

# Incomplete Removal of Totally Implantable Venous Devices : Report of 2 Cases

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## INTRODUCTION

Totally implantable venous devices (TIVDs) have been used increasingly for patients requiring long-term chemotherapy, total parenteral nutrition, and fluid replacement. Many kinds of complications associated with TIVDs have been reported including infection, thrombosis, venous perforation, catheter leakage, dislodgment and fall out, subintimal entrapment, pneumothorax, and tip migration to neighboring veins<sup>1,2</sup>. Retained intravascular fragments after removing a TIVD are a rarely described complication. We report two recent cases of incomplete TIVD

removal.

## CASE REPORTS

Case 1 : 16-month-old girl was diagnosed with an intestinal pseudo-obstruction and a TIVD inserted into the right subclavian vein (SCV) for total parenteral nutrition. When she was 45-month-old, she was admitted for a removal of Candida-infected TIVD. However, she underwent open heart surgery due to an organized thromboembolism obstructing the pulmonary artery that developed after removing a TIVD with a catheter infection. After 1 month later, TIVD was reinserted at right SCV. At the age of 67-months, she was admitted for a catheter infection again and the laboratory study and echocardiogram at that time suggested a Candida-infected catheter

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with vegetation at the tip (Fig. 1a). The removal of TIVD was attempted, but complete removal was impossible due to a severe adhesion between the catheter and the right SCV. Intraoperative trans-esophageal echocardiogram suggested an adhesion with a thrombus along the superior vena cava (SVC), and the catheter was eventually fractured inside the SVC during the operation (Fig. 1b, 1c). After unsuccessfully removing the residual catheter in the SVC by radiological intervention, the patient

underwent open heart surgery and the residual catheter, organized thrombi and vegetation in the SVC and right atrium were removed clearly.

Case 2 : A 79-month-old girl visited the outpatient clinic with a TIVD that had been unused for 2 years. She underwent abdominal wall repair and a small bowel segmental resection for gastroschisis, small bowel atresia, and microcolon after birth and several reoperations for recurrent ileus until the age of 13-months. The TIVD was inserted through the left IJV

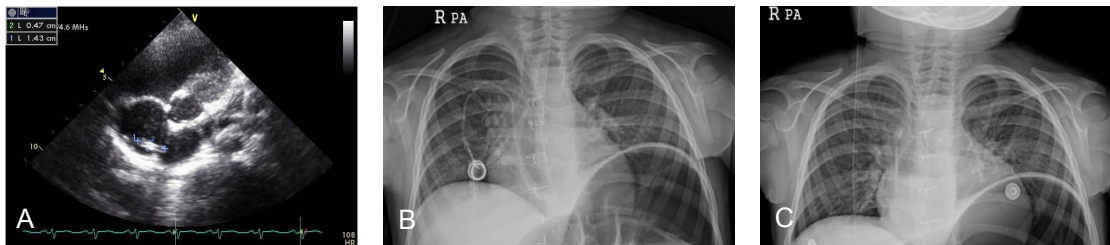


Fig. 1-A. Remained TIVD with vegetation within RA after TIVD removal operation on echocardiogram

Fig. 1-B. TIVD inserted through Rt. SCV before a removal operation

Fig. 1-C. Incomplete removed TIVD

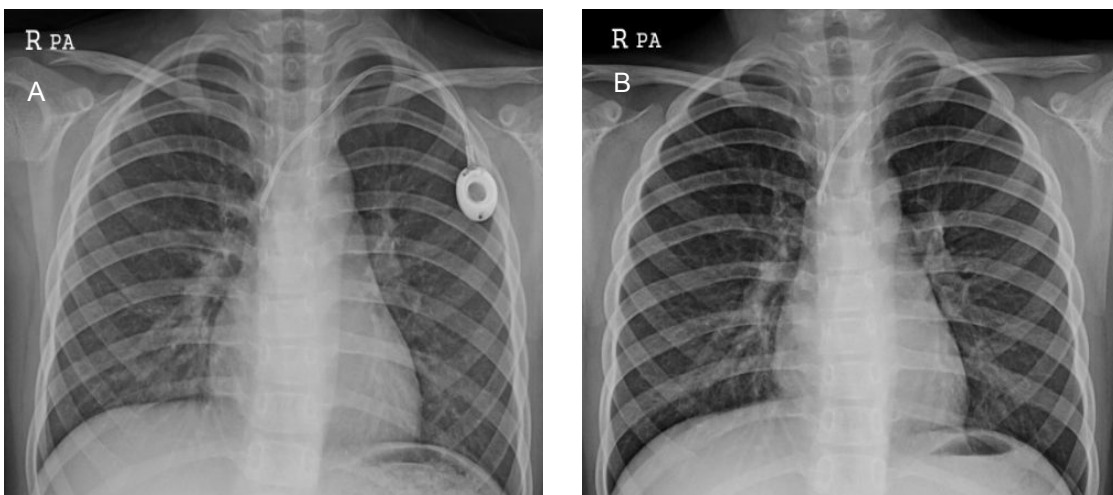


Fig. 2-A. TIVD inserted through left IJV before a removal operation.

Fig. 2-B. Remained TIVD after the operation

for total parenteral nutrition when she was 42-months during an episode of pneumonia and ileus, then the patient was lost to follow-up for 2 years. Elective removal operation of the TIVD was attempted, but retraction of the catheter was impossible even after a full dissection of the catheter and exploration of the neck around the insertion site due to severe adhesion of the catheter to the left IJV. The catheter was cut abruptly just proximal to the vein insertion site. After 12 months of follow-up, the catheter remains in the SVC without complications (Fig. 2).

## DISCUSSION

Few reports have considered the complications that occur at the time of TIVD removal such as a retained fixed catheter fragment. The incidence of retained intravascular fragments after elective removal is 2% of the patients with central venous catheters (CVCs) in some reports<sup>3</sup>, but there is still a lack of consensus regarding the optimal management of this complication.

Little is known about the underlying cause of this complication. Suojanen et al. reported that it seems to be related to the formation of a scar, often with calcification or the so-called "fibrin sheath". It seems to be precipitated by an initial

injury with an occasional thrombus and subsequent overlapping of tissue around the length of the catheter. Vein wall thickening along the length of the catheter and bridging from the vein wall to the catheter is observed with long-term catheters. The venous wall contains both cellular and acellular components including fibrin, collagen, and endothelial cells<sup>4</sup>. In patient 1, vegetation at the catheter tip was observed at the preoperative echocardiogram, but a histopathological review of the removed catheter tip was not performed, unfortunately, so we could not determine if the vegetation on the catheter tip was surrounded by a "fibrin sheath".

CVC fractures are often caused by mechanical problems. In 1984, Aitken et al. first described that the so-called pinch-off sign of the catheter between the clavicle and first rib could lead to late fracture and embolization of the distal segment into the heart and great vessels over time<sup>5</sup>. Some radiologists suggest a radiographic scale for the typical pinch-off sign, and insist on removing the catheter system within 6 months based on that radiological scale<sup>6,7</sup>. In our case 2, TIVD were inserted into the IJV, so neither case might be related to this mechanical problem.

Distal embolization may occur and lead to fatal complications if a fractured

catheter migrates to the heart or other organs<sup>8</sup>. The options for removing a fragmented catheter are to either leave the catheter fragment *in situ* or attempt either an intravascular retrieval or open surgical removal.

Percutaneous transcatheter retrieval of a fragmented catheter has become standard treatment, because this technique is simple, quick, and effective. This technique can be used in very small babies and avoids open surgical removal in high risk populations<sup>9</sup>. In patient 1, we attempted intravascular retrieval at first, but we could not remove the retained catheter, so the patient underwent open surgical removal. In patient 2, the parents of the patient refused a radiological intervention or surgical removal, so we followed her regularly through the outpatient clinic.

If the catheters are well fixed to the vein wall, the risk of migration may be small and the fragmented catheter could be left *in situ*, yet the long-term risk of thrombus formation is unknown<sup>10</sup>. To date, there are few reports about significant complications from leaving these lines; however, one mortality case due to sepsis during follow-up for a fragmented CVC *in situ* has been reported<sup>11</sup>. Thus, a larger study is needed to identify the safety of catheter fragments *in situ*.

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## Totally Implantable Venous Devices (TIVD)의 불완전 제거 2예

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Totally implantable venous devices (TIVD)는 장기간 항암 화학 요법이나 총 정맥 영양, 수액 치료가 필요한 환자에서 많이 사용된다. TIVD는 매우 유용하고 안전한 장치이지만, 이와 관련된 다양한 합병증이 보고 되어 왔다. 저자들은 카테터의 혈관 내 유착에 의해 TIVD의 제거가 불완전 하게 된 2 예를 경험하였기에 보고하는 바이다.

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**Index Words :** *Totally implantable venous devices, Incomplete removal, Children*

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