Open Access

Case Report

Malposition of a Left-Sided Tunneled Hemodialysis Catheter into the Azygos Vein: A Case Report

Muhammad Naveed Alam Shah, Fawad Ahmed, Behzad Kaleem Baloch*

Department of Internal Medicine, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan,
*Department of Nephrology, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan

ABSTRACT

Central venous catheterization through the left internal jugular vein poses a rare yet considerable danger of malposition into the azygos vein caused by anatomical angulation and reduced vessel caliber. We introduce the situation of an older woman suffering from chronic kidney disease and heart failure who experienced tunneled hemodialysis catheter placement employing a landmark-guided approach. Initially operational, the catheter was discovered incorrectly positioned in the azygos vein. The position was adjusted under fluoroscopic imaging. This situation highlights the significance of image-assisted insertion in averting such complications and emphasizes the importance of post-procedural imaging, particularly in left-sided catheterization.

Keywords: Azygos Vein, Central Venous Catheters, Nephrology.

How to Cite This Article: *Shah MNA, Ahmed F, Baloch BK. Malposition of a Left-Sided Tunneled Hemodialysis Catheter into the Azygos Vein: A Case Report. Pak Armed Forces Med J 2026; 76(Suppl-3): S640-S642. DOI: https://doi.org/10.51253/pafmj.v76iSUPPL-3.13563*

INTRODUCTION

The incorrect positioning of a percutaneous tunneled hemodialysis catheter into the azygos vein is an uncommon yet potentially life-threatening complication of landmark-guided (blind) central venous catheter insertion. This risk originates from two primary factors: the comparatively narrow lumen of the azygos vein (6–7 mm compared to 15–20 mm for the superior vena cava) and the reverse direction of blood flow, which leads to local turbulence during infusion.[1] Possible complications include pneumothorax, hemothorax, hemo-mediastinum, cardiac tamponade, thrombosis, and venous obstruction.[1,2] The risk associated with azygos vein cannulation is significantly increased when the catheter is placed through the left internal jugular vein (IJV).[3] As indicated in a literature review by Xiang-Yang Li *et al.,* merely 17 instances of such mal-positioning had been documented by 2018.[4] According to Radiopaedia.org, the incidence of central line cannulation into the azygos vein is 1-2%.5

We report a case involving the unintentional insertion of a tunneled hemodialysis catheter into the azygos vein in a patient with chronic kidney disease (CKD), emphasizing the significance of image guidance in avoiding these occurrences.

CASE PRESENTATION

A 75-year-old female patient with a known history of diabetes mellitus, hypertension, and chronic kidney disease secondary to hypertension presented to the emergency department of Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan, Pakistan, in shock (blood pressure 70/40 mmHg). Her electrocardiogram (ECG) showed ischemic changes consistent with a non-ST elevation myocardial infarction (NSTEMI). A previously normal echo-cardiogram showed a reduced left ventricular ejection fraction (EF) of 30%.

After stabilization, she was maintained on twice-weekly hemodialysis. When the right IJV catheter failed, it was removed and replaced with a temporary right femoral vein catheter.

The patient was referred for surgical creation of an arteriovenous fistula. However, discontinuation of Aspirin preoperatively precipitated an acute myocardial infarction. Given her severely reduced left ventricular ejection fraction (30%) and evidence of diabetic microangiopathy indicating compromised vascular integrity, AV fistula creation was deemed high-risk and deferred.

Due to obstruction of the right IJV, a left-sided percutaneous tunneled hemodialysis catheter was planned. The permanent catheter was placed using a landmark-guided technique. The initial flow was satisfactory but diminished significantly within two weeks.

The patient was referred to a tertiary care center for catheter position assessment under fluoroscopy. Imaging revealed that the catheter tip had been

Correspondence: Dr Fawad Ahmed, Department of Internal Medicine, Mufti Mehmood Memorial Teaching Hospital, Dera Ismail Khan Pakistan
Received: 16 Jun 2025; revision received: 07 Jul 2025; accepted: 08 Jul 2025

inadvertently placed in the azygos vein. All the images of fluoroscopy and chest X-ray findings are shown in Figure-1, and the report of the interventional radiologist is shown in Figure-2. Under fluoroscopic guidance, a guidewire corrected the position. Approximately three weeks (9th April—2nd May 2025) elapsed from catheter insertion to final correction under fluoroscopic guidance.

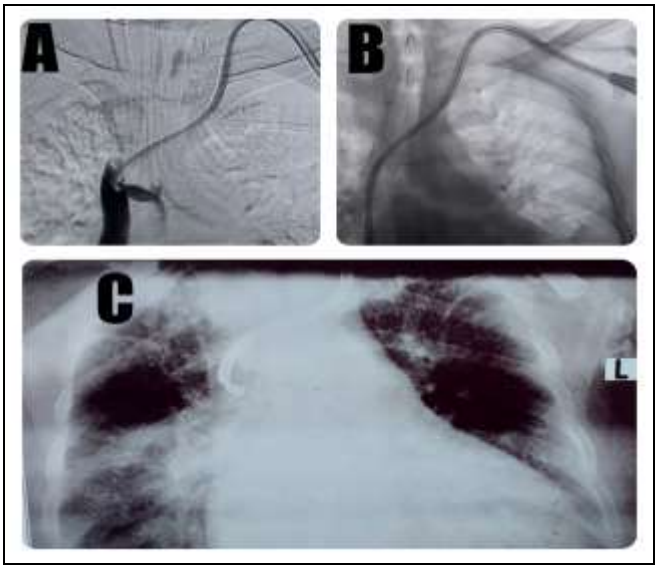
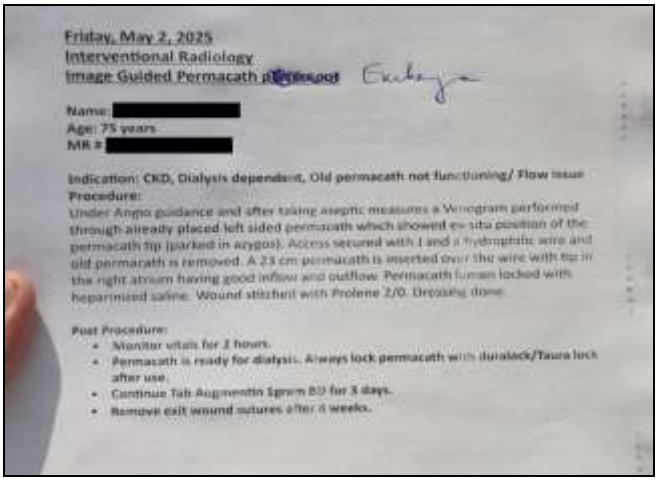


Figure-1A: Fluoroscopy image showing the catheter tip in the Azygos Vein. Figure-1B: Fluoroscopy image showing the Catheter tip in the Superior Vena cava after readjustment. Figure-1C: Chest X-ray showing the catheter tip in the Azygos Vein


Friday, May 2, 2025
Interventional Radiology
Image Guided Permacath p[redacted]

Name: [redacted]
Age: 75 years
MR #: [redacted]

Indication: CKD, Dialysis dependent, Old permacath not functioning/ Flow issue
Procedure:
Under Angio guidance and after taking aseptic measures a Venogram performed through already placed left sided permacath which showed ex-situ position of the permacath tip (parked in azygos). Access secured with J and a hydrophilic wire and old permacath is removed. A 23 cm permacath is inserted over the wire with tip in the right atrium having good inflow and outflow. Permacath lumen locked with heparinized saline. Wound stitched with Prolene 2/0. Dressing done.

Post Procedure:
- Monitor vitals for 2 hours.
- Permacath is ready for dialysis. Always lock permacath with duralock/Taura lock after use.
- Continue Tab Augmentin 1gram BD for 5 days.
- Remove exit wound sutures after 2 weeks.

Figure-2: Interventional radiology report confirming malposition into the azygos vein and subsequent successful repositioning (Patient and doctor details hidden)

DISCUSSION

This case is unique because many risk factors are combined in a single patient, i.e. CHF (as vein may be dilated), left IJV insertion, and blind placement. Interestingly, the catheter was functioning normally with good flow, possibly the flow aspiration from the azygous vein.

The right IJV is preferred for central catheter insertion. If contraindicated, left IJV becomes necessary despite its anatomical angle increasing the azygos deviation risk.[6] The azygos vein's smaller diameter (6–7mm vs 15–20mm SVC) and the opposing flow direction may lead to turbulence, thrombosis, or catheter malfunction.

In cases where the right IJV is occluded or stenosed, instead of moving to the left IJV (which has a higher risk of malposition), interventional techniques like PTA can be employed to re-establish right IJV access, thus avoiding the risks associated with left-sided catheterization.[7]

Xiong *et al.*, reported a case in which a central catheter, malpositioned in the azygos vein, detected after 4 years. While our acute case demonstrates that early fluoroscopic detection prevents venous occlusion. Both reinforce left IJV's inherent malposition risks and the non-negotiable need for image-guided placement, especially when right IJV access is compromised.[8]

This case highlights the need for vigilance during the central venous catheter placement, especially via the left IJV. Utilization of image-guided techniques during insertion and confirmation of the catheter tip with image modalities can significantly reduce the risk of complications.

Conflict of Interest: None.
Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MNAS & FA: Data acquisition, data analysis, critical review, approval of the final version to be published.
BKB: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.
Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Asudani D, Wretzel S, Patel R, Stayman A. A judgment call. Cleve Clin J Med 2008; 75(10): 690–691. https://doi.org/10.3949/ccjm.75.10.690
2. Nayeemuddin M, Pherwani AD, Asquith JR. Imaging and management of complications of central venous catheters. Clin Radiol 2013; 68(5): 529–544. https://doi.org/10.1016/j.crad.2012.10.013

3. Hajeh H, Garcia A, Mishra S, Radicic K. Malposition of the central venous catheter secondary to accessory hemiazygos vein variant. J Vasc Access 2023; 25(3): 995–997. https://doi.org/10.1177/11297298231154291
4. Li XY, Ye JB, Zhang LG, Jia YZ, Zhou RM, Pai P. Misplacement of Tunneled Hemodialysis Catheter into Azygos Vein: Left or Right Jugular Insertion Has Similar Susceptibility. Blood Purif 2019; 48(1): 1–9. https://doi.org/10.1159/000497231
5. Keshavamurthy J. Malposition of central lines into azygos vein. Radiopaedia.org. Radiopaedia.org; 2014. https://doi.org/10.53347/rID-27695
6. Haygood TM, Malhotra K, Ng C, Chasen B, McEnery KW, Chasen M. Migration of central lines from the superior vena cava to the azygous vein. Clin Radiol 2012; 67(1): 49–54. https://doi.org/10.1016/j.crad.2011.05.011
7. Wang D, Guan Y, Zhuo L, Chen Z, Ma X, Huang Y. Percutaneous transluminal angioplasty is safe and feasible for reinsertion of tunneled cuffed catheters in the right internal jugular vein. Sci Rep 2024; 14(1): 24017. https://doi.org/10.1177/11297298231223108
8. Xiong Y, Zhao Q, Yu Y, Cui T. A 4-year tunneled hemodialysis catheter malpositioned into the azygos vein and how to remedy the hemodialysis circuit. J Vasc Access 2024; 26(1): 332–335. https://doi.org/10.1177/11297298231223108