

Percutaneous Transvenous Removal of A Venous Access Port Catheter Fractured And Migrated Into The Left Pulmonary Artery

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1. Abstract

Patients having chemotherapy usually undergo placement of a totally implantable venous access port (TIVAP) with high patient satisfaction and low complication rates. Although properly placed and carefully used, some complications can be introduced in the early and late period. Among the delayed complications, a fractured and migrated catheter into the pulmonary artery is rarely seen and sometimes generates a life-threatening situation. The migrated part can be safely and effectively retrieved by percutaneous transvenous way with a gooseneck snare system. we report a very rare case of TIVAP catheter fractured and migrated of distal part into the left pulmonary artery and its removal via percutaneous transvenous route

2. Introduction

In patients with cancer, long-term central venous path is often needed for periodic administration of chemotherapy, blood intake for testing and sometimes vascular way for contrast enhanced imaging techniques [1, 2]. For this purpose, a totally implantable venous access port (TIVAP) catheter was first introduced Niederhuber et al. in 1982 with present used type usually implanted subcutaneous tissue in the chest wall [3]. Because of their low rates of extravasation and infection, TIVAP has been widely accepted and used worldwide with high patient satisfaction, longer service life and easier care [4]. Nowadays, TIVAP has become an essen-

tial need for many chemotherapy protocols in malignancies with improving the patients' quality of life [5]. Although its routinely used, complications including venous thrombosis, extravasations, dislocation, obstruction, catheter leakage, and local or systemic infections can be seen up to 15% of patients in early (<30 days) and late stage (>30 days) after implantation [3]. Among these delayed complications, a fractured and migrated port catheter into the pulmonary artery is seen very rare and constitutes life-threatening situation leading mostly thromboembolic events or embolization of the vessels [6]. Therefore, removal of this migrated catheter part should be recommended as soon as possible when this hazardous and emergency situation established.

Here, we report a very rare case of TIVAP catheter fractured and migrated of distal part into the left pulmonary artery and its removal via percutaneous transvenous route.

3. Case Report

A 56 year old woman with T2N0M0 infiltrative ductal carcinoma of breast underwent modified radical mastectomy in March 2015. One month after the surgery, a TIVAP placement was performed in another institution on the right chest wall via right subclavian vein (SV). A chest radiography showed the TIVAP located at the correct position and no catheter kinking was seen in the vessel entrance (Figure 1a). So she had been applied several planned schedule chemotherapy via this TIVAP. After the end of planned chemotherapy,

she was followed-up for 3 months in the first two years and once in per year after then. In the previous annual control in April 2019, there was a catheter twisting between the first rib and clavicle (Figure 1b) compatible with pinch-off syndrome. The patient was told that the catheter is needed to be removed but patient refused it. In January 2020, patient came to control with no clinical symptom and a chest x-ray was performed. On the chest radiography, catheter fracture from the former twisting site and distal part migration into the left pulmonary artery was observed (Figure 1c). Because the patient had no clinical symptom, no-added computed tomography (CT) imaging was performed and both the proximal port

catheter and the migrated distal part were planned to remove. The remnant catheter and reservoir were taken by surgically under local anesthesia. For the migrated distal part, we inserted a 6F sheath into the right femoral vein by ultrasound (US)-guided percutaneous puncture. The migrated catheter part was subsequently captured near the proximal free part and moved into the sheath in the right femoral vein using a 6F Amplatz GooseNeck Snare Kit (Figure 1d and 1e). Then, the migrated fragment was removed successfully with venous sheath (Figure 1f). Venous puncture area was compressed a few minutes manually. There was no complication during these procedure.

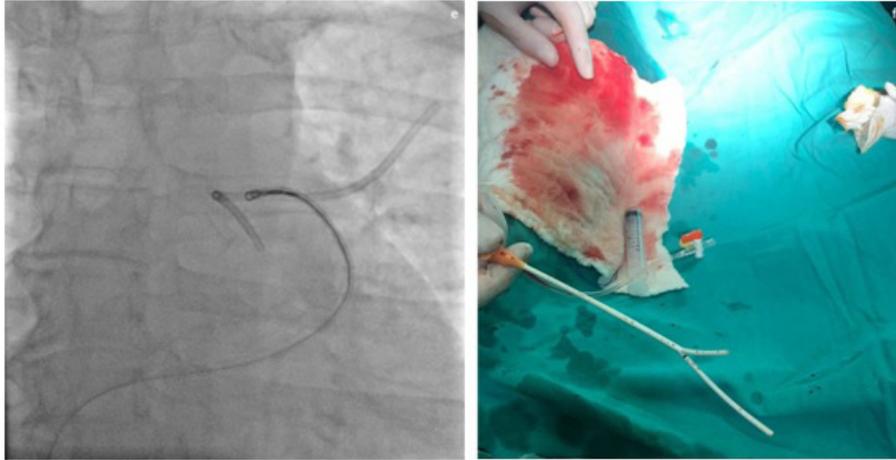


Figure 1: (a) Chest x-ray after TIVAP implantation shows the correct position of it. (b) Approximately 3 years after implantation, a twisting of catheter between the first rib and clavicle, compatible with pinch-off syndrome (arrow) was seen. (c) About 9 month later after (b) image, broken of the catheter from former twisted area and migration of distal part into the left pulmonary artery was detected (arrow). Note the remnant catheter and port reservoir (arrowhead). (d) With right femoral vein approach, the snare kit was moved to the dislodged catheter. (e) The migrated part was captured with snare system. (f) The broken distal part of catheter removed successfully with venous sheath.

4. Discussion

TIVAP has been used in the oncology routine by increasing patient comfort and easing chemotherapy application since the early 1980s [7]. It enables more benefits than other non-implantable systems with low infection rates and unlimited liberty in patients' daily activities. TIVAP consists of a catheter attached to a usually chamber shaped reservoir that is implanted into subcutaneous tissue on the chest wall. The catheter enters the central veins and the tip of it ends in the atriocaval junction or in the right atrium. Although its proper implantation and careful use, approximately 5 to 15% of patients have some complication in short- and long-term [3, 8]. Most common early complications seen within the first 30 day include usually procedure-related troubles such as catheter malpositioning, arterial injury and hematoma, pneumo-hemothorax or cardiac tamponade. In late-stage complications encountered after the 30 days from implantation include infection, catheter thrombosis and stenosis or catheter fracture with extravasation, mostly result with catheter withdrawal. Mainly two central venous accesses are chosen for the TIVAP: the subclavian vein (SV) or the internal jugular vein (IJV). Many reports support the preferential use of the IJV with its low complication rate both in the early and

late period after implantation [1, 5, 9]. However, few studies have shown no differences in the incidence of complications between this two venous placement [5, 10, 11].

Fractured of port catheter is another delayed complication usually seen in delayed phase due to several mechanisms. Loose connection between the reservoir and catheter, mechanical damage of catheter during tunneling or implantation and exhaustion fracture because of sharp angle especially in the venous access site are the most common causes [12]. In patients with TIVAP introduced via SV, like our patient, the catheter part passing through the clavicle and the first rib is also a fracture point called as pinch-off syndrome [6]. In this situation, port catheter fracture usually happens during catheter removal. Some studies reported that US-guided puncture of the lateral site of SV near the axillary vein segment could avoid this syndrome [13]. Choosing IJV access is another suggestion but it should be kept in mind that catheter fracture can also occur less commonly in the IJV route due to repetitive neck motions [14].

Migration of fractured catheter is a very rare complication. The displaced catheter can move to the right ventricle and pulmonary artery following flow direction, as in our case, leading to life-threatening conditions such as heart damage, pulmonary embolism

and obstruction result with distal embolisation [3, 6]. Catheter displacement should be suspected if infusion is not being easy or there is distention around the catheter tract. But sometimes, patient may be clinically asymptomatic and catheter migration into the defined areas above can be identified on a routine chest x-ray, just like in our patient. A chest radiography can be used to show the TIVAP integrity and catheter position. Sometimes, CT of chest or pulmonary CT angiography can be needed particularly in symptomatic patient showing right ventricle dysfunction or thromboembolic event. Radiologic imaging has become very necessary not only peri-procedural assessment and postoperative follow-up for detection of possible complications but also to plan intervention such as removal of fractured and migrated catheter [15]. Early removal of dislodged catheter is necessary to prevent pulmonary embolism and distal embolisation. Thoracotomy was the principal technique to retrieve the migrated fragment in the past but parallel to developments in technology, interventional transvenous techniques with minimal invasive procedures are effectively used nowadays [6, 16]. Endovascular snare systems, with the help of a guide wire or pigtail can be used easily and reliably for the retrieval of fractured catheter [17].

5. Conclusion

The fracture and migration of port catheter occasionally occur in the late phase after TIVAP implantation. Pinch-off syndrome is one of the reasons for broken catheters besides disordered connection between port parts, mechanical damage and fatigue fracture because of sharp angle. Radiologic techniques have an important role in both imaging during the intervention or follow-up and planning intervention. Fractured part of the catheter can be easily and safely removed with minimally invasive percutaneous transvenous route.

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