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THE AZYGOS VEIN AS AN ALTERNATIVE ROUTE FOR HAEMODIALYSIS CATHETERISATION

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ABSTRACT

Introduction: Central venous catheterisation (CVC) is essential for haemodialysis in end-stage kidney disease, but superior vena cava (SVC) stenosis or occlusion often complicates long-term access. The azygos vein, a collateral drainage pathway, has been rarely used intentionally for catheterisation.

Case description: We report on a 68-year-old male on haemodialysis with SVC perforation and stenosis due to prolonged catheter use. After a failed guidewire-assisted exchange, a non-tunnelled CVC was successfully placed in the enlarged azygos vein under fluoroscopy. The patient continued haemodialysis without complications, and the two-month follow-up confirmed catheter patency.

Conclusion: This case demonstrates the azygos vein as a viable alternative for haemodialysis access in SVC stenosis.

KEYWORDS

Vascular access creation, superior vena cava stenosis, azygos vein

LEARNING POINTS

- Complications related to vascular access creation remain one of the main reasons for morbidity and mortality in patients on chronic haemodialysis.
- Prevalence of the stenosis of the superior vena cava is increasing among dialysis-dependent patients, so new pathway such as the azygos vein presents potentially viable alternative for vascular access.

INTRODUCTION

Central venous catheterisation (CVC) is a cornerstone of vascular access for haemodialysis in patients with end-stage renal disease. While the internal jugular, subclavian and femoral veins are the usual sites, superior vena cava (SVC) stenosis or occlusion – often secondary to prolonged catheter use, thrombosis or malignancy – poses a significant challenge in long-term dialysis management. In such cases, alternative venous access strategies must be explored to ensure uninterrupted haemodialysis[1,2].

The azygos vein serves as a major collateral conduit between the superior and inferior vena cava, facilitating venous

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drainage in cases of central venous obstruction[3]. Although the unintentional migration of CVCs into the azygos vein has been reported, its intentional utilisation for haemodialysis catheter placement remains largely unexplored[1,4]. Moise et al. (2009) described the azygos system as a rare but practical alternative route for chronic indwelling catheter placement, emphasizing its anatomical accessibility and functional viability[5]. Given the increasing prevalence of SVC stenosis among dialysis-dependent patients, the azygos vein presents a potentially viable yet underutilised alternative for vascular access.

We present a case of an intentional catheterisation of azygos vein in a patient with accidental perforation of an SVC.

CASE DESCRIPTION

We present the case of a 68-year-old male with chronic glomerulonephritis and end-stage kidney disease on maintenance haemodialysis for 16 years. During this period, the patient had undergone five arteriovenous fistula procedures and required multiple temporary and permanent CVCs. His most recent vascular access was a tunnelled CVC in the right internal jugular vein, inserted one year prior to presentation.

The patient was referred to our clinic due to a tunnel infection at the catheter insertion site. On examination the catheter was loose and mobile, with the cuff visibly exposed outside the tunnel. Despite these findings, the catheter remained patent. A guidewire-assisted catheter exchange was attempted; however, the newly placed non-tunnelled CVC was non-patent. Therefore, an alternative temporary catheter was inserted via the left internal jugular vein under ultrasound guidance.

A subsequent contrast-enhanced CT angiography, conducted because the patient felt pain during the insertion of the catheter, revealed that the right internal jugular CVC had perforated the SVC at the level of the right pulmonary recess *(Fig. 1)*. Below the catheter tip, multiple eccentric thrombi were identified throughout the entire length of the SVC, leading to significant venous stenosis. The left internal jugular CVC was correctly positioned in the left innominate vein. Additionally, an extensive network of enlarged collateral veins was observed on imaging. Given the SVC perforation, the right internal jugular vein CVC was removed under surgical surveillance, without complications. Subsequently, under fluoroscopic guidance, the left internal jugular vein catheter was exchanged over a guidewire with a longer non-tunnelled CVC, which was deliberately placed within the azygos vein, noted to be prominently enlarged *(Fig. 2)*.

At two-month follow-up, the azygos vein CVC remained fully patent, and the patient continued his chronic haemodialysis regimen without complications.

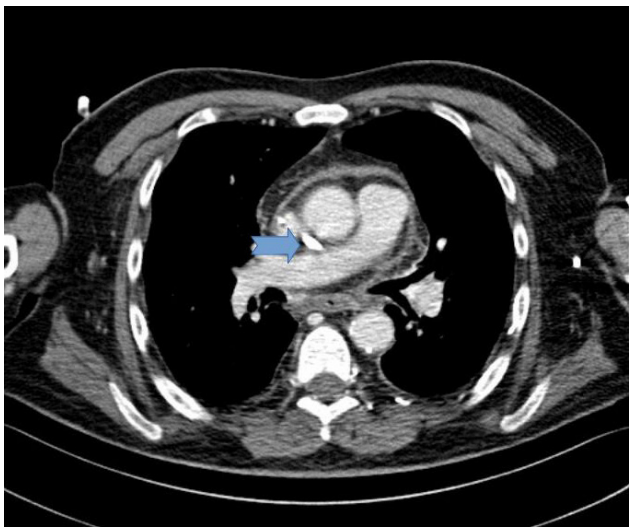


Figure 1. Perforation of the superior cava vein.

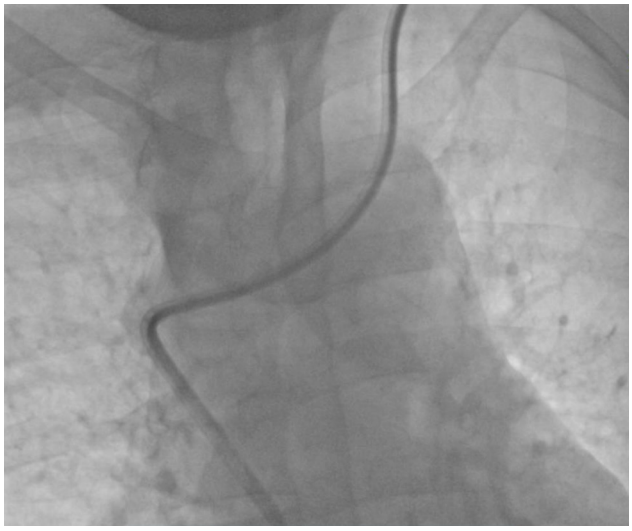


Figure 2. CVC placed in the azygos vein.

DISCUSSION

Long-term haemodialysis patients frequently develop central venous stenosis or occlusion, primarily due to repeated catheter placements, endothelial trauma and thrombosis[1,2]. SVC stenosis, in particular, presents a significant challenge for vascular access, as it may compromise ipsilateral venous return and increase collateral circulation, often leading to symptomatic central venous hypertension[3].

The azygos vein serves as an essential collateral drainage pathway in patients with SVC obstruction. While unintentional catheter migration into the azygos vein has been reported, deliberate CVC placement within the azygos vein remains rare[1,4]. Dejanov et al.[1] and Moise et al.[5] have both demonstrated the feasibility of this route, with successful placement and short-term patency. Moise and colleagues emphasised that, although unconventional, the azygos system can be a suitable solution for chronic catheterisation when conventional access is unavailable, owing to its direct communication with the central circulation and its capacity to accommodate dialysis flow rates[6]. These reports, together with our case, support the consideration of the azygos vein as a salvage option in complex vascular access scenarios. The feasibility of this approach is supported by the azygos vein's proximity to the central circulation, adequate diameter and favourable

haemodynamic properties. However, long-term patency and catheter-related complications in this location remain underexplored, necessitating further clinical evaluation.

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