

# Dilated Thoracic Duct Terminal and Chyle Withdrawal from a Central Venous Port in Innominate Vein Stenosis

Chou-Ming Yeh<sup>1,2</sup>, Chia-Man Chou<sup>3,4,\*</sup>

<sup>1</sup>Division of Thoracic Surgery, Taichung Hospital, Ministry of Health and Welfare, Taiwan

<sup>2</sup>Department of Healthcare, Central Taiwan University of Science and Technology, Taichung, Taiwan

<sup>3</sup>Department of Surgery, Taichung Veterans General Hospital, Taiwan

<sup>4</sup>College of Medicine, National Yang-Ming University, Taipei, Taiwan

\*Corresponding author: Chia-Man Chou(cmchou@vghtc.gov.tw)

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**Abstract** Central vein stenosis is a rare complication that occurs after central venous port placement. We report a case of chyle withdrawal from a central venous port in a patient receiving chemotherapy for stage IV rectal cancer. Dilated thoracic duct terminal and innominate vein stenosis both were clearly shown in the angiography results, and innominate vein stenosis was resolved by performing percutaneous transluminal angioplasty.

**Keywords:** *Central Venous Port, Chyle, Innominate Vein Stenosis*

## 1. Introduction

Implantation of central venous port is associated with many complications. Central vein catheters might cause mechanical and chemical injury of the vascular intima from pharmaceutical infusions, thereby leading to central vein stenosis. We describe the case of a 54 year-old man with stage IV rectal cancer who experienced chyle withdrawal from a central venous port and had dilated thoracic duct terminal due to innominate vein stenosis. Several related studies were also discussed.

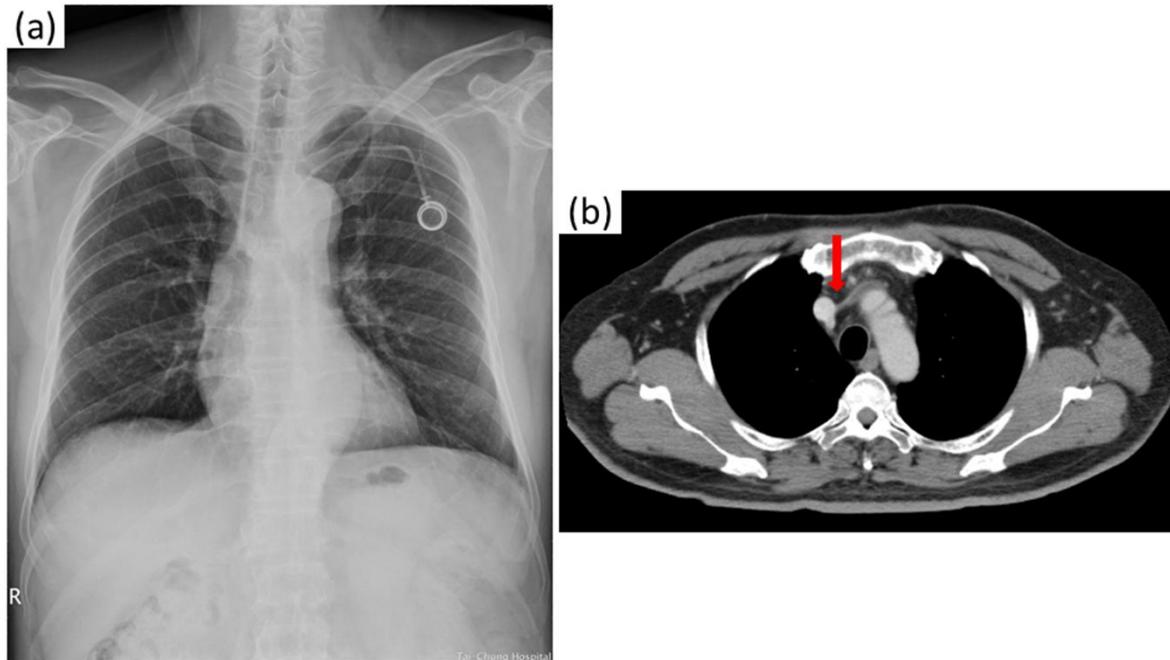
## 2. Case report

A 54 year-old man was diagnosed with stage IV rectal cancer and liver metastases. Abdominoperineal resection and radiofrequency ablation of liver metastases were performed. The patient was implanted with a central venous device (Bard; Salt Lake City, UT) through the left subclavian vein. Adjuvant chemotherapy with high-dose 5-fluorouracil (2600 mg/m<sup>2</sup>) plus irinotecan (150 mg) was continuously infused for four courses. However, the liver metastases progressed, and the chemotherapy regimen was changed to 5-fluorouracil (2600 mg/m<sup>2</sup>) plus oxaliplatin (150 mg).

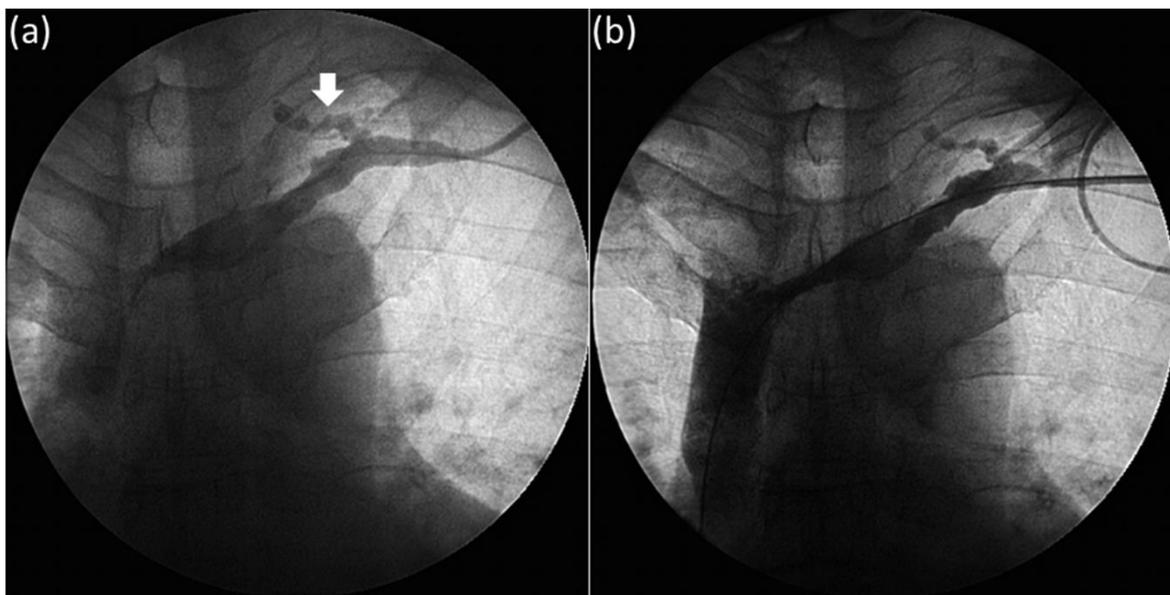
During the fourth course of FOLFOX (5-fluorouracil and oxaliplatin), the port was free flowing upon injection during testing; however, a large amount of milky fluid was aspirated from the central venous port. Chemical analysis of the milky fluid revealed a triglyceride level of 2097 mg/dl and serum triglyceride level of 239 mg/dl. The cell count of the chylous fluid showed WBC 360/dl and RBC 1120/dl with 99% lymphocyte predominance.

Chest plain film showed that the central venous catheter tip was located in the innominate vein. The malposition of the central venous catheter was due to the short catheter length (Figure 1a). A chest computed tomography (CT) scan showed an innominate vein stenosis but no mediastinal lymphadenopathy or tumor mass that can cause external compression

(Figure 1b). Venous angiography through the central venous access port revealed the total occlusion of the innominate vein. The contrast could not flow into superior vena cava. Dilated thoracic duct terminals were also shown (Figure 2a). The central venous catheter was removed, a 6-French sheath was inserted through the left subclavian vein, and balloon dilatation (Fr. 11) for the stenotic lesion was performed. After angioplasty, good contrast flow was observed from the innominate vein to the superior vena cava (Figure 2b). Another central venous device (Bard; Salt Lake City, UT) was implanted. The newly implanted port was functional, and no chyle withdrawal was noted from the port in the following months. However, the liver metastases progressed, and lung metastases later developed. The patient died of malignancy 11 months later after the angioplasty and without port-related complications.



**Figure 1.** (a) Chest plain film showed the central venous catheter tip in the innominate vein due to short length of the catheter. (b) Chest CT scan showed the innominate vein stenosis (arrow).



**Figure 2.** (a) Venous angiography through the central venous access port revealed the total occlusion of the innominate vein. Dilated thoracic duct terminals were also shown (arrow). (b) Good contrast flow was observed from the innominate vein to the superior vena cava after percutaneous transluminal angioplasty.

### 3. Discussions

Herein, a case of asymptomatic central vein stenosis with chyle withdrawal from the central venous port was presented. This complication was uniquely reported by Kao and Chang in 2001 [1]. The innominate vein stenosis was observed from venous angiography through the implanted port. Furthermore, dilated thoracic duct terminal was also found upon angiography. When the chyle was drained into the left subclavian vein through the thoracic duct, the occlusion of the innominate vein compromised the chyle flow, thereby leading to chyle stasis and thoracic duct terminal dilatation. Subsequently, the chyle was withdrawn from the central venous port.

Implantation of central venous port is associated with many serious complications. Immediate perioperative complications, including pneumothorax, hemorrhage, incorrect placement, and catheter embolization, have an incidence range between 1.7% and 20.5% [2,3]. By contrast, late complications, including infections, thrombosis, extravasation, and catheter fracture, have an incidence range between 0.0% and 55.5% [3]. Chylothorax and chylopericardium are rare complications that have been previously reported [4,5]. Possible mechanisms include thoracic duct injury, superior vena cava obstruction, or left subclavian vein thrombosis, which obstructs the orifice of the thoracic duct. Thrombotic obstruction can block chyle drainage and lead to chyle leakage into the pleural cavity or pericardial space.

Central vein stenosis may be caused by thrombosis, fibrosis, external compression, or neoplastic direct invasion. In our case, a chest CT scan showed innominate vein stenosis without mediastinal lymphadenopathy, tumor growth, or external compression. Anticoagulant or thrombolytic therapy might be effective for thrombus obstruction but is ineffective under other conditions. Percutaneous transluminal angioplasty was recommended for central vein stenosis [6]. In the presented case, venous angiography showed total occlusion of the innominate vein and dilation of the thoracic duct terminals. Chyle withdrawal from the central venous port disappeared immediately after conducting percutaneous transluminal angioplasty.

Central vein stenosis may be induced by mechanical and chemical actions. The mechanical factors include catheter tip site in the axillosubclavian vein, narrow contact between the catheter tip and the vessel wall, and turbulent flow [6,7]. Chemotherapy regimen, especially 5-fluorouracil, may cause vessel endothelial damage and result in vascular obstruction [8]. Left-sided central venous devices, especially the catheter tips lying in the upper part of the vena cava, increase the risk for thrombotic complications [7]. In the presented case, the left-sided port, the catheter tip lying in the innominate vein, and the high-dose 5-fluorouracil infusion contributed to innominate vein stenosis.

In conclusion, innominate vein stenosis may induce chyle withdrawal from a central venous port and can be treated with percutaneous transluminal angioplasty.

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