acta medica

CASE REPORT

Femoral tunneled hemodialysis catheter insertion through subacutely occluded lower extremity central veins in patients with exhausted vascular access

Ferdi Çay[1]
ORCID: 0000-0001-9589-7495

Onur Ege Tarı[1]
ORCID: 0000-0002-0341-4407

Güldehan Haberal[2]
ORCID: 0000-0002-5454-5968

Fatma Gonca Eldem[1]
ORCID: 0000-0002-9887-4018

[1] Department of Radiology, Faculty of Medicine, Hacettepe University, Ankara, Türkiye

[2] Department of Internal Medicine, Division of Nephrology, Faculty of Medicine, Hacettepe University, Ankara, Türkiye

Corresponding Author: Ferdi Çay
E-mail: drferdicay@gmail.com

Received: 4 July 2024, Accepted: 9 October 2024, Published online: 30 December 2024

ABSTRACT

Maintaining venous access and catheter patency in patients undergoing hemodialysis through the central catheter is a dire necessity. When conventional venous accesses have been exhausted, unconventional venous access techniques have become rational options to create vascular access for hemodialysis. Herein, a case with exhausted venous access, that underwent tunneled dialysis catheter insertion through subacutely occluded lower extremity central veins was described.

Keywords: dialysis catheter, unconventional, vascular access, femoral, subacute occlusion.

INTRODUCTION

Although tunneled hemodialysis catheters (TDC) are considered inferior to arteriovenous fistulas in terms of infection and patency rates, they are widely used for hemodialysis. They are relatively easy to insert and immediately available to use. Therefore, central venous catheterization is one of the most common procedures performed in an interventional radiology unit [1,2]. Gradual exhaustion of venous access sites is a serious problem for patients dependent on hemodialysis. In case of exhausted upper extremity venous access, femoral TDCs are a reasonable option for vascular access, even though they have lower patency rates than upper extremity TDCs [3]. Also, when conventional vascular access creation attempts have failed, TDC insertion through acutely or chronically occluded central vessels can be considered [1,4]. Herein, we describe a case when all conventional vascular access creation attempts had failed, and a femoral TDC was inserted through subacutely occluded lower extremity central veins.

CASE REPORT

A 24-year-old female patient with a history of surgery due to persistent cloaca and anal atresia had multiple episodes of urinary tract infection and related end-stage renal disease. As renal replacement treatment, the patient had a history of hemodialysis through upper extremity TDC, and renal transplantation, which ended with chronic rejection. After the transplant rejection, the patient underwent hemodialysis through

femoral TDC because of chronic occlusion of the vena cava superior (VCS), which was associated with prior multiple central catheterization. The patient was referred to our interventional radiology department because of dysfunction of femoral TDC. An abdominal CT scan that was obtained because of catheter dysfunction showed acute occlusion of the infra-renal vena cava inferior (VCI) (Figure 1). On inspection, the tunnel was red and on palpation, there was tenderness over the tunnel. After releasing the cuff of the TDC, purulent discharge was observed. Hence, it was considered a tunnel infection. Because of the tunnel infection, the TDC was removed without the insertion of a new catheter on that side. To maintain hemodialysis, a non-tunneled dialysis catheter (NTDC) was inserted through the subclavian vein. The catheter tip was at the brachiocephalic vein as VCS was occluded. The patient underwent hemodialysis through NTDC and was under antibiotic treatment for the tunnel infection. After 20 days, the dysfunction of NTDC occurred. Despite the exchange of NTDC and insertion of a new one, effective hemodialysis through these NTDCs was not successful, mostly due to thrombosis. CT venography of central veins of the upper and lower extremities was ordered for the assessment of the current status of central veins. CT venography showed chronic occlusion of VSC, and subacute occlusion of iliac veins and VCI (Figure 2). An attempt of endovascular recanalization of VCS had failed. As the patient needed acute effective dialysis, insertion of femoral TDC through the occluded iliac vein and VCI was planned. Under sterile conditions and conscious sedation, the patent part of the common femoral vein was punctured, and a 4F vascular sheath was inserted. The DSA images obtained after contrast injection through the vascular sheath showed non-filling of iliac veins and VCI, and collateral vessels that eventually drain into the portal vein (Supplementary Figure 1). Occluded iliac veins were crossed with the guidewire loop technique. However, during the attempt of crossing occluded VCI, multiple times we ended up in intercostal or lumbar/ascending lumbar veins (Supplementary Figure 2). After multiple attempts with a 0.035-inch guide wire which was supported by a support catheter (NAVICROSS® Support Catheters, Terumo Europe), eventually, the occluded lumen of VCI was selected with the guide wire. Then, the support catheter was advanced over the wire to the right atrium (Supplementary Videos). After the balloon dilatation of occluded iliac veins and VCI, the 14.5F 44 cm TDC was advanced over the wire. The tip of TDC was in the right atrium (Figure 3). After the confirmation of good blood flow through TDC, the catheter's suture wings were fixed to the skin.

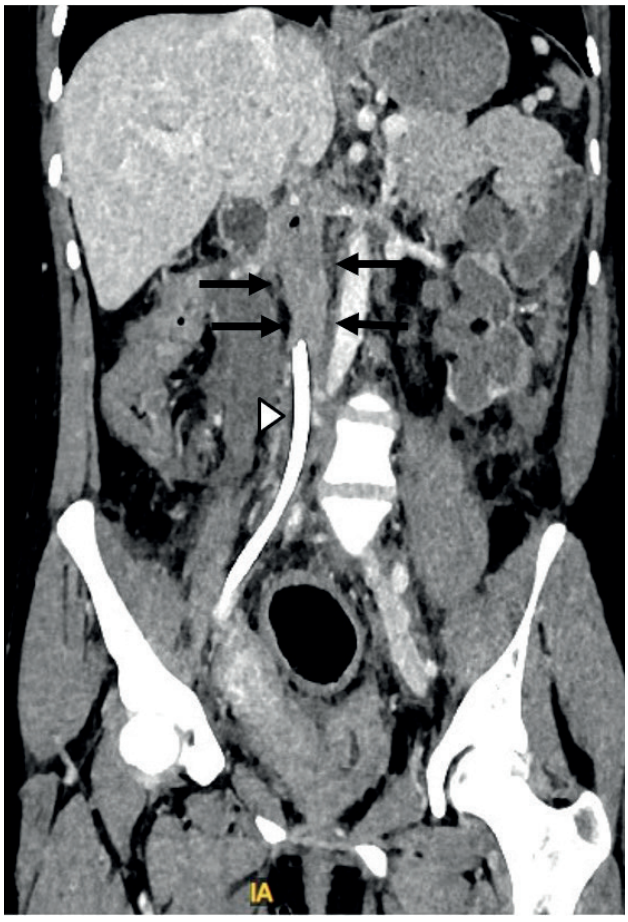


Figure 1. Abdominal CT coronal image shows dialysis catheter (arrowhead) and acute occlusion of infrarenal VCI (arrows).

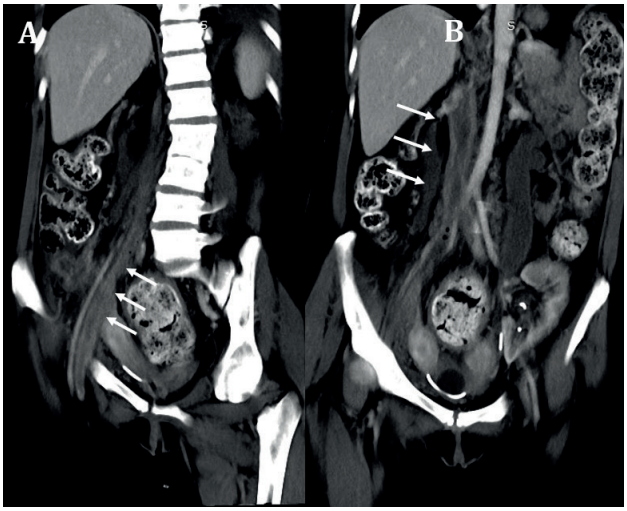


Figure 2. CT venography coronal images show subacute occlusion of iliac veins (arrows in A) and VCI (arrows in B).

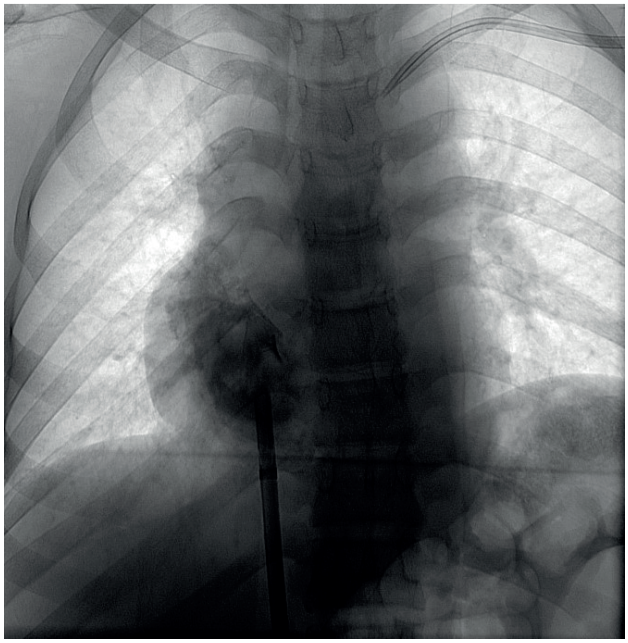


Figure 3. The DSA image shows the tip of the tunneled dialysis catheter in the right atrium, and left subclavian non-tunneled central catheter.

Left iliac veins were patent from the beginning, however, we did not use the left side because of the risk of vessel thrombosis and hampering future renal transplantation. The patient did not experience clinical signs of pulmonary thromboembolism during or after the femoral TDC insertion. Written informed patient consent was obtained before all procedures.

Maintaining venous access and catheter patency in patients undergoing hemodialysis through a central catheter is a dire necessity. In patients who depended on hemodialysis, when conventional venous accesses were run out, unconventional venous access techniques such as micropuncture through thrombus, trans-lumbar, transhepatic, trans-renal access, sharp recanalization, direct IVC cannulation, inside-out technique, and balloon or snare oriented puncture of non-patent central veins can be used to create venous access [3-7]. The decision of which unconventional venous access technique going to be used depends on the availability of requisite equipment and operator experience in that technique. In our case, there were two options, which were transhepatic access and TDC insertion through subacutely occluded lower extremity central veins, to consider. TDC insertion through occluded central veins was chosen instead of transhepatic access. This was because of our previous experience in this patient with NTDC insertions which were mostly complicated with vessel thrombosis. Hence, instead of puncturing the patent hepatic vein and taking the potential risk of patent vessel thrombosis and depleting the vein choice for future venous access. We chose not to puncture a patent vessel and insert the TDC through an already occluded vessel. Birgi et al., [1] published their experience with the insertion of TDC through acutely or subacutely occluded upper extremity central veins and they reported an overall 76% technical success rate. To the best of our knowledge, this is the first case report that reports the successful insertion of TDC through subacutely occluded lower extremity central veins.

CONCLUSION

In patients with subacute occlusion of the lower extremity central vein and exhausted upper extremity venous access, TDC insertion through an occluded central vein may be considered before proceeding with the puncture of patent unconventional veins such as hepatic veins for venous access.

Author contribution

Study conception: FÇ, FGE; Data collection: FÇ, OET; Analysis of data: OET, GH; Draft Manuscript preparation: FÇ, FGE, OET, GH. All authors approved the final version of the manuscript.

Ethical approval

Ethical approval was not required for this case report. This study has been anonymized to protect patient identity. Written informed consent was obtained from the patient for the procedure, and verbal consent was obtained for the publication of the case report.

Funding

The authors declare that the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

REFERENCES

[1] Birgi E, Durmaz H. Placement of hemodialysis catheters with the help of the micropuncture technique in patients with central venous occlusion and limited access. Turk J Med Sci 2021;51(1):95-101. https://doi.org/10.3906/sag-2006-11

[2] Mandolfo S, Acconcia P, Bucci R, et al. Hemodialysis tunneled central venous catheters: Five-year outcome analysis. J Vasc Access 2014;15(6):461-5. https://doi.org/10.5301/jva.5000236

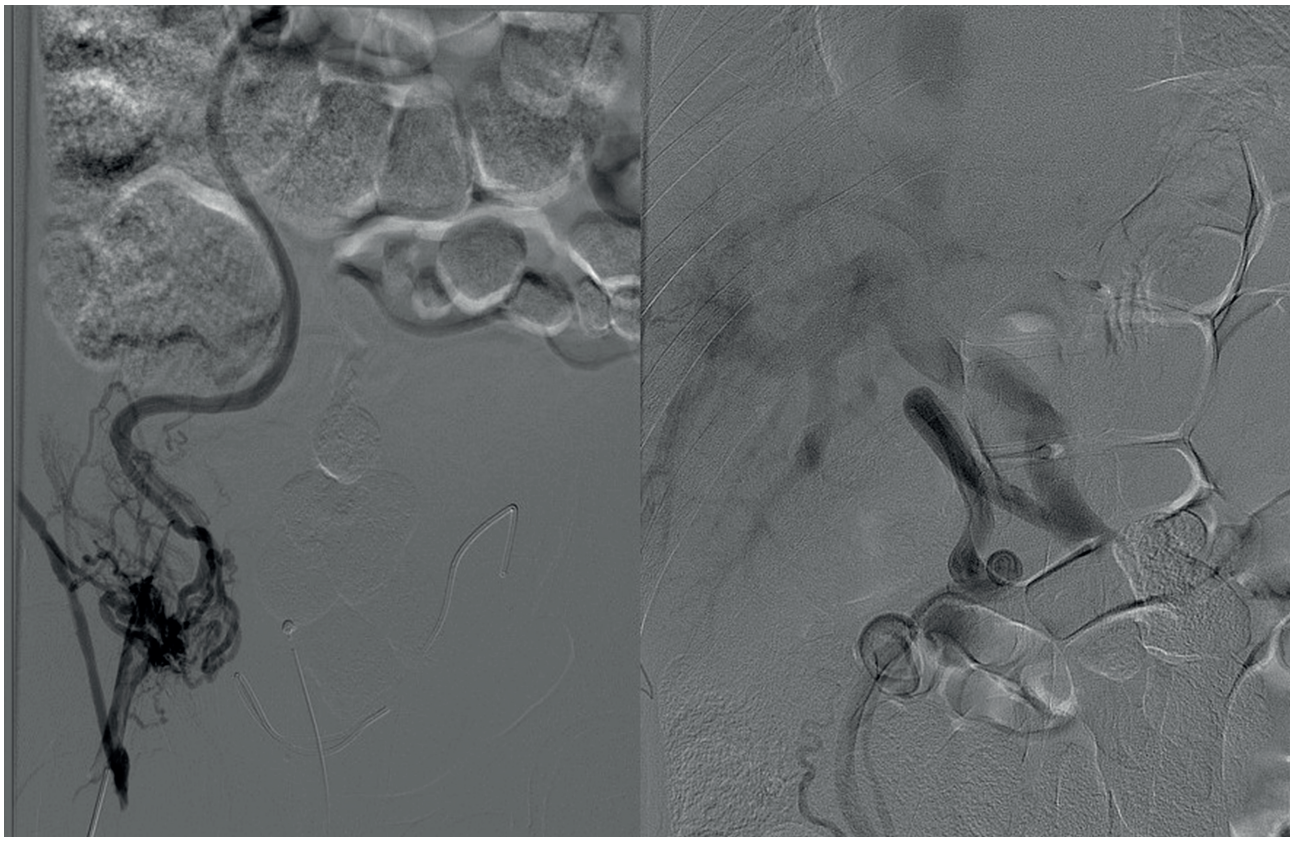
[3] Radhakrishnan Y, Dasari J, Anvari E, Vachharajani TJ. Tunneled femoral dialysis catheter: Practical pointers. J Vasc Access 2023;24(4):545-51. https://doi.org/10.1177/11297298211039633

[4] Lorenz JM. Unconventional venous access techniques. Semin Intervent Radiol 2006;23(3):279-86. https://doi.org/10.1055/s-2006-948767

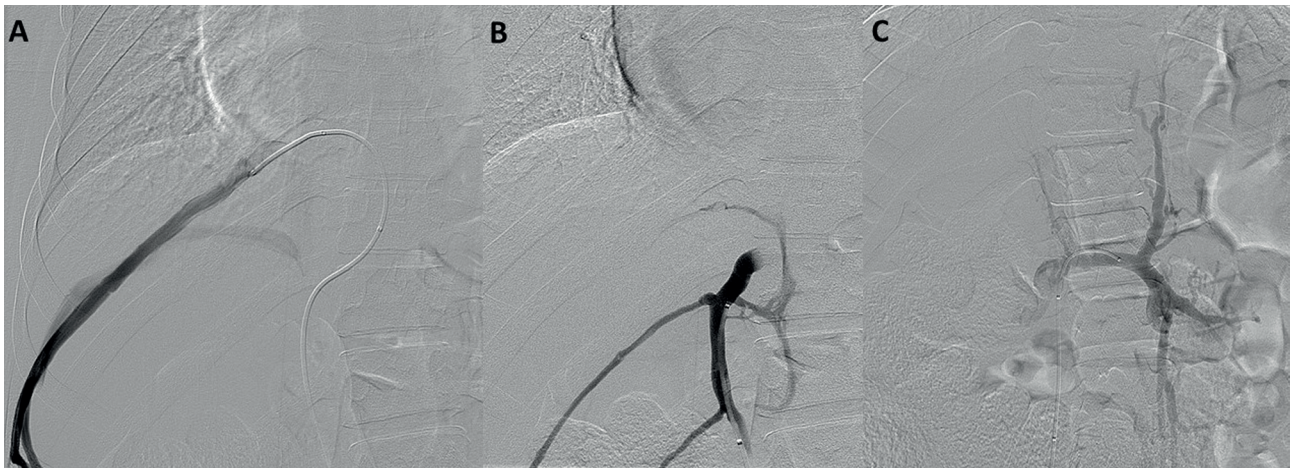
[5] Freeman BM, Tingen JS, Cull DL, Carsten CG. The inside-out technique for tunneled dialysis catheter placement with central venous occlusion. J Vasc Surg Cases Innov Tech 2019;5(3):350-5. https://doi.org/10.1016/j.jvscit.2019.03.015

[6] Hur J, Jeong B, Shin JH, et al. Transrenal Hemodialysis Catheter Insertion and Replacement in Patients with Upper Extremity Central Venous Access Exhaustion. Cardiovasc Intervent Radiol 2021;44(7):1121-6. https://doi.org/10.1007/s00270-021-02769-6

[7] Too CW, Sayani R, Lim EYT, Leong S, Gogna A, Teo TK. REcanalisation and Balloon-Oriented Puncture for Re-Insertion of Dialysis Catheter in Nonpatent Central Veins (REBORN). Cardiovasc Intervent Radiol 2016;39(8):1193-8. https://doi.org/10.1007/s00270-016-1383-5



Supplementary Figure 1. Images after contrast injection to the common femoral vein shows the collateral venous drainage to the portal vein.



Supplementary Figure 2. A: The catheter is in an intercostal vein. **B:** The catheter is in the ascending lumbar vein. **C:** The catheter is in the lumbar vein.