



Misplaced Central Venous Catheter in the Left Hemiazygos Vein; A Case Report

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ABSTRACT

Introduction: The structure of the hemiazygos vein is often various in different individuals. There is a normal variation that connects the ascending hemiazygos vein to the left innominate vein, parallel with the subclavian and internal jugular veins.

Case Presentation: A 33-year-old man who was a known case of End Stage Renal Disease (ESRD) was admitted to the emergency department due to Double Lumen (DL) dysfunction. The emergency physician inserted DL in his left jugular vein on the ultrasound guide. The result of angiography showed that DL was placed in his left hemiazygos vein.

Conclusions: This condition should be considered as part of the anatomical variation of the left hemiazygos vein during DL insertion by emergency physicians.

1. Introduction

The right azygos vein carries blood from the right spine to the Superior Vena Cava (SVC) vein through the posterior mediastinum and joins it at T5 and T6 levels (1). The hemiazygos and its accessories on the left side of the body, created by the intersection of the ascending left and subcostal lumbar veins, are equivalent to the azygos vein on the right side of the body, which carries venous blood to the posterior intercostal veins (1, 2). The structure of the hemiazygos vein is often various in different individuals. There is a normal variation that connects the ascending hemiazygos vein to the left innominate vein along the subclavian and internal jugular veins (3).

In this case report, a patient with End Stage Renal Disease (ESRD) has been presented. Due to problems in the SVC, the patient could not receive a Double Lumen (DL) insertion. Hence, it was decided to insert a DL in the SVC during ultrasonography. However, it was placed in the left hemiazygos vein instead of SVC.

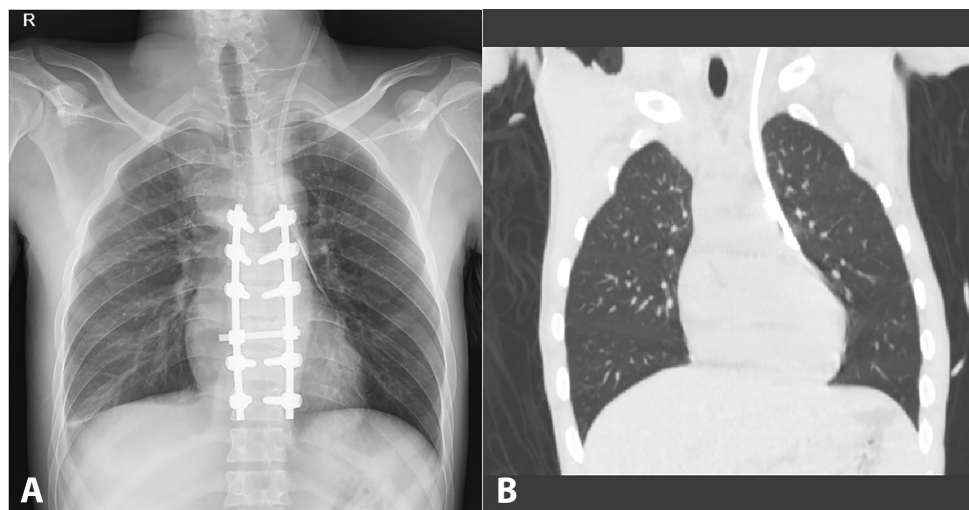
2. Case Presentation

A 33-year-old man who was a known case of ESRD due to rhabdomyolysis since 28 months ago was admitted to the Emergency Department (ED) of Shiraz Namazi Hospital,

one of the biggest educational hospitals in southern Iran, for DL insertion. His chief complaint was missed hemodialysis for two weeks because of DL dysfunction. He was opium addicted and a known case of hypertension, hepatitis C, and cord injury. He was under treatment with captopril (250 mg/Bid) and folic acid (10 mg/QD) and underwent hemodialysis twice a week (4 hours/session). He suffered from nausea/vomiting, oliguria, dysuria, dyspnea, and flank pain. He looked ill and toxic, but his vital signs were stable. He was also oriented to time, place, and person at the time of admission. Tachypnea and lower extremities edema (grade: 3+) were found in his physical examination. In addition, his Vein Blood Gas (VBG) showed a severe metabolic acidosis. Moreover, the laboratory data showed white blood cells = 16,800 cm², hemoglobin = 7.7 gm/dL, PT = 17.7 sec, INR = 1.31, BUN = 46 mg/dL, creatinine = 5.5 mg, serum sodium = 137 meq/L, and serum potassium = 8.3 meq/L. In abdominopelvic ultrasonography, his left kidney was normal in size with increased cortical parenchymal echogenicity with an evidence of severe stasis. His right kidney was small in size (82 mm) with increased cortical parenchymal echogenicity and mild stasis. Stasis was associated with dilation of the total course of both ureters, with no sign of stone or perinephric collection. Furthermore, mild free fluid was detected in the abdominopelvic cavity.

An Emergency Medicine (EM) resident tried to insert a central venous catheter in his right jugular vein, but the guide wire did not progress due to thrombosis. Then, the

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Figure 1. Double Lumen Place

A) Chest X-ray (AP) showing that the double lumen was not inserted in the superior vena cava. B) The coronal cut of spiral chest computed tomography with intravenous contrast showed that the double lumen was not inserted in the superior vena cava.

EM attending physician tried to insert it in his left jugular vein on the ultrasound guide. DL was checked and sutured. In the controlled Chest X-Ray (CXR), the tip of the DL was not in his SVC (Figure 1, A). The patient was referred for hemodialysis, but the internal medicine specialist did not allow it, because the DL was suspected to have been inserted in the artery or the mediastinum. Therefore, the patient was referred to the general surgery service for consultation.

The general surgery service evaluated the patient's CXR. Due to the suspicion regarding the intra-arterial insertion of the DL, urgent spiral chest Computed Tomography (CT) scan without intravenous contrast was requested for further evaluation. However, the place of the DL could not be determined (Figure 2, B). Thus, angiography was recommended by the on-call vascular surgeon. The result of angiography showed that DL was placed in the patient's left hemiazygos vein (Figure 2).

After confirmation of the DL location in the hemiazygos

vein in angiography, the patient underwent hemodialysis. Then, due to thrombosis in the right jugular and subclavian veins as well as left vein abnormalities, the right femoral catheter was inserted for him under angiography in the operating room under general anesthesia. Percutaneous Continuous Ambulatory Peritoneal Dialysis (CAPD) was also inserted via a low middle incision. Despite the proper functioning of the left jugular DL, it was exited due to the insistence of other specialists. The patient was discharged 13 days later under good conditions.

3. Discussion

The hemiazygos veins connect the SVC and inferior vena cava, which is of crucial importance (4). The hemiazygos and its accessories on the left side of the body, created by the intersection of the ascending left and subcostal lumbar veins, are equivalent to the azygos vein on the right side of the body, which carries venous blood to the posterior intercostal veins (1, 2). Abnormal anatomical variations



Figure 2. Angiography of Superior Vena Cava. A) Angiography Showed Obstruction and Superior Vena Cava Syndrome. B) Azygos Continuation.

of the hemiazygos vein are often congenital (1). There is a normal variation that connects the ascending hemiazygos vein to the left innominate vein along the subclavian and internal jugular veins (1, 3). This variation should be considered during DL insertion.

Smith and Pop reported a 31-year-old man who had been suffering from regional enteritis for four years and needed a total parenteral nutrition insertion. Two weeks later, right axillary vein thrombosis was diagnosed, which led to another catheter implantation in the left syphilitic vein. However, the post-procedure radiography revealed that the catheter was malpositioned. Further examinations created the suspicion that the implant was located in the superior intercostal vein and the accessory hemiazygos. This was also confirmed by the venography, and the catheter was successfully replaced (4).

Another study reported a 25-year-old man with a history of hydronephrosis caused by neurogenic bladder. The patient was under dialysis, and the catheterization was also performed. Nonetheless, because of the unusual anatomy of the central venous system, a cuffed-tunneled catheter was used. The CT-angiography revealed subclavian thrombosis and bilateral intravenous occlusion. Thus, the catheter was inserted into the accessory hemiazygos through the left inner jugular vein (5). Ali et al. also presented a 63-year-old woman with known renal failure who mistakenly had a misplaced hemodialysis catheter in the accessory hemiazygos vein, which was connected to the upper left intercostal vein (6).

Muhm et al. described a 26-year-old man with a history of hemodialysis. He had a misplaced catheter, which was discovered after radiography with contrast. Accordingly, the tip of the catheter was inserted in the accessory hemiazygos (7). Another study reported a 79-year-old patient with a history of chronic kidney failure. The radiography after the catheter insertion showed that the tip of the hemodialysis catheter was not in the left inner jugular vein. In addition, angiography revealed clots in the brachiocephalic vein, and the drainage of the left internal jugular and subclavian veins were performed through the accessory hemiazygos. Finally, it was found that the variant was congenital (8).

Based on what was mentioned above, awareness about normal vascular variations can prevent additional diagnostic procedures, particularly angiography, and exposure to radiation. This condition should be considered as a part of the anatomical variation of the left hemiazygos vein during DL insertion by emergency physicians.

3.2. Ethical Approval

The current study was approved by the local Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.MED.REC.1398.636).

3.3. Informed Consent

Written informed consent was obtained from the patient.

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Authors' Contribution

Study concept and design: N.Z. and R.S.M.; interpretation of data: N.Z. and R.S.M.; drafting of the manuscript: N.Z. and R.S.M.; critical revision of the manuscript for important intellectual content: N.Z. and R.S.M.

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The authors have no financial interests related to the material in the manuscript.

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