



Case report

A delayed complication of a port-a-cath insertion via subclavian venous access: Case report of a “pinch-off syndrome”

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ABSTRACT

Introduction: Port-a-caths are long-stay central catheters often used for chemotherapy or parenteral nutrition. The implantation of a port-a-cath, despite being involved in routine procedures, is also associated with immediate and delayed complications. Complications are rare but must be known and managed by operators.

Case report: A delayed complication related to the presence of a port-a-cath, consisting in the fragmentation of the catheter, has been reported, in a 63-years-old female patient. The port was placed via subclavian venous access and affected by pinch-off syndrome, which resulted in catheter malfunction and then in fragmentation from compression by the subclavius-costoclavicular complex. The onset symptom was device malfunction.

Discussion and conclusion: The focus in the management of this rare but possible complication was the quick removal of the device and of the catheter fragment in the endovascular lumen with collaboration between different medical specialists.

1. Introduction

This work has been reported in line with the SCARE criteria [1].

Port-a-caths (Port) are fully implantable, long-stay central venous catheters, suitable when permanent central venous access is required for intermittent therapies (e.g., chemotherapy, nutritional therapy). They consist of a reservoir chamber and a silicone or polyurethane central venous catheter (CVC) connected to the reservoir system and guarantee good esthetic result, easy management, long period usage and a lower risk of infection [2].

Port-a-cath insertion is commonly performed in the care of the critically ill patients. However, this routine procedure has complications that every provider must recognize and be able to manage, either directly or with prompt specialty assistance [3].

Procedural complications can be immediate or delayed. Immediate complications occur at the time of catheter insertion and include vascular (e.g., arterial puncture), cardiac (e.g., atrial positioning with risk of arrhythmias), pulmonary (e.g., pneumothorax), and placement complications [4]. Ultrasound has significantly reduced the incidence of immediate complications [5].

Delayed complications are infection and device dysfunction, including fibrin sheath formation, fracture and thrombosis. Site of catheter placement, duration of catheterization and patient comorbidities all affect the rate of device dysfunction. Catheter fracture occurs most commonly in subclavian lines after a catheter has been in place for an extended period. Fracture can lead to serious complications related to catheter embolization including sepsis, endocarditis, cardiac perforation, or arrhythmias.

Port-a-caths placed via subclavian venous access can be affected by pinch-off syndrome, which results in catheter malfunction from compression by the subclavius-costoclavicular complex between the clavicle and first rib. Malfunction caused by anatomic compression may rarely result in fracture and embolization of the catheter [6].

The aim of this case study is to report a rare case of a spontaneous fracture and embolization of a Port-a-cath, successfully resolved with a perfect and integrated collaboration of different specialists.

2. Case presentation

63-year-old female patient, with history of breast adenocarcinoma

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and liver metastases, needed to start neoadjuvant chemotherapy. The patient came in our Public Hospital in June 2021, at the reference center for the implantation of long-term vascular accesses, to carry out the implantation of a Port-a-cath.

After ultrasound vision, the right subclavian vein was cannulated. The subcutaneous pouch was made approximately 3 cm from the puncture site and the reservoir was inserted. The catheter was connected to the reservoir and aspiration and infusion tests were performed. Before closing the pouch, the correct positioning of the distal end of the CVC was checked with chest X-ray in the operating room (Fig. 1A). The set used for the procedure is a high quality and famous branded kit.

There were no immediate complications related to the procedure.

The patient began to use the Port almost immediately for the monthly chemotherapy sessions without reporting any problems.

In January 2022 the patient returned to our hospital for a device dysfunction. Due to problems with the Port, it was not used in the chemotherapy session the day before. Aspiration and infusion tests were performed through the reservoir. On aspiration the device was not working, the infusion caused discomfort and burning to the patient, therefore probably the catheter fragmentation occurred at the level of the subcutaneous tissue. A control chest x-ray showed that the catheter was broken at the level of the first rib (Fig. 1B). It was therefore decided to proceed with the removal of the Port.

Under local anesthesia, the pouch was incised, and the reservoir was delicately extracted. After extraction, only an approximately 5 cm segment of the CVC remained connected to the reservoir (Fig. 2A). The other length of the catheter then remained in the endovascular lumen.

A control x-ray scan was performed in the operating room, which showed the CVC fragment near the pulmonary artery (Fig. 2B). The patient was then promptly referred to an interventional radiology center to carry out the recovery of the fragment as soon as possible. Upon arrival of the patient, a pulmonary arteriography was performed, and it revealed the presence of the catheter fragment in the superior branch of the left pulmonary artery. Through a noose catheter system, it was possible to completely recover the fragment and it measured 19 cm (Fig. 2C).

3. Discussion

The results of our report demonstrated the importance of knowing the possible complications of long-term venous access and that management of these complications includes the perfect collaboration between different medical specialists.

In this case, the subclavian access was chosen for the lower incidence of infections related to this type of central venous access, in consideration of the fragility of our patient, oncologic and immunosuppressed.

Subclavian venous access is characterized with lower probability of

catheter-associated infection when compared to both internal jugular and common femoral access. However, it is associated with notable intraprocedural complications, including inadvertent arterial access (3.1%–4.9%), hematoma formation (1.2–2.1%), pneumothorax (1.5–3.1%) and hemothorax (0.4–0.6%) [6].

The Ultrasound-guide has drastically reduced the intraprocedural complications [5].

Regarding delayed complications, fragmentation of central venous catheters placed via the subclavian venous route is a rare and often late occurring complication. The catheter component, in fact, courses between the costoclavicular ligament and subclavius muscle at the level of the first rib and clavicle, giving rise to the pinch-off syndrome [7,8].

Transection of the catheter may also be precipitated by mechanical defects within the catheter, inadvertent damage to the catheter occurring at the point of placement or by needle access, or by an additional central venous catheter coursing via a contiguous access.

The most common clinical presentation of catheter fragmentation is increased resistance to infusion (in about 60% of patients) [9].

In our patient there was negative aspiration test, increased resistance to infusion and burning infusion. The location of the catheter fragments within the cardiovascular system depends on the route of entry and gravity, the length and stiffness of the materials, the flow pattern of the vessel or cardiac chamber and the position of the patient at the time of the accident [10].

Most common location of dislodged fragments embolization was in the pulmonary artery [11].

A high suspicion of delayed complication occurred to the Port-a-cath must be considered if the venous catheter doesn't work (negative aspiration test, resistance and pain to injection) and it must be diagnosed and treated as soon as possible, considering the dangerous consequences of catheter fragmentation and its embolization. Patient must be educated to recognize these signs of malfunction.

4. Conclusion

In the case illustrated, the patient promptly reported the device malfunction. This allowed for prompt removal of the Port, with rapid recognition of catheter fragmentation. Another important element in the management of this complication was the collaboration between different medical specialists. After having identified the complication, the patient was in fact quickly sent to interventional radiology for the recovery procedure of the catheter fragment located in the pulmonary artery. In conclusion the correct management of this delayed complication avoided adverse consequences, such as arrhythmias, thromboembolism, cardiac perforations. The patient, aware of the existence of complications related to the presence of the port-a-cath, was very satisfied with the rapid and precise management of her problem.

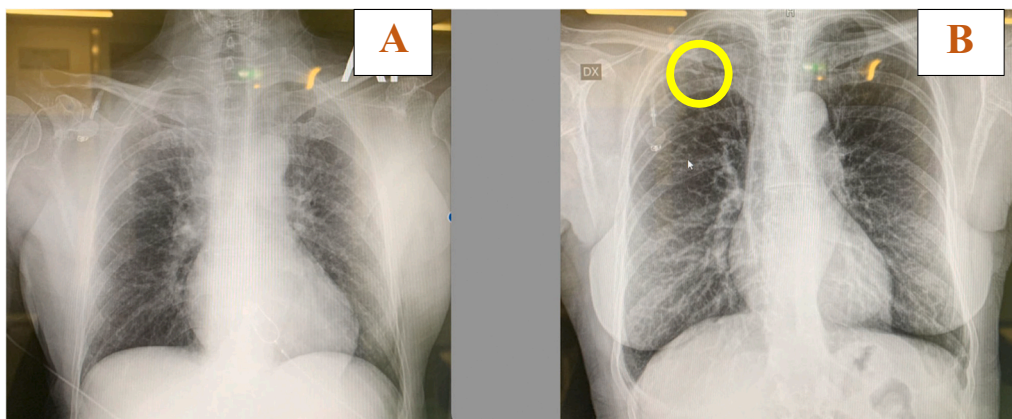


Fig. 1. A. Control chest X-ray performed after placement of the port-a-cath in June 2021. B. Control chest X-ray showing catheter fragmentation at the first rib, January 2022.

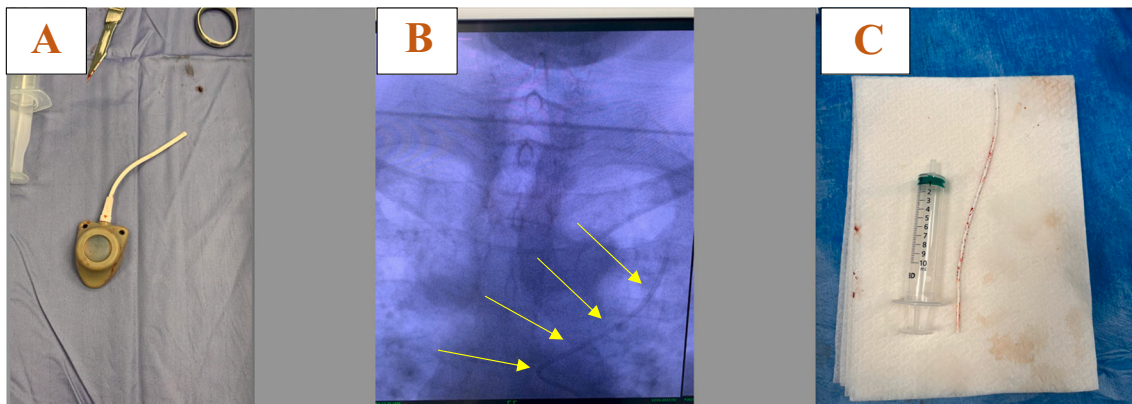


Fig. 2. A. Reservoir and catheter fragment connected to reservoir extracted. B. X-ray image obtained in the operating room showing a catheter fragment at the pulmonary artery. C. Fragment of catheter recovered with endovascular procedure, length 19 cm.

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Ethical approval

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Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Declaration of competing interest

No conflict of interest.

References

- [1] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical Case Report (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [2] G.A. Schmidt, M. Blaivas, S.A. Conrad, F. Corradi, S. Koenig, M. Lamperti, B. Saugel, W. Schummer, M. Slama, Ultrasound-guided vascular access in critical illness, *Intensive Care Med.* 45 (4) (2019 Apr) 434–446.
- [3] C. Kornbau, K.C. Lee, G.D. Hughes, M.S. Firstenberg, Central line complications, *Int. J. Crit. Illn. Inj. Sci.* 5 (3) (2015) 170–178.
- [4] S. Machat, E. Eisenhuber, G. Pfarl, J. Stübler, C. Koelblinger, J. Zacherl, W. Schima, Complications of central venous port systems: a pictorial review, *Insights Imaging* 10 (1) (2019 Aug 28) 86.
- [5] A.G. Randolph, D.J. Cook, C.A. Gonzales, C.G. Pribble, Ultrasound guidance for placement of central venous catheters: a meta-analysis of the literature, *Crit. Care Med.* 24 (1996) 2053.
- [6] D.C. McGee, M.K. Gould, Preventing complications of central venous catheterization, *New Engl. J. Med.* 348 (2003) 1123–1133.
- [7] T. Nostdahl, N.A. Waagsbo, Costoclavicular pinching: a complication of long-term central venous catheters, *Acta Anaesthesiol. Scand.* 42 (2008) 872–875.
- [8] B. Mirza, V.W. Vanek, D.T. Kupensky, Pinch-off syndrome: case report and collective review of the literature, *Am. Surg.* 70 (2004) 635–644.
- [9] C.C. Cheng, T.N. Tsai, C.C. Yang, C.L. Han, Percutaneous retrieval of dislodged totally implantable central venous access system in 92 cases: experience in a single hospital, *Eur. J. Radiol.* 69 (2) (2009 Feb) 346–350.
- [10] R. Biffi, F. de Braud, F. Orsi, et al., Totally implantable central venous access ports for long-term chemotherapy: a prospective study analyzing complications and costs of 333 devices with a minimum follow-up of 180 days, *Ann. Oncol.* 9 (7) (1998) 767–773.
- [11] B. Bessoud, T. de Baere, V. Kuoch, et al., Experience at a single institution with endovascular treatment of mechanical complications caused by implanted central venous access devices in pediatric and adult patients, *Am. J. Roentgenol.* 180 (2) (2003) 527–532.