

# HEMIAZYGOUS VEIN TRIALYSIS CANNULATION FALSELY APPEARING AS EXTRAVASCULAR MEDIASTINAL PLACEMENT AFTER LIVER TRANSPLANT

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## INTRODUCTION

Central venous catheters are essential for administering medications that can damage peripheral veins (e.g., vasopressors, chemotherapeutic agents, hypertonic solutions), providing long-term intravenous therapy, enabling hemodynamic monitoring, and facilitating hemodialysis or plasmapheresis. They are also invaluable when peripheral venous access is difficult or impossible.

Although central line placement is a common procedure, it carries the risk of serious complications, including inadvertent cannulation of the azygos vein via the internal jugular vein (IJV). The azygos vein is typically small but may become dilated in certain pathological conditions, increasing the likelihood of accidental cannulation.

## CASE PRESENTATION AND CLINICAL COURSE

64-year-old female with NASH cirrhosis (MELD 29) complicated by ascites, portal hypertension, and hepatorenal syndrome, scheduled for liver transplant followed by kidney transplant the next day.

### 1. Stage 1 Liver Transplant

- Left IJ trialysis catheter placed uneventfully under US guidance
- VIP port used intraoperatively for push medication; patient responsive to vasopressors
- Routine intraoperative TEE showed no mediastinal fluid or vascular injury
- Intraoperative CRRT ongoing without issues until end of the surgery when clotting/suction alarms increased; CRRT paused
- oLT otherwise uneventful

### 2. Postoperative Imaging

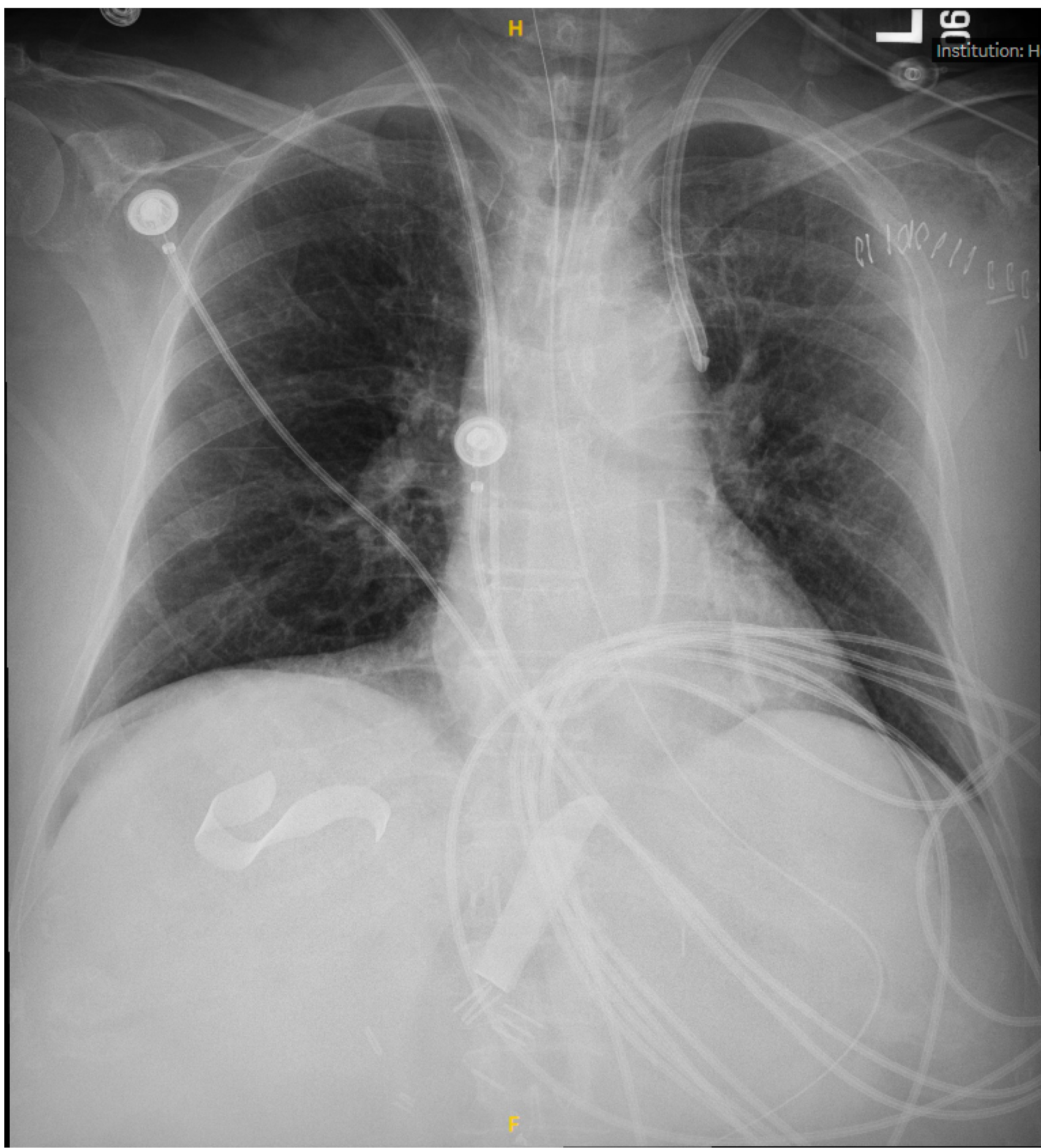
- CXR: Left IJ central line terminated left of aortic knob, **appeared malpositioned, raising concern for possible extravascular placement within the mediastinum**
- CT (AM read): Re-demonstrated similar suspected findings as CXR
- CT (PM re-read): Catheter intravascular along entire course within an enlarged left intercostal vein

### 3. CV Surgery Evaluation

- Catheter crossed innominate vein at the IJ-SVC confluence, extending inferiorly along the lateral aortic arch
- Prior CT showed vascular structure in this region likely a large collateral or persistent left SVC; uncertain if placement was intravascular vs aberrant placement vs extravascular

### 4. Catheter Removal

- CV surgery performed under fluoroscopy with limited contrast injection; upper hemisternotomy setup available if needed
- Contrast confirmed intravascular position
- Catheter removed safely without complication



## TEACHING POINTS

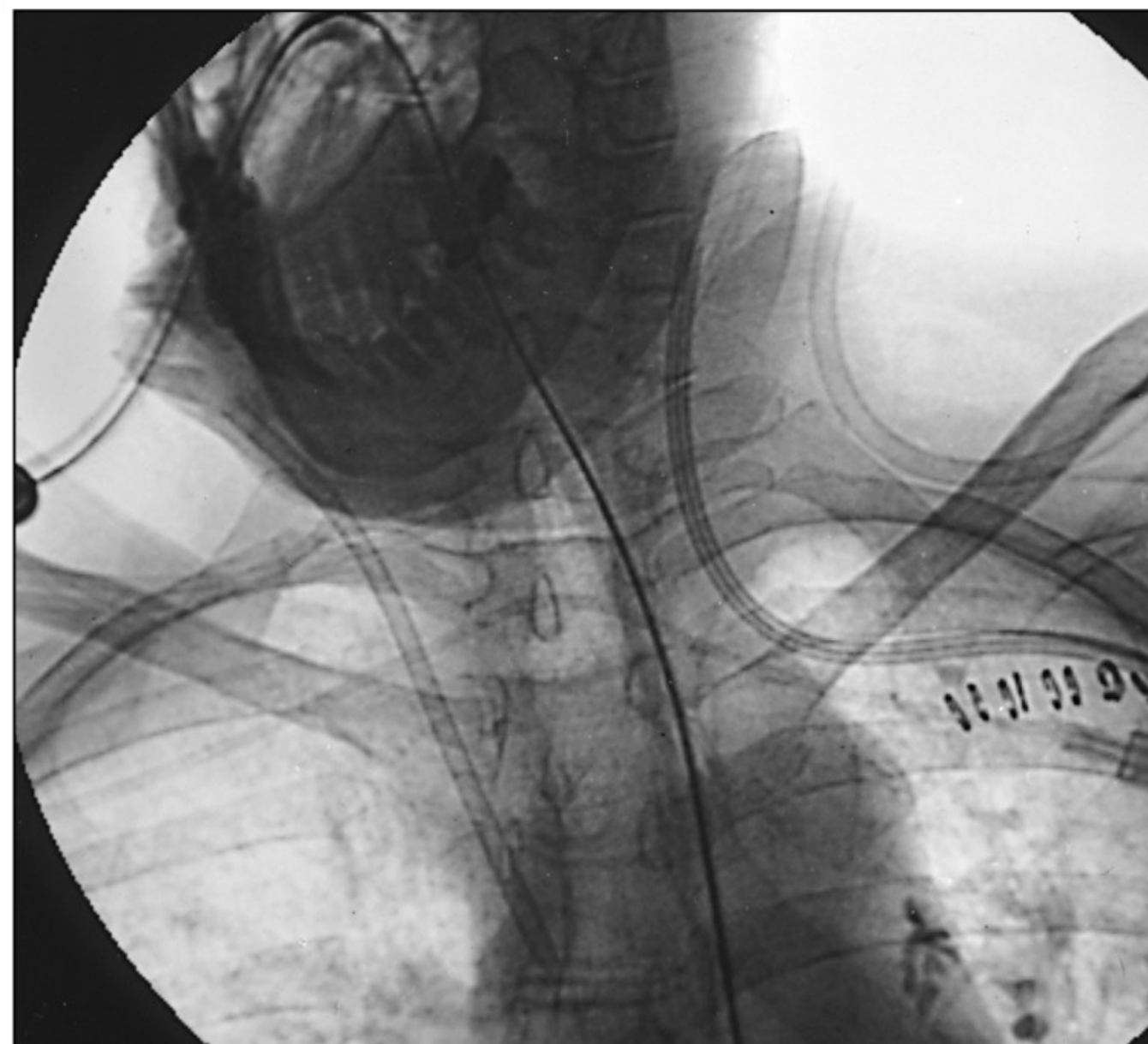
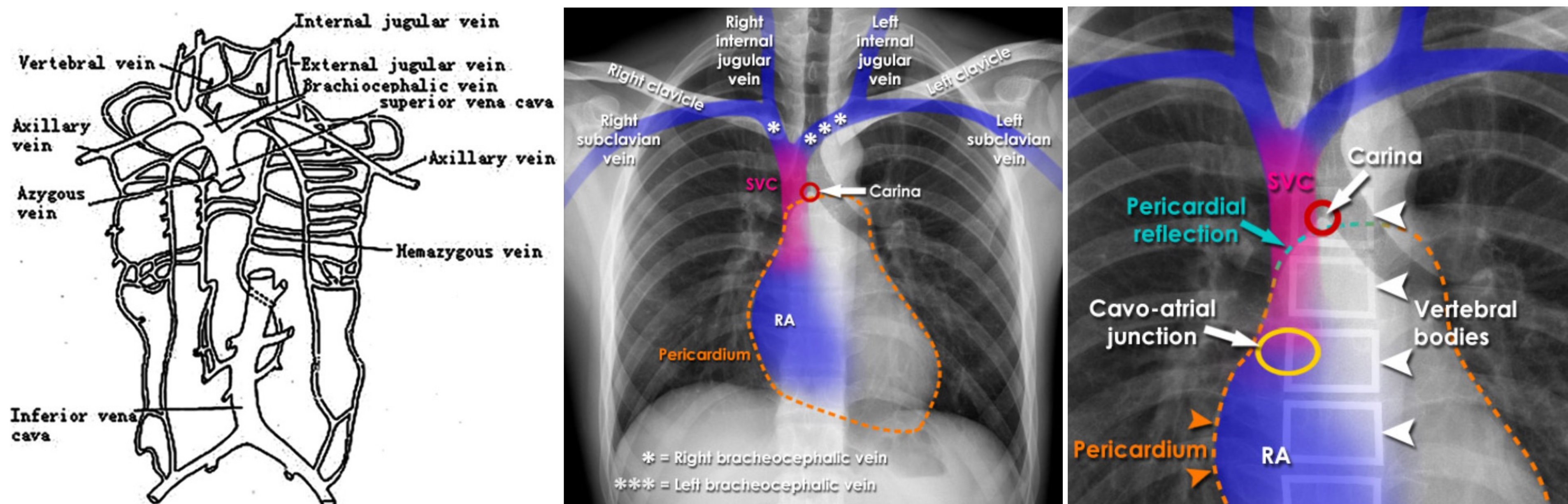


**Fig. 6.**—Fluoroscopic image shows catheter malpositioned in left internal jugular vein of 49-year-old man.

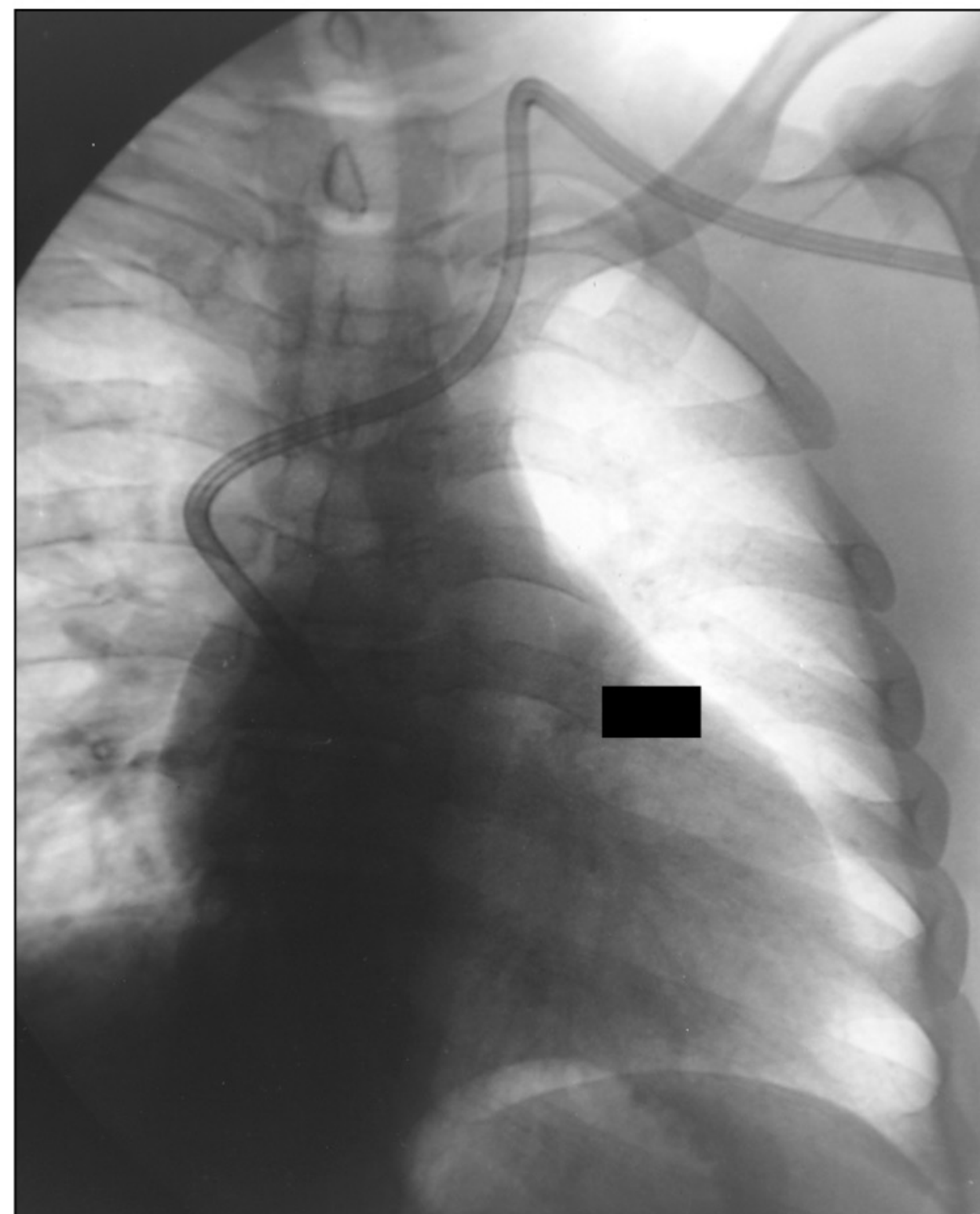


**Fig. 7.**—Fluoroscopic image shows atypical medial position of left internal jugular vein hemodialysis catheter in azygos vein of 43-year-old man.

| Table 1: Analysis for the intra-cava misplacements during the catheterization |                                                               |                                                                                                                |                                                                                                                  |                                                 |
|-------------------------------------------------------------------------------|---------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Sites                                                                         | Cause                                                         | Chest X-ray                                                                                                    | Consequence                                                                                                      | Management                                      |
| Carotid artery                                                                | Inaccuracy, penetration, anatomical variation                 | The catheter's tip projected to the left of the vertebral column                                               | Asymptomatic, erythema, hypotension, and hemorrhagic shock                                                       | Leave the catheter until further intervention   |
| Azygos vein                                                                   | Dilation of the azygos vein, high CVP, IVC, or SVC is blocked | Superior intercostal vein is to be cannulated with contrast filling the accessory hemiazygos vein              | Catheter's dysfunction, pleural effusion, pulmonary edema, dyspnea, chest pain, back pain, and cardiac tamponade | Reposition under radiological guidance          |
| Persistent left-sided SVC                                                     | Abnormal variation                                            | The catheter is passing down the left side of the mediastinum                                                  | Dyspnea, chest pain, and cardiac tamponade                                                                       | Surgical removal                                |
| Internal mammary vein                                                         | Blocked IVC or SVC                                            | The catheter descends in the region of the mediastinum                                                         | Catheter's dysfunction, shoulder or arm pain                                                                     | Remove the catheter under radiographic monitor  |
| Vertebral vein                                                                | Excessive rotation of the patient's head                      | The catheter passes the transverse processes of the 6 <sup>th</sup> and the 7 <sup>th</sup> cervical vertebrae | Trapping catheter, thrombosis, endothelial damage, and fluid leakage                                             | Remove the catheter moderately                  |
| Other veins                                                                   | Narrowing IVC with split-tipped catheter, bent wire           | One or both of lumens lose their routes to other veins                                                         | Catheter's dysfunction                                                                                           | Cautious removal, or using step-tipped catheter |

SVC: Superior vena cava; IVC: Inferior vena cava; CVP: Central venous pressure.

## CONCLUSION

Accidental azygos vein cannulation during central venous access via the internal jugular vein is rare, occurring in approximately 0.7–1.2% of cases, but represents a potentially serious complication requiring prompt recognition and management. Misplacement typically occurs without resistance during advancement but is often characterized by poor venous return or difficulty aspirating blood. The risk is increased in patients with venous congestion or dilation, such as those with portal hypertension, congestive heart failure, or right heart strain, where the azygos vein may be enlarged. Complications of malposition include pleural effusion, pulmonary edema, chest wall abscess, dyspnea, chest or back pain, and, in severe cases, cardiac tamponade. Diagnosis can be challenging; while chest radiographs may suggest malposition, confirmation generally requires contrast-enhanced CT, fluoroscopy, or echocardiography. Management depends on catheter function and patient stability. Functional catheters may be repositioned into the superior vena cava, whereas non-functional or symptomatic catheters should be removed after excluding vascular perforation. When perforation is suspected, early consultation with vascular surgery or interventional radiology is essential to minimize the risk of hemorrhagic complications.

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