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(CASE REPORT)

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Catheter fragmentation and premature atrial contraction: A case report of right atrium complications

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Abstract

Critical medical devices known as central venous catheters (CVCs) are frequently used for intermittent, long-term central venous access, such as when administering intravenous (IV) antibiotics and/or chemotherapeutic medicines. Delayed mechanical complications such as catheter fracture and migration to other areas may be seen. After fragmentation, these pieces are displaced into different locations, the right heart being the most commonly affected site. Some complications include arrhythmias, thromboembolism, infections, and cardiac arrest. We report a case of catheter fragment that migrated into the right atrium after being dislodged from the intravenous infusion port causing premature atrial contractions.

Keywords: Catheter; Fracture; Foreign body retrieval; Complications

1. Introduction

CVCs are an important medical instrument employed in a wide range of procedures, which includes intravascular infusion, blood sampling, hemodynamic monitoring, chemotherapeutic interventions, and intravenous antibiotics [1]. Despite their tremendous utility, catheter-related complications occur in about 10–15% of patients [2]. CVCs are known to be rare causes of fractures that lead to embolization, thrombosis, or damage to cardiac structures [3]. Embolization of fractured catheter fragments occurs to multiple places, but more often the right heart chambers [4].

2. Case Presentation

A 72-year-old man with gastric cancer had been diagnosed previously and was hospitalized for a distal gastrectomy. After the surgery, he underwent six cycles of chemotherapy through a permanent indwelling port CVC. A routine follow-up visit a month ago had an electrocardiogram showing sinus bradycardia with premature atrial contractions (Figure 1). Mediastinal X-ray examination revealed a thin-dense tubular shadow from the right atrium (RA) to the right ventricle (RV), at the level T7-T9 thoracic vertebrae. Subsequent imaging demonstrated a malpositioned catheter that creates a loop in the RA extending into the RV (Figure 2,3). Transthoracic echocardiography demonstrated the consistency and extension of the catheter from the RA to the RV. The catheter path seen in the apical four-chamber view as a hyperechogenic line (arrow) and the hyperechogenic artifact (arrow) depicted the catheter tip inside the right ventricle from the right atrium (Figure 4,5).

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Fluoroscopy demonstrated a subfragmented fragment of the CVC embedded in the right atrium. Vascular sheaths were inserted after the right internal jugular vein and right femoral vein were punctured under ultrasound guidance. A 5F pigtail catheter was inserted via the sheath of the right internal jugular vein and floated into the right atrium via a guidewire while being guided by hemodynamic and fluoroscopic techniques. The pigtail catheter was advanced into the loop of the dislodged CVC up to the superior vena cava. A 6F sheath was then placed in the right femoral vein. A simple loop snare was advanced through the femoral sheath, grasping one end of the catheter and retrieving it into the inferior vena cava. The detached catheter assembly was successfully retrieved intact, with no evidence of breakage and the entire procedure is shown in video (1).

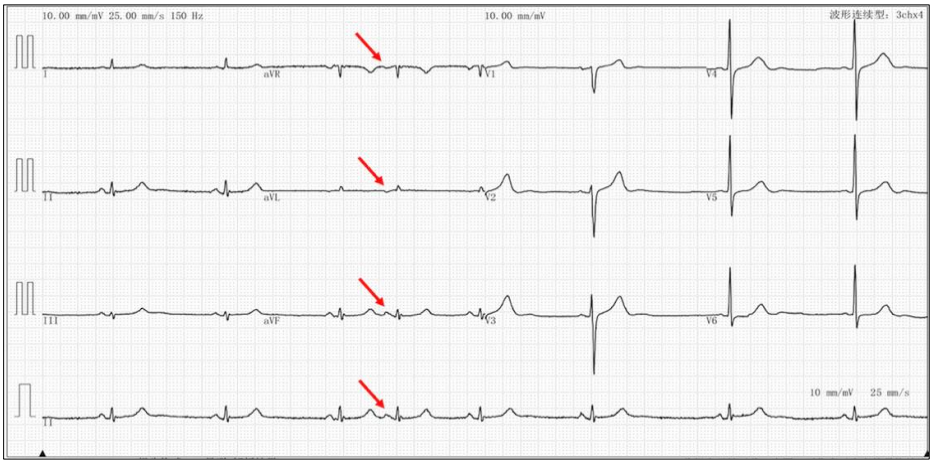

Figure 1 ECG showing Sinus Bradycardia with a Premature Atrial Contraction (PAC)

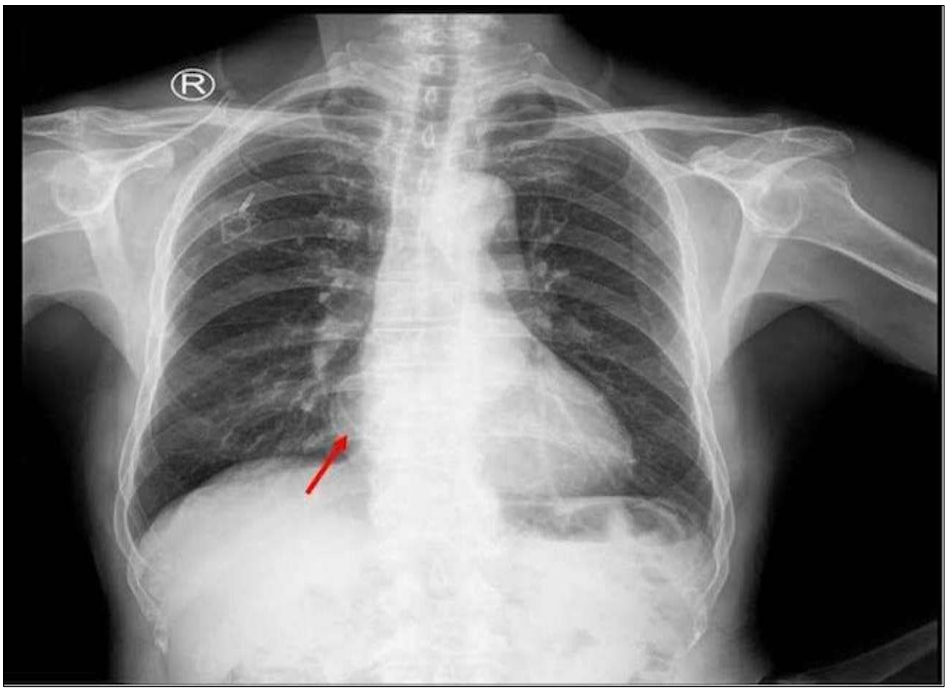

Figure 2 Chest X-ray PA view Revealing a Catheter Loop in the Right Atrium

Figure 3 Chest X-ray Lateral view showing the Catheter Tip Positioned in the Right Ventricle

Figure 4 Transthoracic Echocardiography Highlighting the Catheter in the Right Atrium (Arrow)

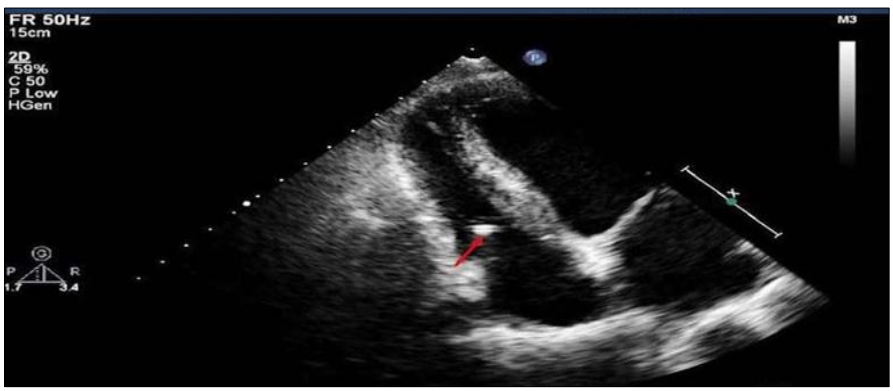

Figure 5 Transthoracic Echocardiography Highlighting the Catheter in the Right Ventricle (Arrow)

Figure 6 The retrieval of catheter entire procedure

3. Discussion

Catheter fracture is a rare although serious complication, with an approximate incidence of 0.1% and can result in migration, embolization, obstruction, and damage to cardiac structures [5,6]. Pinch-off syndrome is the most common mechanical cause of catheter fracture, which occurs due to chronic intermittent compression of the catheter between the clavicle and the first rib as a result of improper medial placement [7,8]. Awareness of this complication can help prevent and manage catheter-related contamination issues. This particular case highlights the need for careful attention to detail during catheter placement as well as ongoing monitoring to minimize mechanical stress and decrease risk for fracture or dislodgement.

In this case, a fractured port catheter had migrated into the right heart, resulting in a loop in the right atrium with the catheter tip trapped in the right ventricle. Management of such cases involves a highly skilled, multidisciplinary approach. These endovascular techniques are commonly used for retrieval of intravascular foreign bodies like dislodged catheter fragments. Such an endovascular intervention would require commonly used tools like snare devices and pigtail catheters inserted and guided by wires [9,10].

One important feature of this case is the utilization of dual vascular access to aid with retrieval. Access through the right internal jugular and femoral veins provided optimal maneuverability and control. A pigtail catheter was initially placed from the internal jugular vein to descent the dislodged catheter into inferior vena cava (IVC). Then, a snare device, advanced through the femoral vein, was used to capture the free end of the IVC catheter, facilitating safe complication-free removal. This strategy underscores the importance of using a combination of vascular access pathways to improve catagenic results, particularly in complicated cases. To prevent these types of complications, catheter placement and monitoring should be done carefully. In the case of catheter fractures, clinicians need to be alert for mechanical stress or incorrect positioning as early signs of catheter fractures! Early identification of these risks enables early intervention, which has a great impact on lowering morbidity and mortality rates.

4. Conclusion

This case highlights that endovascular modalities serve as a minimally invasive and effective option for intravascular foreign body retrieval. It also highlights the need for ongoing education and training for healthcare providers in recognizing and addressing catheter associated complications. Further studies are needed to develop catheters with

designs to be more resistant from mechanical stresses and novel imaging modalities to allow an early diagnosis may minimize these devices' ruptures during use and consequently improve patient outcomes.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare no conflicts of interest in this work.

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Statement of informed consent

Informed consent was obtained from the patient for this case report.

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