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Pinch-Off Syndrome Causing Fracture and Migration of an Implantable Venous Port Catheter: A Radiological Case

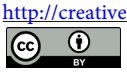
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Abstract

Background: Totally implantable venous access ports are widely used in patients receiving chemotherapy. Although generally safe, subclavian placement may rarely be complicated by mechanical compression of the catheter between the clavicle and the first rib, known as pinch-off syndrome, which can progress to catheter fracture and migration. Case presentation: A 42-year-old woman with invasive carcinoma of the left breast underwent left mastectomy with placement of a tissue expander and subsequently required a permanent subcutaneous venous access port for chemotherapy. One month after port implantation, she developed self-limiting palpitations and difficulty obtaining blood return from the device. Radiological assessment demonstrated fracture of the catheter at its entry into the right subclavian vein, most likely related to entrapment and repeated friction in the costoclavicular space. The patient reported performing upper-extremity exercises at the gym. The migrated catheter fragment was retrieved by an endovascular catheter-based procedure, followed by removal of the port and the remaining non-functioning catheter. The palpitations resolved after treatment. Conclusion: This case illustrates the diagnostic value of radiological imaging in recognizing pinch-off syndrome and clarifying the mechanism of catheter fracture and migration. New catheter dysfunction, particularly impaired blood return, should prompt evaluation for a mechanical complication in patients with subclavian venous access ports.

Keywords

Pinch-Off Syndrome, Implantable Venous Port, Catheter Fracture, Catheter Migration, Subclavian Vein, Computed Tomography, Endovascular Retrieval

1. Introduction

Totally implantable venous access devices provide reliable long-term vascular access for chemotherapy and other prolonged intravenous treatments. Despite their clinical utility, they may be associated with infectious, thrombotic, and mechanical complications. Catheter fracture is uncommon but potentially serious because a detached fragment may migrate centrally and produce symptoms or other complications [1]-[3].

Pinch-off syndrome is a mechanical complication associated with the subclavian route. It results from compression of the catheter between the clavicle and the first rib, with repetitive mechanical stress potentially leading to progressive narrowing and eventual fracture [1] [4]. Catheter malfunction, including difficulty aspirating blood, may be an early warning sign; migration of a fractured fragment can also be associated with palpitations or arrhythmias [2] [5]. We present a radiologically illustrative case of early catheter fracture and migration after implantation of a permanent subcutaneous venous access port.

2. Methods

This report describes a single clinical case referred from the Oncology Day Hospital for evaluation of a recently implanted permanent subcutaneous venous access port. The clinical presentation, radiological findings, and therapeutic management were reviewed. Imaging was used to assess catheter integrity, identify the site and probable mechanism of fracture, and demonstrate migration of the detached catheter fragment. The submitted imaging set includes conventional chest radiography, thoracic computed tomography (CT), and three-dimensional CT reconstructions.

3. Results

A 42-year-old woman had been diagnosed with invasive carcinoma of the left breast and underwent left mastectomy with placement of a left breast tissue expander. Chemotherapy was initiated, requiring implantation of a permanent subcutaneous venous access port. The intact catheter was documented on the initial chest radiograph (**Figure 1(A)**). One month after implantation, she experienced self-limiting palpitations together with difficulty obtaining blood return from the port.

Radiological evaluation demonstrated fracture of the port catheter at its entry into the right subclavian vein (**Figure 1(B)** and **Figure 1(C)**). Three-dimensional CT reconstructions depicted the fracture site and its relationship to the adjacent costoclavicular anatomy (**Figures 2(A)-(C)**). The location of the fracture was compatible with entrapment and repeated friction within the space between the clavicle and the first rib, consistent with pinch-off syndrome. The patient had been performing upper-extremity exercises at the gym. Chest radiography also demonstrated migration of the detached catheter fragment (**Figure 1(C)**), which was further localized on axial and sagittal CT images (**Figures 3(A)-(C)**).

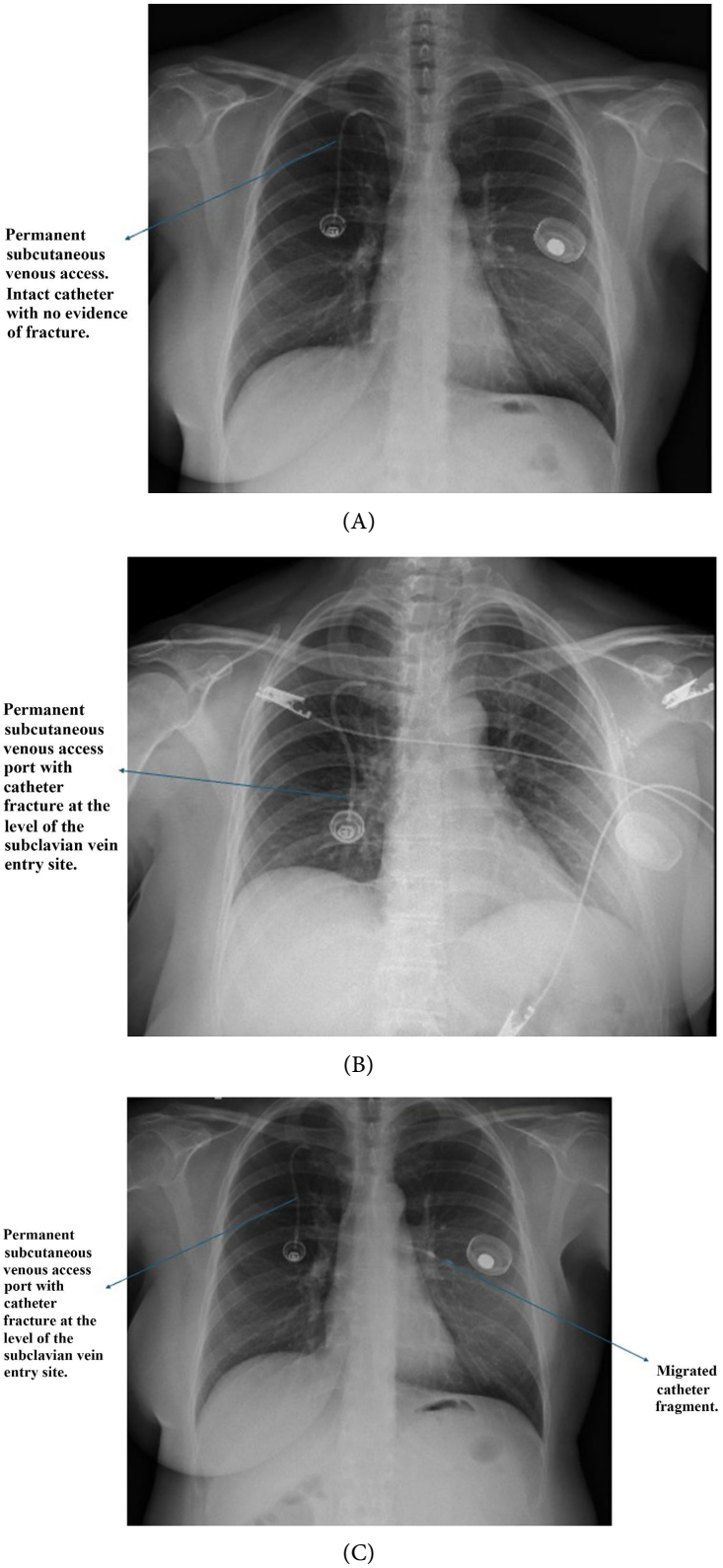


Figure 1. (A) Chest radiograph obtained before fracture, showing the permanent subcutaneous venous access port with an intact catheter. (B) Chest radiograph demonstrating catheter fracture at the right subclavian venous entry site. (C) Chest radiograph demonstrating catheter fracture and the migrated catheter fragment.

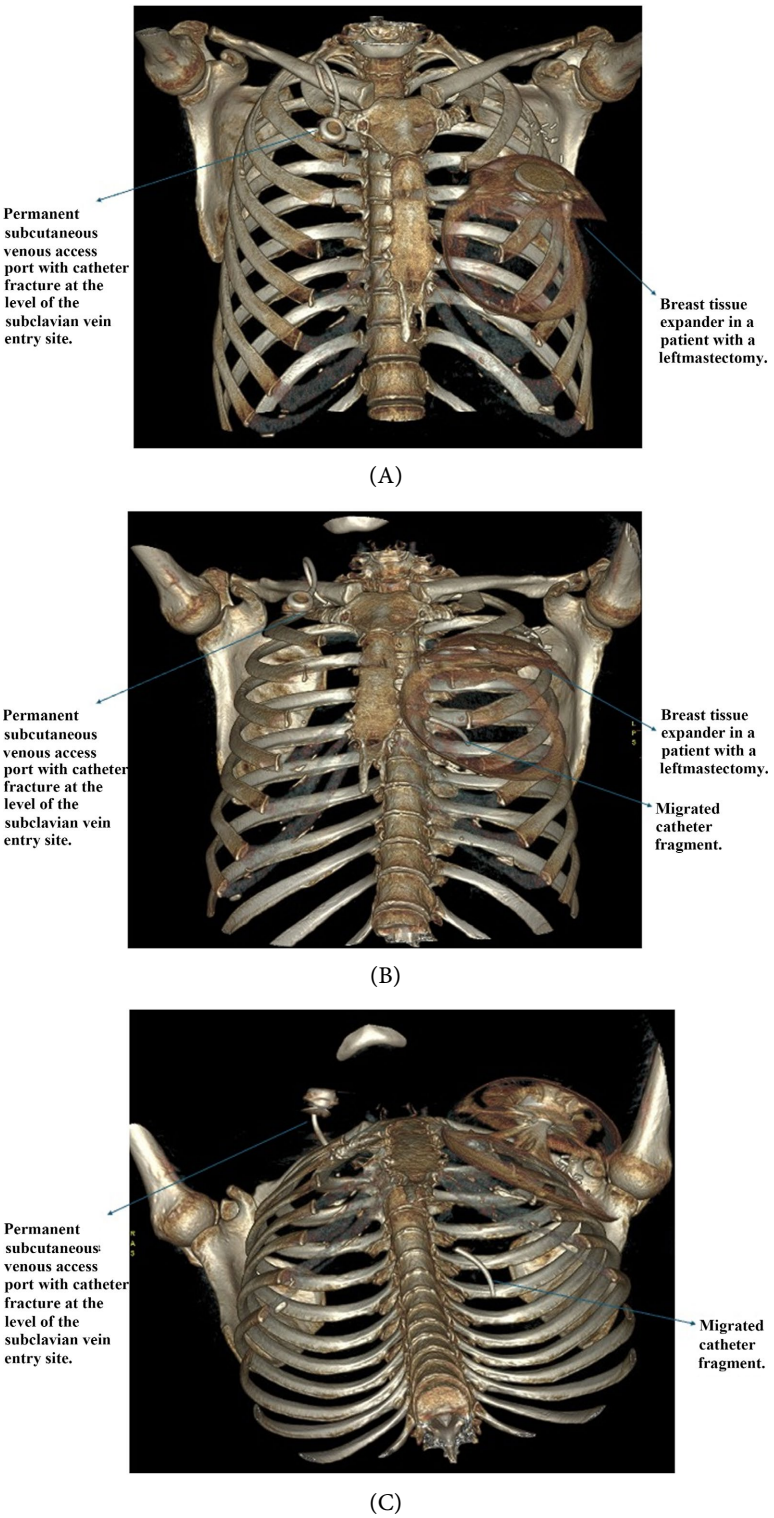
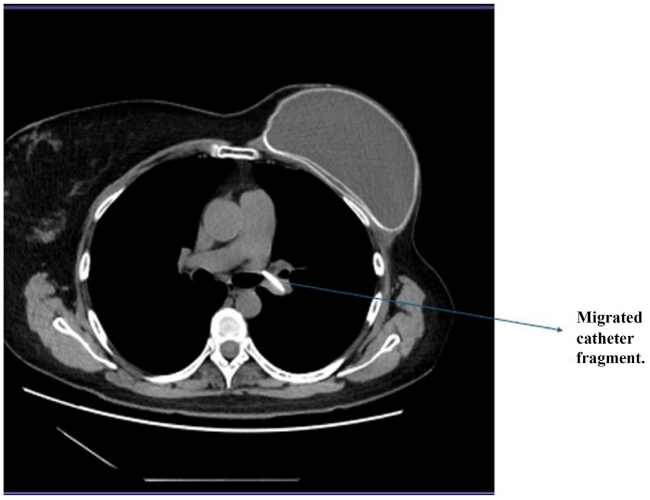
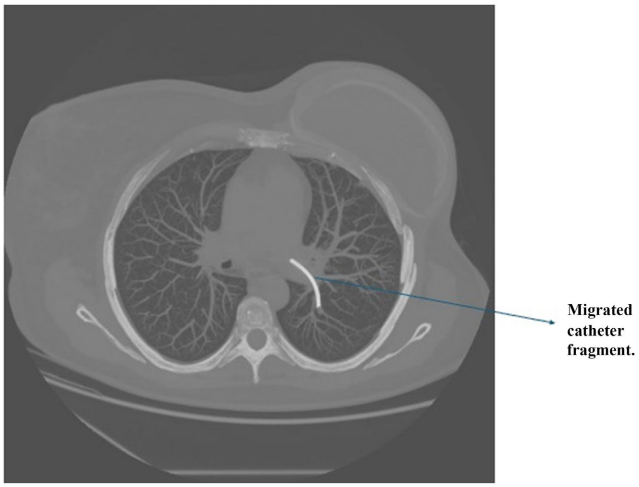


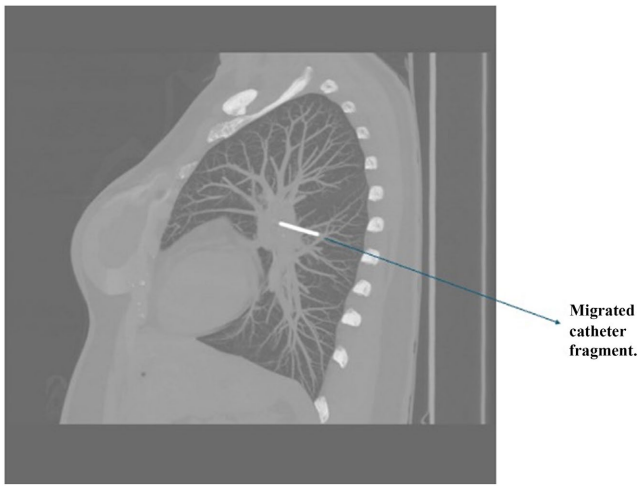
Figure 2. (A) Three-dimensional CT reconstruction showing the permanent subcutaneous venous access port with catheter fracture at the right subclavian venous entry site and the left breast tissue expander. (B) Three-dimensional CT reconstruction demonstrating the fractured port catheter and the migrated catheter fragment, with the left breast tissue expander also visible. (C) Oblique three-dimensional CT reconstruction showing the catheter fracture at the right subclavian entry site and the migrated catheter fragment.



(A)



(B)



(C)

Figure 3. (A) Axial thoracic CT image demonstrating the migrated catheter fragment. (B) Axial CT reconstruction demonstrating the migrated catheter fragment within the thorax. (C) Sagittal CT reconstruction demonstrating the migrated catheter fragment.

The migrated fragment was successfully retrieved by an endovascular catheter-based procedure. The port and the remaining non-functioning catheter were subsequently removed. Following treatment, the patient's palpitations resolved.

4. Discussion

Pinch-off syndrome was originally described as compression of a subclavian venous catheter between the clavicle and first rib. Radiographic appearances have been graded from an altered catheter course without narrowing to complete fracture [1]. Repeated costoclavicular compression can weaken the catheter wall and ultimately produce transection and embolization of the distal segment.

Clinical presentation is variable. Catheter malfunction is an important warning sign, particularly difficulty withdrawing blood or resistance during infusion. Patients with a migrated fragment may remain asymptomatic or may develop cardiopulmonary symptoms, including palpitations and arrhythmias [2] [3]. In the present case, the combination of impaired blood return and new self-limiting palpitations prompted radiological investigation only one month after implantation.

The principal educational value of this case lies in the complementary radiological demonstration of the complication. Conventional chest radiography can rapidly identify catheter discontinuity and migration, as illustrated by the progression from an intact catheter to fracture and fragment migration (**Figures 1(A)-(C)**). CT can help characterize the course and position of the migrated fragment (**Figures 3(A)-1(C)**), while three-dimensional CT reconstructions illustrate the anatomical relationship of the fracture site to the clavicle and first rib (**Figures 2(A)-1(C)**). These complementary views may improve visual understanding of the costoclavicular mechanism, particularly for teaching and multidisciplinary review.

Once fracture and migration have occurred, retrieval of the detached catheter fragment is generally pursued because of the potential for further migration and cardiopulmonary complications. Percutaneous endovascular retrieval is commonly used and can avoid open surgery when technically feasible [3] [6]. In this patient, endovascular retrieval was successful, the residual port system was removed, and the symptoms resolved.

This report is limited to a single patient and is intended primarily to emphasize the radiological and educational features of the complication rather than to establish causality. Although the patient reported upper-extremity exercise, the available clinical information does not establish exercise as the cause of catheter fracture. The anatomical site of fracture and imaging appearance support costoclavicular compression as the probable mechanism.

5. Conclusion

Pinch-off syndrome should be considered when a subclavian implantable venous port develops new dysfunction, particularly difficulty obtaining blood return. Catheter fracture may lead to fragment migration and symptoms such as palpitations. Chest radiography, CT, and three-dimensional reconstructions can provide

complementary information regarding catheter integrity, migration, and the underlying costoclavicular mechanism. Early recognition allows timely endovascular retrieval and removal of the dysfunctional device.

Patient Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical images.

Author Contributions

Juan Carlos Díaz Monrové was responsible for the clinical case conception, review of the clinical and radiological information, manuscript preparation, critical revision, and approval of the final version.

Data Availability

The data supporting this case report are contained within the article. Additional clinical information is not publicly available in order to protect patient confidentiality.

Conflicts of Interest

The author declares no conflicts of interest.

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