

# How to get out of jail: An endovascular approach to a mal-positioned central venous dialysis catheter from left subclavian artery to left ventricle

Shu Shyan Wong, MSurg<sup>1</sup>, Nicholas Yong Wah LAM, MBBS<sup>2</sup>, Feona Sibangun Joseph, MMed Surg<sup>3</sup>, Benjamin Dak Keung Leong, MSurg<sup>3</sup>

<sup>1</sup>Vascular Unit, Hospital Sultan Idris Shah Serdang, Selangor, Malaysia, <sup>2</sup>Department of Surgery, Queen Elizabeth Hospital, Kota Kinabalu, Sabah, Malaysia, <sup>3</sup>Vascular Unit, Queen Elizabeth Hospital II, Kota Kinabalu, Sabah, Malaysia

## SUMMARY

Iatrogenic vascular injuries during central venous dialysis catheter insertion can lead on to significant morbidity and mortality. The emergence of endovascular intervention has revolutionized the treatment and outcome of such injuries. Here we present a case of mal-positioned dialysis catheter inserted in the left subclavian artery and tracked into the left ventricle managed by concurrent removal and deployment of endovascular balloon expandable covered stent with minimal blood loss and good recovery.

## INTRODUCTION

Haemodialysis is the most common mode of renal replacement therapy in patients with end-stage renal disease (ESRD). The ideal haemodialysis access is one that provides reliable, minimal complication access for dialysis. Native arteriovenous fistula (AVF) is the first choice of access as they are associated with lower incidence of complications when compared to arteriovenous graft (AVG) and central venous catheter (CVC).<sup>1,2</sup> Central venous dialysis catheterization is a common procedure for attaining an urgent haemodialysis access.

NKF-KDOQI guidelines recommends the use of image-guided CVC insertions to improve success of insertions.<sup>3</sup> The main complications include haematoma and inadvertent arterial puncture, with the incidence of 4-35%. Injuries involving the arterial system secondary to the procedure are known to be catastrophic and increase morbidity and mortality. Endovascular intervention for iatrogenic subclavian arterial injury is emerging as the preferred option, as opposed to open repair, as it is minimally invasive.<sup>4</sup> Here we present a case of one of the major complications associated with central venous catheterization and an effective non-surgical endovascular approach to mitigate it.

## CASE PRESENTATION

A 62-year-old female, with established renal disease presented to the emergency department for severe sepsis with altered mental status secondary to catheter related blood stream infection (CRBSI) from an indwelling left internal jugular catheter. She has long standing hypertension and diabetes mellitus with target organ damage. She has had

multiple native AVFs created- which subsequently failed, resulting in long-term usage of a CVC.

In view of the CRBSI, the infected catheter was removed for 2 days and a new 12 F catheter was inserted through a new route at the left internal jugular vein. However, this resulted in an unintentional mal-positioning of the catheter, with chest x-ray suggested the tip of catheter to be in the left ventricle (Figure 1). The patient was then, referred to the vascular team.

Computed tomography angiogram revealed the placement of the catheter into the left subclavian artery (LSA) and directed to the aortic valve into the left ventricle (Figure 1). It was also noted that she had an aberrant left vertebral artery- which arose from the aortic arch(Figure 1). The catheter was left in-situ and the patient was prepared for intervention.

Emergent concurrent removal and endovascular stenting of the LSA were performed, as opposed to open surgical repair. Left brachial and left common femoral access were obtained percutaneously under ultrasound guidance for stenting and angiography respectively. A 8x57mm balloon expandable stent covered stent (BE Graft, Bentley) was inserted in place over a Rosen wire protected by a 6F 45cm sheath via the left brachial access(Figure 2). Upon pull back of sheath to expose the stent, the dialysis catheter was removed with immediate deployment of the stent (Figure 2). Final angiography revealed no extravasation of contrast(Figure 2) and the patient showed good recovery with good left upper limb perfusion and no neurological complication.

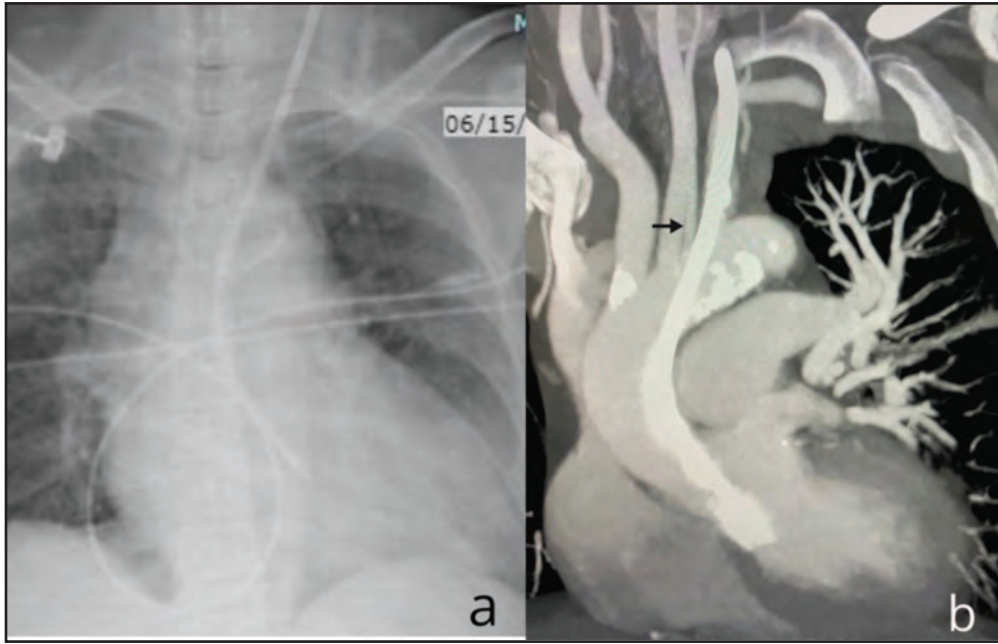
## DISCUSSION

Insertion of a central venous catheter for dialysis access is commonly carried out in our region. It is recommended that central venous catheterization to be performed under safe ultrasound guidance. However, depending at the facility, an ultrasound machine is not always readily available and there may also be inadequate competence in ultrasound guided puncture. These may have led to incidences of inadvertent iatrogenic arterial injury to the great vessels of the arch. Traditionally, these patients would be referred to the cardio-thoracic team for an emergent retrieval of catheter and open repair of the artery. These procedures runs a high risk of

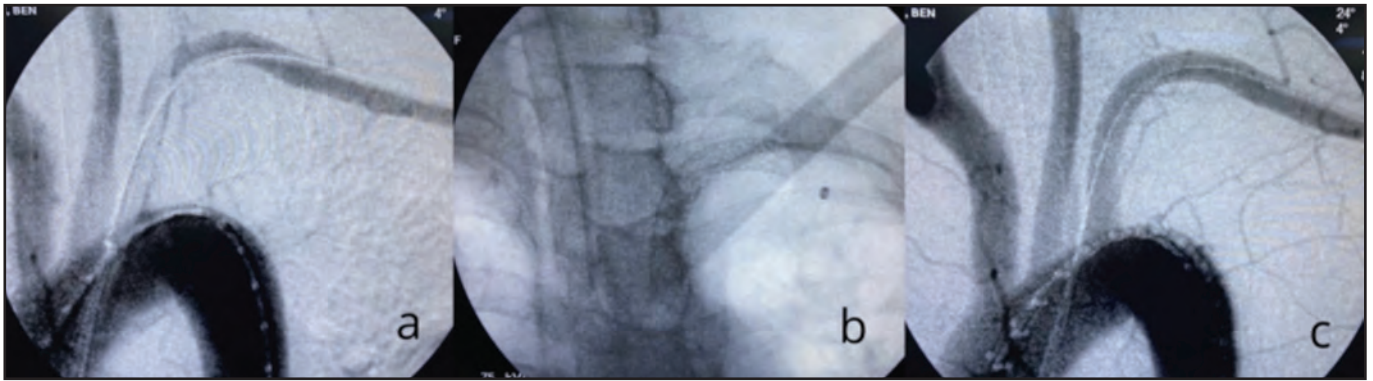
*This article was accepted: 05 November 2024*

*Corresponding Author: Shu Shyan Wong*

*Email: shushyan@gmail.com*



**Fig. 1:** Chest x-ray showing the course of CVC(a) and CTA showing CVC in left ventricle(b) with an aberrant left vertebral artery arising from arch of aorta(arrow)



**Fig. 2:** Balloon expandable stent put in place with 6F sheath(a). Deployed 8mm balloon expandable stent(b) and completion angiogram(c)

morbidity especially in patients with end-stage renal disease and other co-morbidities due to the invasive operative access, long operative time and prolonged recovery. With the emergence and advancement of endovascular therapy, we now have the option of an endovascular repair of such iatrogenic injuries with good outcome.<sup>4</sup> Endovascular repair of this injury allows a shorter operative time and a faster recovery for the patient.

**CONCLUSION**

This case report describes the technical aspect and clinical decision in managing an arterial injury related to central venous haemodialysis catheter- allowing in a relatively bloodless and complication-free procedure.

**ACKNOWLEDGEMENT**

The authors would like to thank the patient for agreeing to publish this case.

**DECLARATION**

The authors have no conflict of interest to disclose.

**REFERENCES**

1. Dhingra RK, Young EW, Hulbert-Shearon TE, Leavey SF, Port FK. Type of vascular access and mortality in U.S. hemodialysis patients. *Kidney Int* 2001; 60: 1443–51.
2. Besarab A. Resolved: Fistulas are preferred to grafts as initial vascular access for dialysis. *Pro J Am Soc Nephrol* 2008; 19: 1629–31.
3. Lok CE, Huber TS, Lee T, et al; KDOQI Vascular Access Guideline Work Group. KDOQI clinical practice guideline for vascular access: 2019 update. *Am J Kidney Dis* 2020; 75(4)(suppl 2): S1–S164.
4. Leong BD, Naresh G, Hanif H, Lee SK, Zainal AA, Sara CM. Endovascular management of axillosubclavian artery injuries: report of three cases. *Surg Today* 2013; 43(8): 918–22.