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Case Report

Percutaneous endovascular removal of a broken port-a-catheter from right atrium using manual made snare ☆,☆☆

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ABSTRACT

Fracture and migration of port-a-catheter, following long term access into the central venous vasculature is a rare clinical scenario. The consequences of fracture and migration includes fragmented device relocating into the right atrium or ventricle, eventually causing life threatening complications such as arrhythmias, pseudoaneurysms, perforations or very rarely embolization. We report a case of a 67-year-old female with a broken port-a-catheter which had been placed initially for chemotherapy for bilateral breast cancer. Chest radiograph showed the fragmented catheter had migrated to the right atrium; which was successfully removed via percutaneous radiological endovascular intervention. No immediate post procedure complication was noted.

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Introduction

Port-a-catheter is a device that allows access to the central venous circulation and is used for delivering medication, parental nutrition, and for drawing blood. The catheter is inserted through the anterior chest wall subcutaneous tissues, into the large vein which leads toward the right atrium under local anesthesia by an interventional radiologist/vascular surgeon. The catheterization is done primarily in cancer patients to avoid frequent needle pricks as these patients frequently require blood transfusions, administration of cytotoxic medications and parenteral nutrition [1,2].

Complications can arise both during insertion or maintenance of the line. Complications mostly seen are arterial puncture and pneumothorax observed during insertion and infections, thrombosis or structural disruptions observed

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during the maintenance period. Practices advocated include flushing the catheter regularly to keep the access intact and avoid complications such as thromboembolic events and infections [1,2]. Catheter fracture and migration is a rare but serious complication with reported rates of less than 0.4% [3,4]. We report a case of fractured port-a-catheter where the migrated fragment was successfully retrieved via percutaneous endovascular intervention using manual made snare under fluoroscopic guidance.

Case presentation

A 67 years old female patient was referred by the surgical oncologist to our institute for removal of broken port-a-catheter through an endovascular approach. Three years back patient was diagnosed with bilateral breast cancer. Patient was also a known hypertensive. Two years back port-a-catheter insertion was performed to assist in delivering chemotherapeutic agents and for blood sampling. The catheter was washed every month; however, recently it was noted repetitively that blood was no longer drawn out of the catheter. The patient also developed lethargy and loss of appetite despite being vitally stable. Upon x-ray imaging, it was discovered that the port-a-catheter is broken and the fractured fragment has migrated to the right atrium (Fig. 1). After informed consent, using aseptic measures, 12 Fr (French) vascular access sheath was placed in the right internal jugular vein. A snare was made manually using 300 cm BMW 0.014 wire, which was introduced via 4 Fr vertebral catheter up to the right atrium. Multiple attempts were made to retrieve the broken port-a-catheter which was initially unsuccessful. Followed by that, the 4 Fr vertebral catheter was replaced with a 4 Fr RDC catheter. After few attempts, the fractured port-a-catheter was successfully grabbed inside the snare and gradually moved through the sheath (Fig. 2). After removal of the jugular sheath, homeostasis was secured by manual compression. Subsequently, an incision was made in the left infraclavicular area at the site of port of the catheter disc. Blunt dissection of the skin was carried out and the port disc was successfully removed. Skin incision was closed using skin sutures. No immediate post procedure complication was noted.

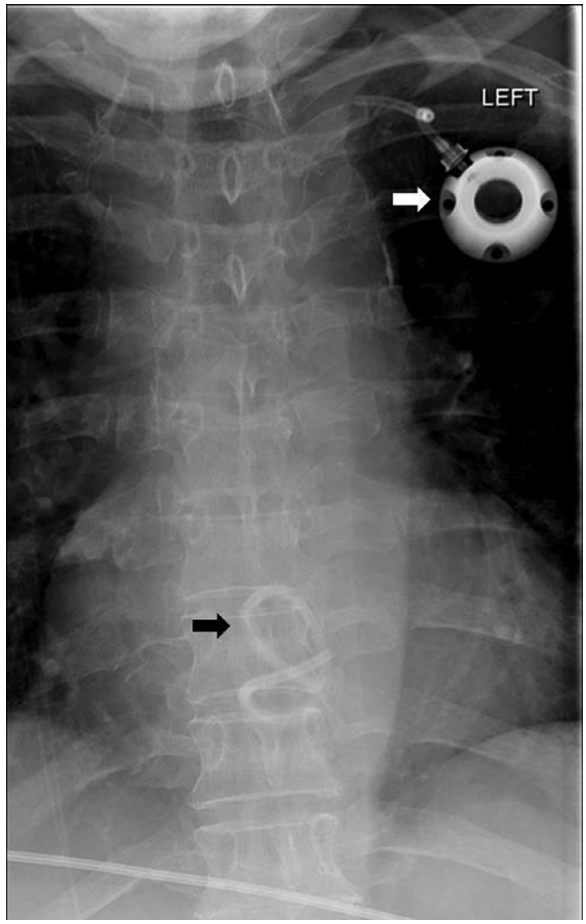

Fig. 1 – Pre-procedure X-ray showing broken limb of port-a-catheter projecting over cardiac shadow, curled up in figure of eight fashion (black arrow). Port of catheter can be seen projecting over left upper chest (white arrow).

Discussion

The central venous port devices were developed in 1982, introduced by Niederhuber et al and are widely used today in clinical practice [5]. These devices are primarily indicated for chronically ill patients who require parenteral nutrition, frequent blood transfusions and frequent administration of chemotherapeutic or pain medications.

Despite care during insertion and maintenance period, complications related to venous port devices are inevitable, the most common being catheter related infections followed by thrombosis. Complications related to mechanical factors include catheter malpositioning, catheter occlusion and fracture or impingement of the catheter. Fracture and catheter migration as noted in our case is a rare, but serious complication. The fractured fragment may get embolized to right heart or pulmonary artery leading to life threatening situations including cardiac arrhythmias, myocardial infarction, cardiac tamponade or pseudoaneurysms [5,6].

Factors leading to fracture and migration of catheter includes; 1) building up of intra-catheter pressure via flushing through a syringe causing subsequent fracture 2) external compression for example seat belt or tight clothing and 3) pinch-off syndrome due to catheter impingement between the first rib and clavicle [4,7].

To prevent complications, correct positioning of the catheter is of high value. While inserting the catheter, extreme changes in direction are avoided as it may result in catheter damage and improper connections. Venous port should be flushed with approximately 100 unit/mL of heparin with a 10mL syringe after use or monthly after inactivity. Furthermore, the complications can also be minimized by using ultrasound guidance for catheter insertion as it ensures correct placement of catheter. Along with that, frequent follow-up with chest radiography can avoid serious complications [7,8].

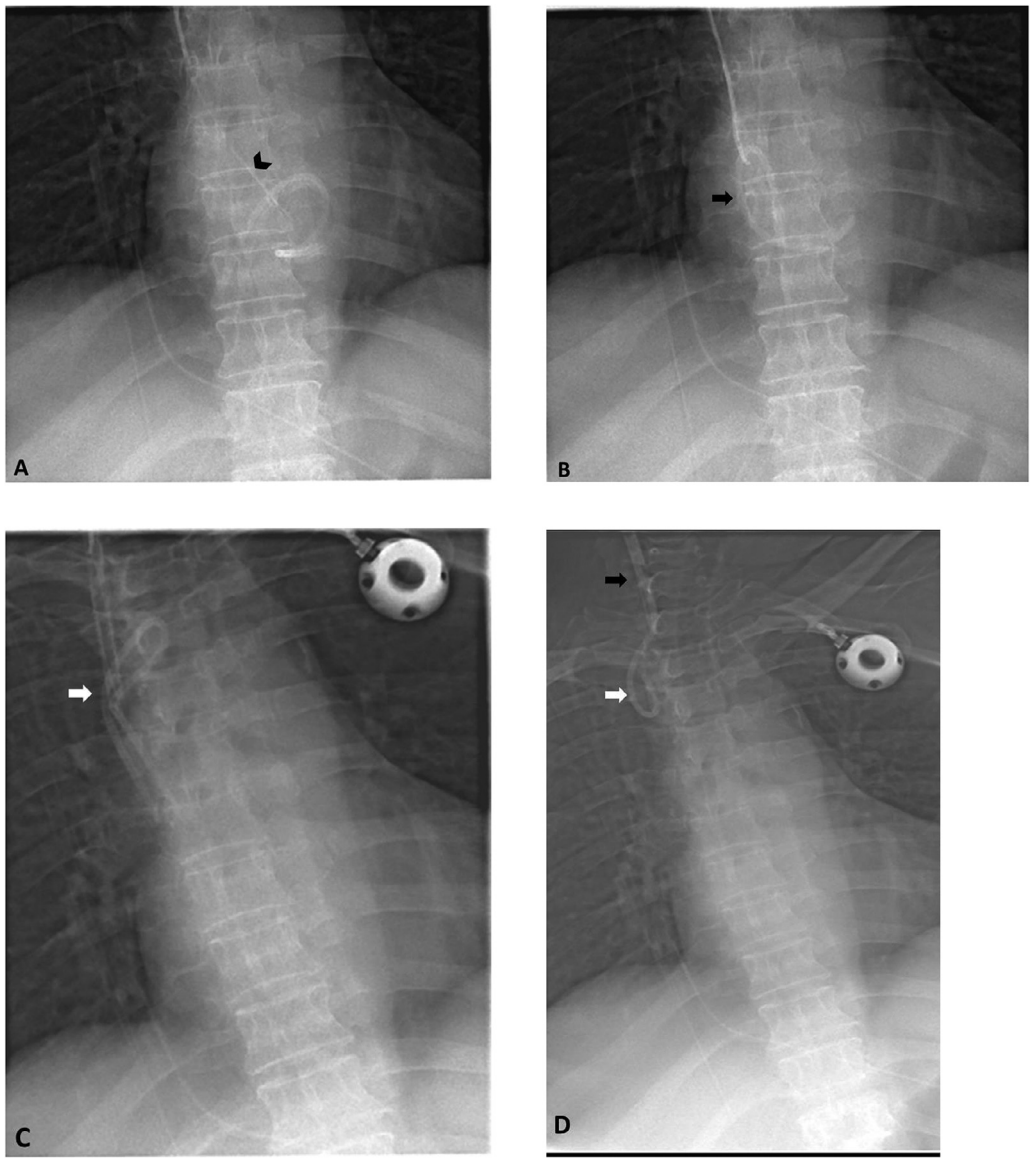

Fig. 2 – (A–D) Spot intra-procedure X-ray images showing step by step retrieval of broken port-a-catheter from right heart with manual snare by using combination of 4 Fr Renal Double Curve (RDC) catheter and 0.014-BMW guide wire. (A) showing successful grasp of broken port-a-catheter in snare loop (black arrowhead). (B) showing retrieval of broken catheter in to right atrium (black arrow). (C) showing further proximal retrieval of broken catheter in to SVC (white arrow). (D) showing successful negotiation of broken catheter (white arrow) in to vascular access sheath placed in right IJV (black arrow).

With modern advancements in interventional radiology techniques, various kinds of graspers and snare devices are commercially available for removal of intravascular and non-vascular foreign bodies. For intravascular foreign bodies, loop snares are usually the first device of choice [9]. Initial proposed design of loop snare was a retractable loop that came out from the end hole of main guiding catheter but it carried an intrinsic disadvantage of only a single plane available for manipulation which was the same plane as guiding catheter. Modern snares are now using side hole design in which loop emerges from side hole of guiding catheter at 90 degrees which considerably increases its maneuverability potential thus aiding in easy grasping of foreign body. A range of snare devices are now available commercially including microsnares (eg, Radius Medical technologies, MA) measuring 2 mm increasing up to 35 mm, as well as single-loop snares (eg, gooseneck, ev3, Minneapolis, MN; Welter retrieval loop, Cook, Letchworth, UK; and trefoil, EnSnare/TriSnare, Merit Medical, South Jordan, UT) [10].

When a purpose-built snare is not readily available, a manually made snare can be a reasonable alternative with almost similar procedure success in experienced hands. These usually require a 0.014 or 0.018- inch narrow wire and a selective end hole or side hole guiding catheter such as a Cobra or Vertebral catheter. Mallmann et al. reported 100% success rate of removal of intravascular foreign bodies using self-made snare, successfully retrieving 16 out of 16

foreign bodies including guide wires, stents, broken venous catheters and IVC (inferior vena cav) filters [11]. Advantage of self-made snare includes significant cost reduction and easy preparation without significant time consumption. Size of the loop is adjustable by operator giving it an additional benefit to be used in wide range of scenarios and against wider spectrum of foreign bodies. Overall snare devices carry a great safety profile posing very low traumatic potential. These are easy to use and carry an excellent success rate even in inexperienced hands for successful retrieval of foreign bodies. A generic advantage of endovascular retrieval of foreign bodies using snare devices over surgical removal is cost effectiveness, low morbidity rates related to surgery, reduced hospitalization duration and of course reduction in anesthesia related complications [12].

Conclusion

Using a manual made snare can be of same value as that of a snare device in retrieving an intravascular foreign body in resource poor setting as we saw in our case. Imaging and timely involvement of interventional radiology specialists with good hands provided the easiest and safest way to deal with the complication arising from the fractured port-a-catheter.

Patient consent

Consent was obtained for the publication of this case report.

Ethics approval

Ethical approval was granted by the Ethics Review Committee.

Consent for publication

Informed written consent was obtained from the patient for their anonymized information to be published in this paper.

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