index of suspicion whenever there is a possibility. However, when suspected, a radiograph should be done before attempted retrieval of the port. It is also good practice to inspect extracted catheters and devices to ascertain they are whole and intact.

According to Maria Leitman *et al.* (2015) in which 104 cases of 'foreign body' in the heart were reviewed, the following results were obtained. Most of the 'foreign bodies' were iatrogenic and 88% of them reached the heart by migration. They were mostly lodged in the right heart chamber, 56% of cases were asymptomatic and the mortality rate was 3.8%. 54% of cases were managed surgically, 29% had percutaneous removal and 14% were followed conservatively (Leitman and Vered, 2014). Even if this study reports that most cases were managed surgically compared to the percutaneous method of removal, the percutaneous method remains as successful as the surgical method and is considered safer. It can also be attempted even when standard retrieval devices are not available.

There have been reported cases of 'foreign bodies' remaining within the body for years without complications, but the removal of any foreign body is prudent, considering the possibility of high-risk complications such as endocarditis, sepsis, cardiac arrhythmias, embolization into the pulmonary arteries, myocardial perforation, thrombosis, and others. Comparatively, complications resulting from endovascular removal of foreign bodies are rare, and the success rate is reported to be near 100% (Martins & Faria, 2007). Conservative management should be reserved for asymptomatic foreign bodies without associated risk factors or those diagnosed late after the injury (Actis Dato *et al.*, 2003).

Currently, there are several commercial devices and techniques available for percutaneous retrieval of 'foreign bodies' from the heart chambers, and among the available devices include grasping forceps, loop snares, angioplasty balloon catheters, retrieval baskets, and filters. The loop snare is the most widely used extraction device for retrieving 'foreign bodies' with a free end, while the grasping forceps are used to retrieve 'foreign bodies' without free ends.

The unavailability of commercially sold retrieval devices in the developing parts of the world is a challenge for the percutaneous retrieval method of 'foreign bodies'. Here, we have described our success in extracting a chemoport catheter that migrated to the right heart chamber. We utilized a guide catheter and an angiographic guide wire which was modified into a loop snare. The procedure was done in 35 minutes without complications. There are similar reports of using locally-devised removal devices in India (Kamal & Yadav, 2011).

CONCLUSION

The percutaneous method of retrieval of a 'foreign body' from the 'right atrium' can be successfully done with improvised extraction materials. Hence, the unavailability and a high acquisition cost of standard retrieval devices in developing regions of the world should not be a limiting factor for choosing the safer percutaneous method over the surgical method.

CONFLICT OF INTEREST

There is no conflict of interest to disclose.

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