



## Case Report

## Removal of Retained Port-A Catheter in Central Lines in a Pediatric Population

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### Abstract

Port-A catheter implantation is relatively easy and safe in today's medical practice. However, there are still occasional reports about retained Port-A catheter fragments and their retrieval in adult patients. This kind of problem is also encountered in pediatric patients, but they seldom receive intervention for retained catheter fragment removal. We present four cases of retained Port-A catheter in the superior vena cava and suggest that when manual extraction of Port-A is not feasible, angiographic-assisted device removal can safely be used to accomplish the task. (*Tzu Chi Med J* 2007;19(4):245–248)

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## 1. Introduction

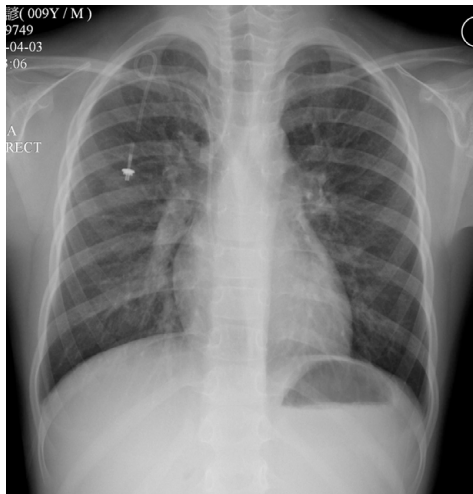
Port-A catheter implantation has become a common procedure for chemotherapeutic drug delivery in today's medical practice. The implantation is relatively easy and safe, but there are occasional reports of retained Port-A catheter fragments and their retrieval in adult patients (1,2). Pediatric patients also experience this kind of problem but seldom receive intervention for retained catheter fragment removal (3–6).

## 2. Case reports

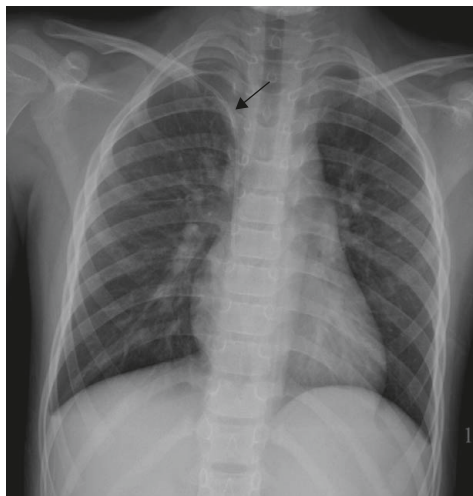
### 2.1. Case 1

A 10-year-old boy with the diagnosis of rhabdomyosarcoma received a complete course of chemotherapy

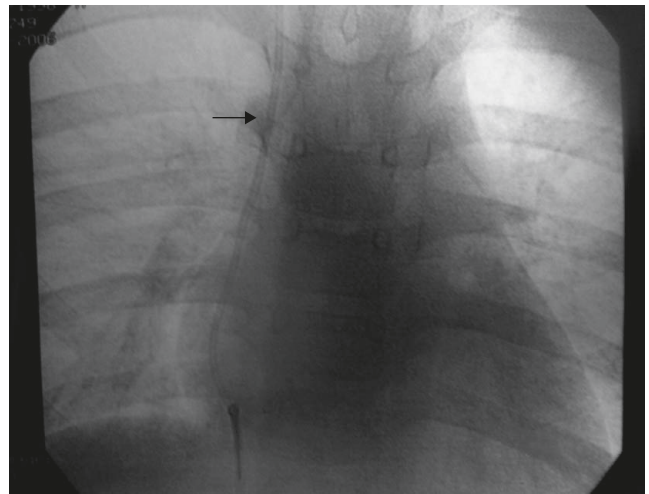
and was noted to have complete remission. Port-A catheter had been placed for more than 6 years and its removal was performed in April 2006 (Figs. 1 and 2). Marked adhesion between the Port-A catheter and the surrounding soft tissue was noted. Soft tissue dissection was performed down to its entry site into the right external jugular vein and then into the internal jugular vein. The port and a portion of the catheter were removed but the other portion of the catheter could not be removed and was retained in the superior vena cava (SVC). Angiographic-assisted device removal using EnSnare (MDTech, Gainesville, FL, USA) was performed on the same day to remove the retained tube (Figs. 3 and 4). The procedure was done smoothly and safely with few complaints and little discomfort. The extracted catheter fragment was sent for pathologic examination, which revealed a calcified fibrin sheath around the tube (Figs. 5 and 6).



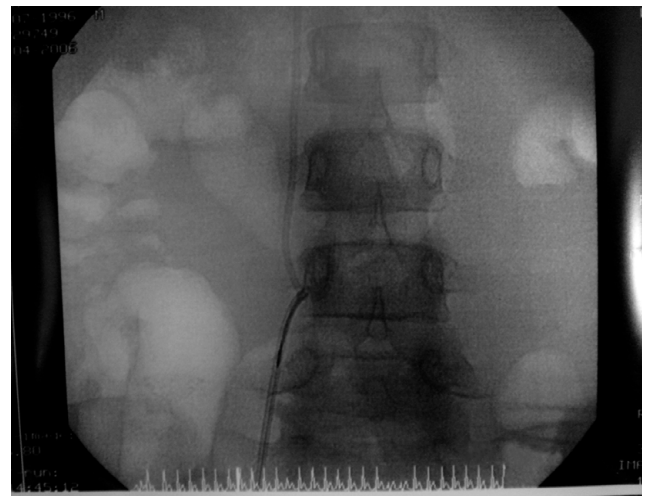
**Fig. 1 — Preoperative chest X-ray.**



**Fig. 2 — Retained Port-A catheter (arrow).**



**Fig. 3 — The “snare” was pulling down the Port-A (arrow) fragment from the superior vena cava to the inferior vena cava.**



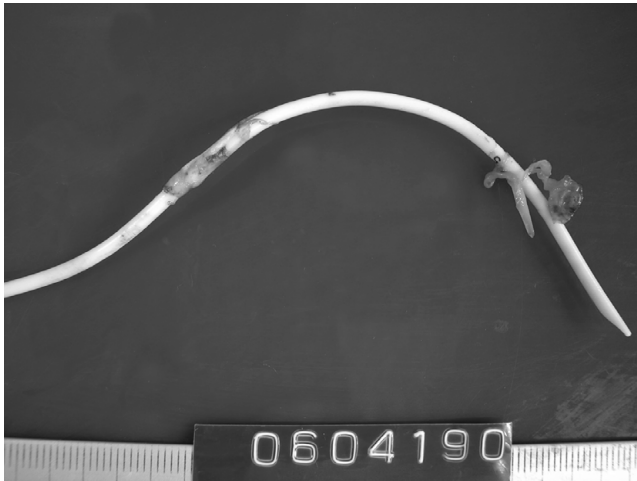
**Fig. 4 — The Port-A fragment was pulled down to the level of the lumbar spine.**

## 2.2. Case 2

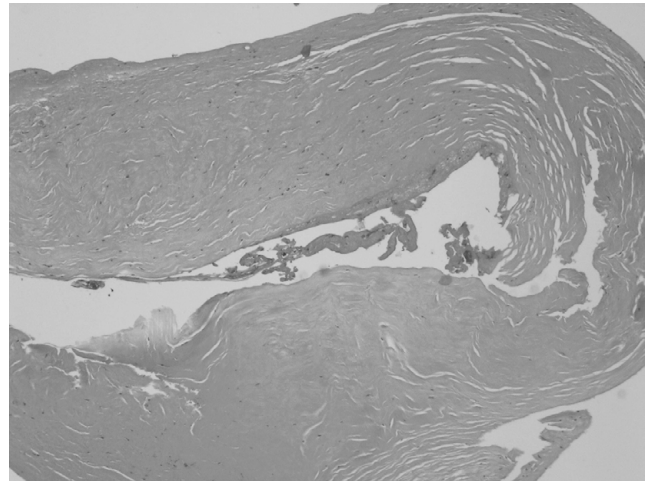
A 9-year-old girl with a diagnosis of Wilms' tumor was noted to have complete remission of malignancy after receiving several courses of chemotherapy. Port-A catheter had been placed for almost 3 years and removal was arranged in July 2001. Severe adhesion between the Port-A tube and the entry site of the right external jugular vein was noted. We had to cut off the Port-A tube at this site and left a segment of it in her SVC. Angiographic-assisted device removal was performed successfully 5 days after the device was left. The whole process was painless and uneventful.

## 2.3. Case 3

A 13-year-old girl with a diagnosis of acute lymphocytic lymphoma (ALL) received complete courses of chemotherapy and had complete remission. Her clinical course is listed in Table 1. The Port-A tube was cut off at the venotomy into the right internal jugular vein after difficulty in manual extraction. Angiographic-assisted device removal with EnSnare (MDTech) was performed on the same day the Port-A tube was removed. The procedure was done safely with only a few complaints of local tenderness of the right femoral wound.



**Fig. 5 — Removed Port-A catheter with fibrin sheath wrapping.**



**Fig. 6 — Fibrin sheath: collagen fibers with focal calcification.**

**Table 1 — Characteristics of the four pediatric patients with retained Port-A catheter**

Gender/Age (yr)	Diagnosis	Site of retained Port-A	Implantation time	Removal time
M/10	Rhabdomyosarcoma	Superior vena cava	1999/06	2006/04
F/9	Wilms' tumor	Superior vena cava	1998/09	2001/07
F/13	ALL	Superior vena cava	2001/08	2005/12
M/4	ALL	Superior vena cava	2005/08	2006/09

ALL = acute lymphocytic lymphoma.

**2.4. Case 4**

A 4-year-old boy with a diagnosis of ALL is receiving chemotherapy for his disease at the time of writing. Partial occlusion of his Port-A unit was noted 6 months prior to this admission and complete occlusion occurred in September 2006. Removal of this dysfunctional Port-A was performed in the same month. The Port-A catheter could not be removed after venotomy and a pediatric cardiologist was consulted for angiographic-assisted device removal. The procedure was performed safely 4 days after the initial attempt with no complaints coming from the patient.

**3. Discussion**

These four examples of retained Port-A catheter fragments are very good demonstrations of foreign body reactions (fibrin sheath formation) (7). The fibrin sheath engulfs the catheter tubes, rendering them difficult to be extracted out of the patients' blood vessels. According to a report (6), our four cases of retained Port-A catheters were graded as 4 for their difficulty in removal and were not able to be removed

using long venotomy. Although these catheter tubes could not be extracted manually (for fear of massive bleeding), the fragments left in the SVC were extracted using angiographic-assisted devices.

Catheter retention after Port-A implantation occurs very rarely in children. Two reports in the pediatric literature published six examples of retained fixed catheter fragments in the SVC for up to 30 months without dislodgment or any complications (3,6). However, considering the long expected lifespan of the patients, the absence of complications in the short term does not exclude future harm (6). Our way of doing this was not to just "leave it in there"; instead, we used an angiographic-assisted EnSnare procedure to extract them. Thus, we possibly avoided further migration and dislodgment of the catheter fragments, which might potentially result in major complications (e.g., catheter embolization in the pulmonary artery or pulmonary artery thrombosis) or even fatal complications if left untreated (4,8–12).

Fibrin sheath formation is caused by foreign body reactions, local intima trauma, and also the biological/inflammatory process that occurs at the site of central line insertion into the venous system (3). For prevention of catheter retention by fibrin sheath formation,

we suggest more gentle soft tissue dissection using "sharp" instead of "blunt" dissection to create a clear-cut plane when implanting Port-A units. In addition, "snug" (not tight) knot placement is advised when fixing the Port-A tube at the entry site into the external jugular vein to minimize intimal trauma. When intimal hyperplasia and fibrin sheath formation occur, it causes constriction of the tubes and makes the catheter difficult to extract. Optimal tissue handling actually decreases the chance of local inflammation and the occurrence of difficult-to-extract catheter fragments.

While retrieving a retained catheter from out of the external jugular venotomy, opposing directional forces between the surgeon's hand and the pericatheter fibrin sheath cause tension over the segment of the catheter just outside of the venotomy. Extreme stretching and thinning of the catheter is visible and breakage of the catheter is expected if increased force is applied by the hand. If the direction of the retrieval force is applied downward and directly onto the fibrin sheath, there will be no significant forces in opposite directions. If the EnSnare grips the catheter near the venotomy, or if it cuts through the fibrin sheath (as in our case) and is applied to the outer surface of the catheter directly, then the catheter can be retrieved from the right femoral vein rather easily without significant stretching or thinning. When we pulled the retained catheters out using EnSnare, we "peeled off" a piece of the vessel wall from the external jugular vein (or even, subclavian vein). Because blood flow in the veins is low-pressure, the surrounding soft tissues apply a tamponade effect on the hematoma, and there is usually little harm and the incident goes unnoticed. However, if forceful manual extraction is applied with open dissection and venotomy, massive bleeding may occur from the vessel wall defect, making the situation hard to control and even dangerous.

According to Jones and Giacomantonio (3), retained catheter fragments might be safe for a period of time but there will always be a possibility of migration of the catheter fragments, which may cause major or even fatal complications (4,8-12). We presented four

cases of retained catheters in the SVC, which were all removed safely using angiographic-assisted EnSnare. In our opinion, we suggest that angiographic-assisted device removal is a safe way of dealing with difficult manual extraction of Port-A catheters.

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