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Case report

Successful recovery of central venous catheter fragment from coronary venous sinus and right ventricle: A case report ☆

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ABSTRACT

Catheter fracture with subsequent embolization is a well known but a potentially serious late complication of central venous catheter placement. Central venous catheters are frequently implanted for the purpose of chemotherapy and parenteral nutrition. Most common vein used for the placement of central venous catheter is subclavian vein. According to case reports, catheter placed in subclavian vein is vulnerable for fracture and is often preceded by the "pinch-off sign", first described by Aikten and Minton. It is due to shearing forces between the clavicle and first rib. Broken catheter frequently embolises to Right atrium, Right Ventricle, Inferior vena cava, Pulmonary arteries and rarely into Coronary sinus. Migration to Coronary sinus is very uncommon and only 5 cases are reported in the literature as of now. We are presenting an unusual case where chemoport catheter severed and lodged partly in coronary venous sinus and partly in right ventricle taking a "U "shape. Fragment was successfully retrieved percutaneously using a snare after straightening it with a pigtail catheter. Though majority of patients deny symptoms however, some do have symptoms or complications. Catheter fragment can lead to arrhythmias, thrombosis, infection and perforation. Thrombosis of coronary sinus is a life threatening complication. Regular follow up with Chest x ray may recognize the fracture and embolization much earlier. In almost all cases the migrated portion can be retrieved safely percutaneously without recourse to surgery.

Introduction

Catheter fracture with subsequent embolization is a well known but a potentially serious late complication of central venous catheter placement. The Chemoport system has 2 parts: a Port chamber and an attached central catheter made of silicone (Fig. 1). Central catheter is inserted into a central vein either internal Jugular vein or subclavian vein and port chamber is placed into a subcutaneous pocket. Access of this

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totally implanted reservoir is possible with a special needle that allows puncture of the skin and silicone membrane of the port chamber. Because of low rates of extravasation and infection, it is frequently used for administration of chemotherapy and parenteral nutrition. However, proper implantation, use, care of a port system and follow-up X rays are essential to prevent and recognize short- and long- term complications [1]. Most common early complications occur during initial 30 days and include venous malpositioning of catheter and perforation with arterial injury, pneumothorax, hemothorax, thoracic duct injury, or even a cardiac tamponade. Delayed complications occurring beyond 30 days include infection, catheter thrombosis, vessel thrombosis, and stenosis, catheter fracture with extravasation, or fracture with embolization of catheter material. Catheter fracture with consequent embolization is rare occurring in 1.1%-2.1% [2]. The site to which the fractured fragments migrate varies, with the most prevalent being the right heart chambers [3]. Migration of the port catheter to the coronary sinus is extremely rare and may cause a potentially fatal complication due to thrombosis of Coronary sinus (CS) [4]. Coronary sinus is approximately 15-65 mm in length, is formed by great cardiac vein and main postero-lateral vein. Thebesian valve guards the ostium of the CS in almost 88% of people. For the same reason, embolization into CS is highly unlikely. Fracture and embolization has been reported most commonly with a catheter placed using the subclavian approach and is often preceded by "pinch-off sign", first described by Aikten and Minton [5]. Only 5 cases were reported in the current literature of coronary sinus migration of fractured catheter [6–9]. We report a unique case where chemoport catheter implanted into right subclavian venous system fractured spontaneously and embolized and lodged in CS and RV cavity at the same time. It was never reported in the literature before. Using percutaneous technique with the help of pig-tail catheter and loop snare, we could successfully and safely capture and extract the catheter fragment from RV and CS.

Presentation of case

A 60-year-old lady was referred by the surgical oncologist for possible percutaneous retrieval of Chemoport catheter fragment which fractured and embolized. Chemoport catheter was placed 14 months ago for adjuvant chemotherapy following radical mastectomy of left breast. This lady underwent radical mastectomy of left breast and subsequently radiotherapy for carcinoma breast. At the end of chemotherapy X ray chest was done before planned extraction of chemoport catheter. X ray chest revealed fracture of catheter where it crosses the junction of first rib and clavicle (Fig. 2). She has no other co-morbid conditions. Clinical examination and ECG were unremarkable. Fluoroscopy revealed flexible catheter taking “U shape” with one arm lodging in CS and the other in RV cavity (Fig. 3). As far as literature is concerned, it is the first such case.

Right femoral vein was punctured under local anaestesia using Seldinger technique and 8 F sheath was inserted. An effort was made with One snare to catch the RV end of

Fig. 1 – Chemoport catheter.

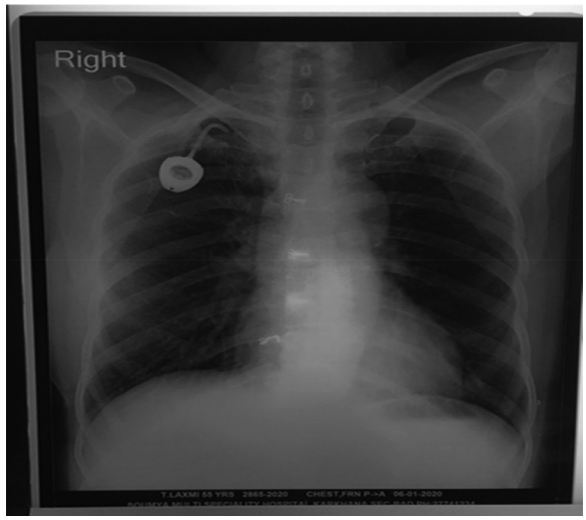

Fig. 2 – X Ray Chest showing severed chemoport.

embolized catheter without success (Fig. 4). After several attempts with snare, we took recourse to pigtail catheter [Cordis] with which we could catch and straighten the RV end of the catheter into IVC (Figs. 5 and 6). This position was favorable for grasping the tip of the catheter using the snare device (Fig. 7). It was then snared using a 15 mm loop snare (EN snare Endovascular Snare System, Merit Medical Systems Inc, UT, USA) (Fig. 8). Then whole assembly of snare, captured catheter fragment and 8 F sheath were pulled out in unison (Figs. 9 and 10). The patient tolerated the procedure well without any complications. Had the fragment been embedded deeply in the CS it would not have been feasible to extract it percutaneously. There was 1 such case report where the catheter fragment could not be extracted as it was sitting deeply in the CS.

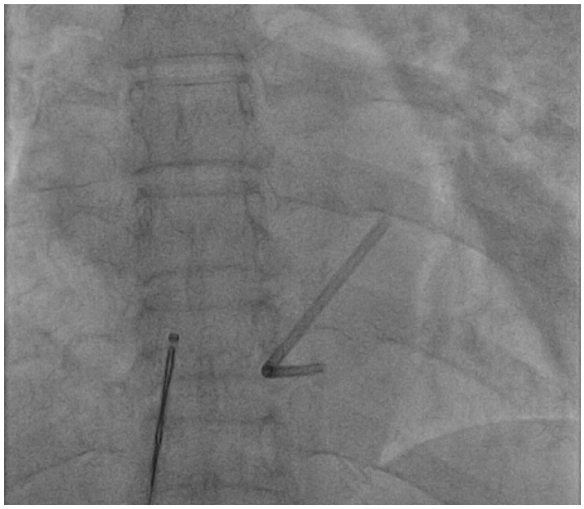

Fig. 3 – Chemoport catheter lodged partly in CS and partly in RV.

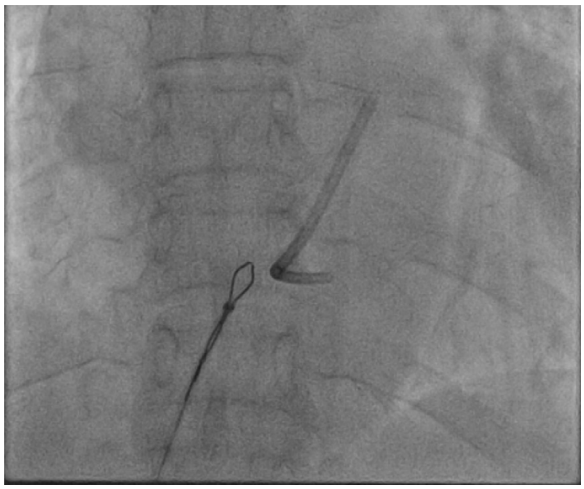

Fig. 4 – Attempt to snare with One snare device.

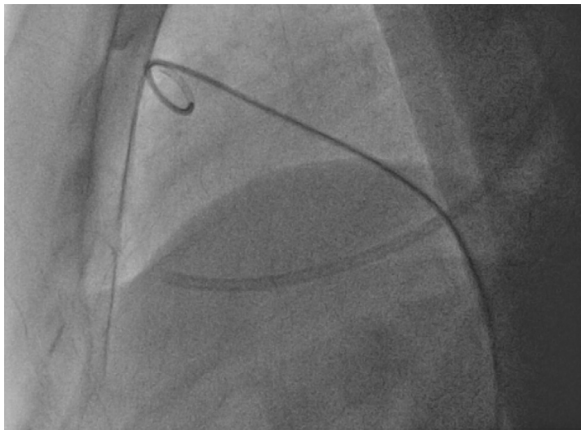

Fig. 5 – Attempt to catch and straighten catheter fragment with Pig-tail catheter.

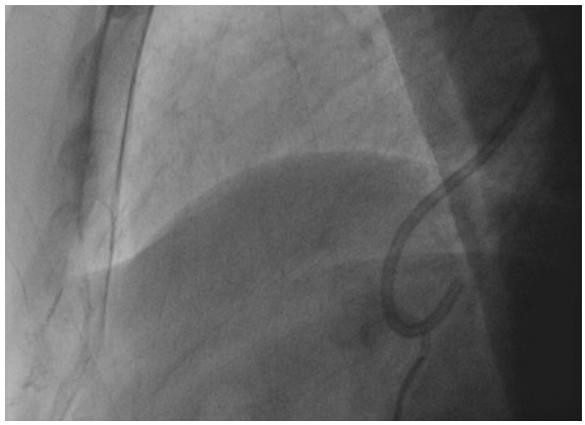

Fig. 6 – RV end of the catheter was being caught and straightened.

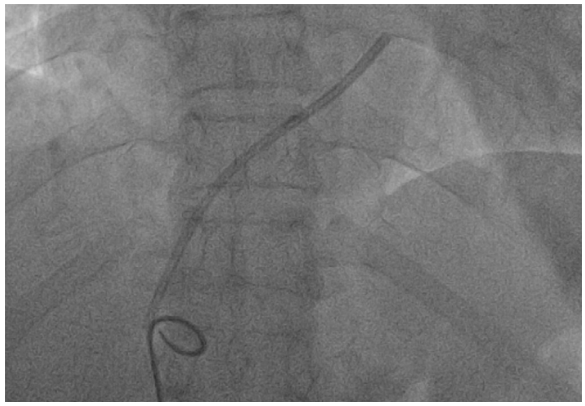

Fig. 7 – Catheter tip in IVC after straightening.

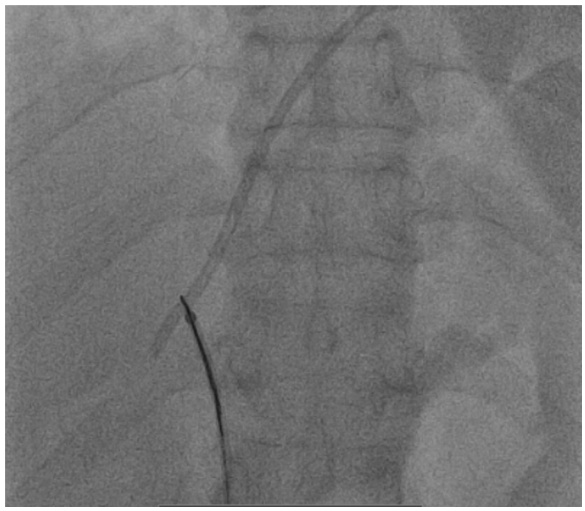

Fig. 8 – IVC end of the catheter was seized by Snare.

Fig. 9 – Whole assembly including venous sheath is being pulled out.

Fig. 10 – Extracted catheter fragment of Chemoport. Catheter fragment is approximately 8-9 cms.

Discussion

Totally implantable chemoport catheter is widely used to deliver chemotherapeutic drugs in cancer patients. Catheter fracture and migration is not very common. Fractures notoriously occur at the junction of port chamber with catheter or where catheter courses between the junction of first rib and clavicle. According to Cheng et al., broken catheters embolize frequently to superior vena cava (23.9%), right atrium-inferior vena cava (20.6%), right atrium-hepatic vein (11.9%), and right atrium- right ventricle (10.8%.0. Migration of fractured venous device into CS is extremely uncommon because entrance is guarded by Thebesian valve and the anatomical location of ostium. Only 5 cases were reported in the current literature wherein catheter fragment migrated to coronary sinus. Interesting aspect of our case is broken catheter lodging partially in CS and partially in RV at the same time was not reported earlier. Of the 5 cases reported, only in 4 cases catheter fragment could be removed percutaneously. In 1 case, however, fragment migrated so deep into the CS that it was considered not possible to extract it percutaneously [10].

Catheter fractures are known to occur more frequently after a subclavian insertion because of catheter "pinch off " between first rib and clavicle which has been associated with subsequent fracture and embolization. This has led some to believe that Internal Jugular Vein approach as the secure method to avoid pinch off. However, there were anecdotal case reports of fracture of catheter when implanted through internal jugular veins as well [11]. With the increasing use of these indwelling catheters for long term use for various purposes, physicians should be alert to the potential complications.

In majority of cases, fragment can be extracted percutaneously without any untoward events [12]. Majority of patients deny symptoms, however, some patients do complain of mild pain or swelling in clavicular region, shoulder pain, and chest pain during chemotherapy [13,14]. Cardiac perforation, thrombosis, embolism, dysrrhythmia, endocarditis, or sepsis were the fatal complications that may develop due to the fracture and migration of port catheter [15]. To prevent these complications, extraction of the fragment must be carried out expeditiously by endovascular or surgical approach. Endovascular approach is the preferred approach due to its ease and safety. There are 3 devices available for extraction of foreign body percutaneously: the loop-snare, helical baskets, and the forceps [16–18]. In 1 case, catheter fragment was caught and straightened with pig-tail catheter before grasping with snare [19]. Radiologic imaging has become highly relevant in the intra procedural assessment and post implantation follow up, for detection of possible complications and to plan intervention thereof.

Patient consent

The author/s confirm that written consent for submission and publication of this case report including image [s] associated with text has been obtained from the patient and spouse.

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