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Total Implantable Venous Access Ports: Stuck Catheter during Manual Removal-Presentation of 2 Cases

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Abstract

Background: In the intravenous chemotherapy treatment of a neoplasm, the implantation of a total implantable venous access port (TIVAP) is a technique that is not without complications depending on the route used. However, its explant in principle is simple, fast and without complications. However, complications can occur, with the main one being a stuck catheter and subsequent possible breakage.

Summary: Two cases of rupture of the TIVAP catheter are presented; rupture occurred upon removal at 24 and 84 months after implantation. In the first case, 3 months after the rupture after the failed explant, the catheter migrated to the right ventricle; extraction was achieved with a loop snare through the right femoral vein. In the second case, after attempting extraction and verifying, after numerous attempts, that extraction was impossible, the distal end was fixed to the pectoralis major muscle to avoid possible migration.

Conclusion: If complete extraction of the catheter is not possible, an option is fixation distal to the muscular plane to avoid rupture and possible migration.

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Introduction

Total Implantable Venous Access Port (TIVAP) is a system formed by a catheter that is introduced through a peripheral vein (cephalic, axillary, subclavian or jugular) whose distal end is lodged in the atrium and that is connected to a chamber or port that is lodged subcutaneously and is used for the intravenous administration of chemotherapy, drugs or contrasts, for nutritional support and to obtain blood samples (Figure 1).

From September 2008 to December 2022, 1129 TIVAPs were implanted by a single vascular surgeon, 913 (80.1%) by cephalic vein cut-down (CVC) and 216 (19.1%) by subclavian vein puncture (SVP). In all cases, a NuPport HP * (PHS MEDICAL, Fuldabrück, Germany) device with a unicameral titanium port and silicone catheter with an external diameter of 9.6F was used. Likewise, 341 (30.2%) of them were explanted for various reasons, the main one being the end of the treatment (87.1%). On 20 occasions (5.8%), its extraction was difficult, and in two of them (0.06%), it was impossible. These cases are presented.

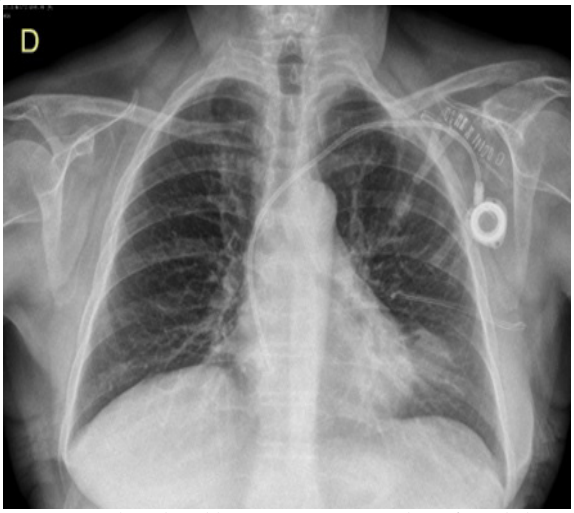

Figure 1: Total Implantable Venous Access Port by Left Cephalic Vein cut-down.

Case 1: A 37-year-old woman underwent lumpectomy and lymphadenectomy in 2018 for a right breast neoplasm. A TIVAP was implanted via the left SVP. In 2020, she attends for the explant after finishing the treatment. During the intervention, great resistance to extraction is verified, and due to repeated attempts, applying greater force breaks the catheter, extracting the distal part, but the proximal fragment remains fixed in the subcutaneous tissue. In a control scanner 3 months after the rupture (Figure 2a), migration of the distal fragment to the right ventricle was observed. In a medical-surgical session, its extraction is decided in principle by endovascular methods. In the hemodynamic room and by puncture of the right femoral vein and 16F introducer (Medtronic, Minneapolis USA), a pig tail catheter (AngioDynamics, New York USA) was used for mobilization of the catheter and later extracted by means of a loop snare of 30 mm (EV3, Bonn Germany) (Figure 2b). The patient is currently asymptomatic.

Case 2: A 68-year-old woman was implanted in 2012 with a TIVAP via the left SVP for postoperative chemotherapy treatment after a hemicolectomy for a colon neoplasm with liver metastases. In 2019, explant was indicated due to the end of treatment. During the intervention and after releasing the port from the pectoralis major, an attempt was made to manually remove the catheter, but after numerous attempts, it was not achieved, so to avoid fragmentation and possible subsequent migration, it was decided to fix the catheter 2 cm distal to the pectoralis major muscle plane using 3 stitches with Prolene (Ethicon, New Jersey USA). A control chest X-ray in January 2023 shows the catheter attached to the distal end of the pectoralis major muscle (Figure 3), and the patient is currently asymptomatic.

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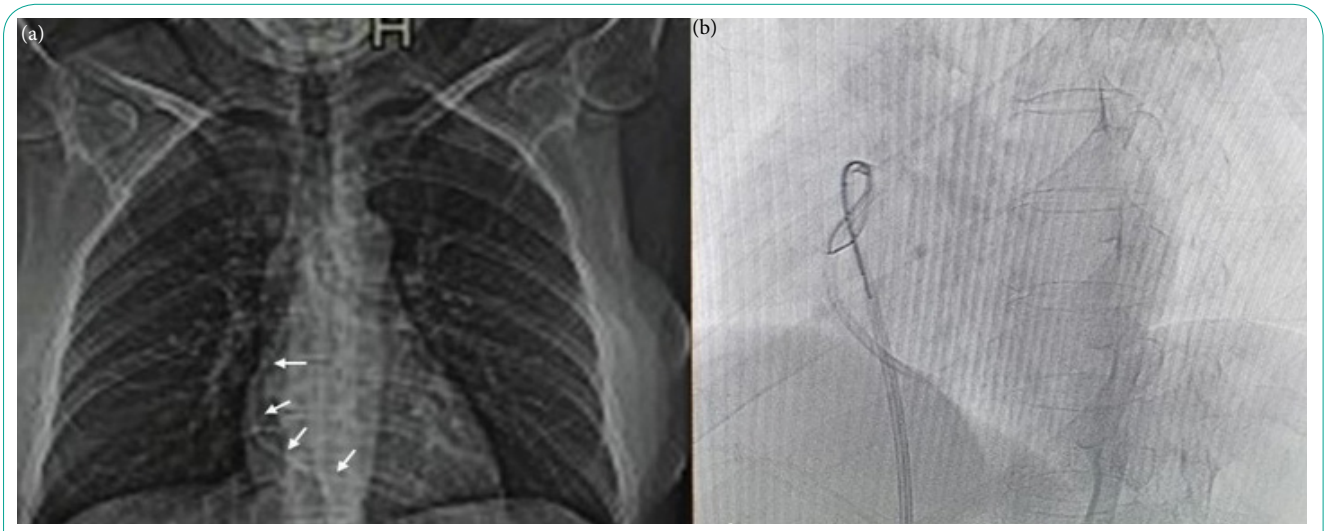

Figure 2: (a) Catheter in the Right Ventricle (b) Catheter retrieved with a loop snare.

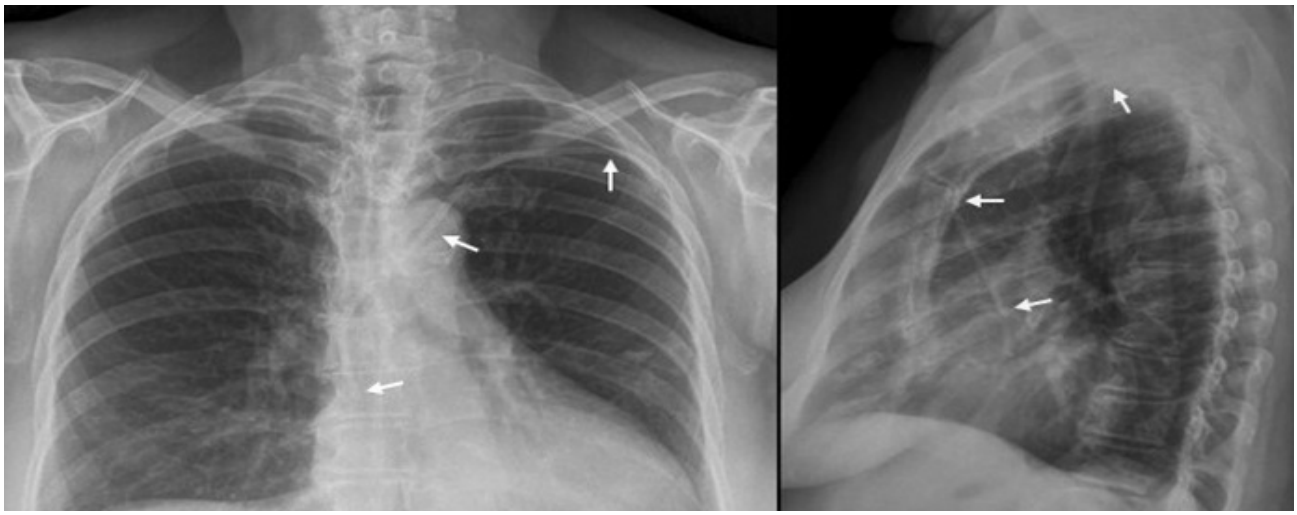

Figure 3: Radiographic antero-posterior and lateral control of the catheter left in situ.

Discussion

Chatani [1] reports that of 514 TIVAP extractions, 7.4% were difficult and that when the systems were extracted after 6 years, this percentage rose to 44.0%. The incidence of catheter breakage during extraction is less than 1.0% in the literature [2], and it usually occurs in young patients with hematological tumors and implantation times greater than 20 months [3,4], in our case, it was 0.06%. With regard to the type of catheter, authors such as Akgun [5] believe that those made of silicone are more fragile than those of polyurethane with a greater chance of breakage, while others such as Wilson [3] think the opposite, that they are those of polyurethane. In this study, the broken catheter was made of silicone. The introduction of the catheter by SVP and possible pinch-off syndrome would be another possible breakage factor [6]. In our cases, breakage occurred through this route. Possible causes responsible for fixation and the impossibility of extraction include the formation of a fibrin sleeve adhered to the venous wall and its possible subsequent calcification [7], formation of bridges between the catheter and the venous wall [8]. The effects of systemic chemotherapeutic regimens can be considered a precipitating factor

When we are faced with the difficult extraction of a TIVAP catheter, we can choose several techniques. The first is to attempt repeatedly and with increased force its extraction with the possible risk of breakage, fragmentation and subsequent migration, as was our first case. Another is to carry out its extraction by various methods, such as endovascular dissection of the space between the catheter and the area of adhesions and subsequent recovery with a loop snare through the right femoral vein, as proposed by Chatani [1]. In another technique to remove the catheter, a guidewire was inserted to straighten the catheter, and then a "push" force was applied to loosen the adherence of the central vein. The catheter was then successfully removed. We believe this is a new and simple method of removing a Stuck Catheter [11]. When we find a free intravascular foreign body, a very useful technique is extraction through the use of loop snares (e.g., Amplatz gooseneck snare, Trefoil En-Snare, Dormia baskets)[12], as in our case. In earlier times, conventional (open) surgery was the treatment of choice for both TIVAP and hemodialysis catheter removal [13,14].

In 1.5% of cases [3], the catheters are left in situ due to the impossibility of their extraction. In these cases, the port is released from the catheter, and the distal end is fixed by means of a suture both to the muscular and subcutaneous planes, as in our second case to avoid possible later migration. In principle, nonextraction of the catheter does not usually cause complications, as confirmed by Wilson and other authors [3,4]. The possible complications of this technique are catheter infection, which according to the literature in functioning catheters is between 0.0 and 22.0% [15], but we did not find statistics on isolated catheters. If such infection occurs, it must be extracted since the antibiotic treatment alone cannot eradicate the infection from the catheter due to the formation of a peri-catheter layer that is resistant to antibiotics [16], in this case, it would be extracted. The other possible complication is deep venous thrombosis, which has an incidence between 2.0% and 12.8% [17] but also refers to functioning catheters since there are no studies on this subject. However, it would be treated in the same way, in principle with anticoagulant drugs, and in special cases, it could require removal of the catheter.

Conclusions

TIVAPs should be explanted at the end of intravenous treatment to avoid possible complications. There is no consensus on the type of catheter that fractures more easily. Given the possibility of fragmentation of the catheter due to great difficulty when trying to explant it, leaving it in situ and fixing it distally to the muscle is a good and simple solution with few complications

Competing Interests

The author declare that he has no competing interests.

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