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Endoluminal dilatation technique to remove stuck hemodialysis tunneled catheter: A case report from Indonesia

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ABSTRACT

BACKGROUND: Tunneled CVC is being increasingly used worldwide as a mean of vascular access for hemodialysis. Among these, one of the emerging complications is that of the “embedded” or stuck catheter. There have been registered cases of vasomotor collapse, non-ST-elevation myocardial infarction (NSTEMI), avulsion of the vena cava, damage to the tricuspid valve having fatal consequences, and breakage of the CVC (Lodi et al., 2016).

CASE PRESENTATION: A 63-year-old female with mature AV fistula came to the clinic for removal of a tunnelled 15 fr double lumen dialysis catheter (Medical Components, Harleysville, Pennsylvania) that had been inserted into the left internal jugular vein 15 months prior to this visit. In the OR, our surgical attempt to remove the catheter failed. The first few dilation procedures were performed using 0.035-inch guidewire and balloon catheters. The technique was subsequently modified as follows. In this case we use a 6 × 60 mm Scoreflex balloon. Endoluminal dilation was repeated along the length of the catheter up to the cuff. Once the catheter has been removed, pressure was applied using sterile gauze to aid hemostasis. The procedure was successful without any observed complication.

CONCLUSION: Endoluminal dilatation technique is considered as the easiest and safest technique to remove hemodialysis catheter. Our case is the first stuck hemodialysis catheter reported in Indonesia and probably the first case that happen and treat with endoluminal dilatation technique in our country.

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1. Introduction

An increasing number of patients is under supportive or substitutive treatment for lost kidney function, mainly due to a longer life expectancy. Four main options are available to provide such treatments: native arteriovenous fistula (AVF), arteriovenous graft (AVG), central venous catheter (CVC) placement, and peritoneal dialysis. Although the preferred and most efficient way to deliver dialysis are AVF or AVG, CVC is typically used as a temporary solution to allow creation and maturation [2].

Tunneled CVC is being increasingly used worldwide as a mean of vascular access for hemodialysis. This increase is partly justified by the increased age of the incident in patients, the aging of the prevalent patients associated with the exhaustion of vascular endowment, and the more serious comorbidities that the patients in question suffer from. The increased use of these devices often

outlive the patients life and the extended time are associated with more frequent complications [1].

Among these, one of the emerging complications is that of the “embedded” or stuck catheter. This term refers to when the catheter cannot be removed after detaching the retention cuff. Fluoroscopic observations show an abnormal movement toward the upper portion of the cardiac silhouette and large vessels when an attempt is made to remove the CVC, which can cause intense retrosternal pain if it is pulled forcefully. There have been registered cases of vasomotor collapse, non-ST-elevation myocardial infarction (NSTEMI), avulsion of the vena cava, damage to the tricuspid valve having fatal consequences, and breakage of the CVC [1].

It was then decided to remove the tunneled double-lumen catheter using intracatheter ballooning for endoluminal dilatation.

This work has been reported in accordance with the SCARE criteria [3].

2. Case report

A 63-year-old female with mature AV fistula came to the clinic for removal of a tunnelled 15 fr double lumen dialysis catheter (Medical Components, Harleysville, Pennsylvania) that had been inserted into the left internal jugular vein 15 months prior to this

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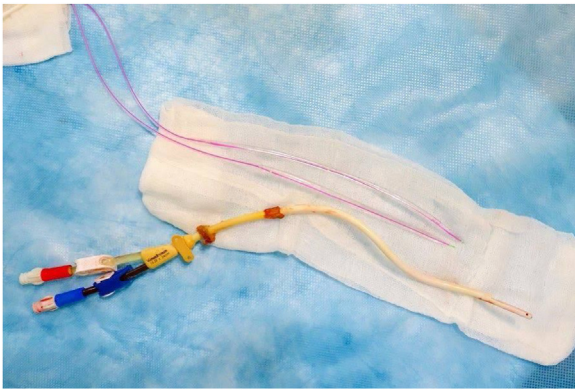


Fig. 1. The CDL that has been removed and two balloons that have been used.

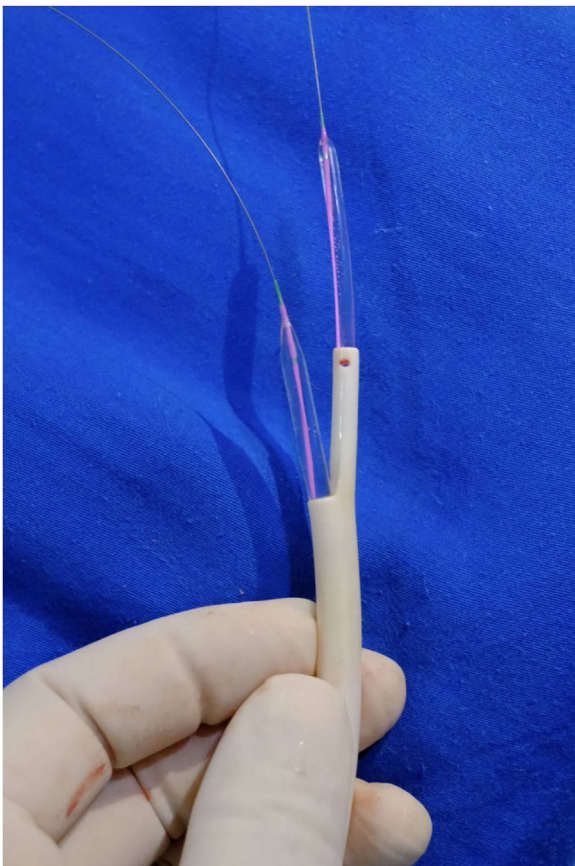


Fig. 2. Illustration of the balloon is inflated in the blood vessel.

visit. In the OR, our surgical attempt to remove the catheter failed (Figs. 1–3).

It was then decided to remove the tunneled double-lumen catheter using intracatheter ballooning for endoluminal dilatation. Endoluminal dilation procedures were performed in National General Hospital dr Cipto Mangunkusumo, Jakarta, Indonesia, by the fellowship-trained surgical vascular and endovascular. The cuff of the indwelling tunneled dialysis catheter was first dissected from its subcutaneous tunnel. The first few dilation procedures were performed using 0.035-inch guidewire and balloon catheters. The technique was subsequently modified as follows. A 0.018-inch x150 cm SV-5 wire (Cordis, Milpitas, California) was inserted through the catheter lumen and navigated into the IVC. An 0.035-inch x180 cm regular or stiff shaft Glidewire (Terumo, Somerset, New Jersey) was then optionally placed into the superior vena cava (SVC) through the arterial and venous lumen to be used as both a safety wire and to aid in catheter exchange if required. A 6 × 60 mm Scoreflex balloon (OrbusNeich, Hong Kong, China) on an 80 cm shaft is subsequently inserted into the venous lumen over the SV-5 guidewire and advanced to near the distal tip of the dialysis catheter. Using an Encore 26 inflation device (Boston Scientific), the Scoreflex balloon was inflated to its rated burst pressure (16 atm) and maintained at this pressure until there was complete or near-complete effacement of areas of narrowing.

Endoluminal dilation was repeated along the length of the catheter up to the cuff. Once the catheter has been removed, pressure was applied using sterile gauze to aid hemostasis. Post operative period was uneventful and patient was discharged home following day after routine inpatient overnight observation.

3. Discussion

The stuck catheter is an uncommon but possible complication of CVC placement. This condition is always diagnosed at removal time, often leaving operator unprepared [4]. In the absence of widely recognized techniques for removal of such embedded catheters. A strategy of pre-emptive catheter exchange has been recommended [2]. Though such a strategy will likely prevent catheters from becoming embedded and stuck, it would be quite resource-intensive and would be a substantial burden on hemodialysis patients. Talreja et al. [2] found that the technique has been safe and effective with no complications in a series of 15 patients.

Unfortunately, for various reasons including patient factors [5,6], long term catheter use remains quite common, and as a consequence, the need to recognize and appropriately handle embedded catheters remains of paramount importance [2].

It is still not clear as to the exact mechanism of this phenomenon since all patients with a prolonged duration of catheter implantation do not develop this complication. Previous studies of non-embedded central venous catheters, from animal as well as

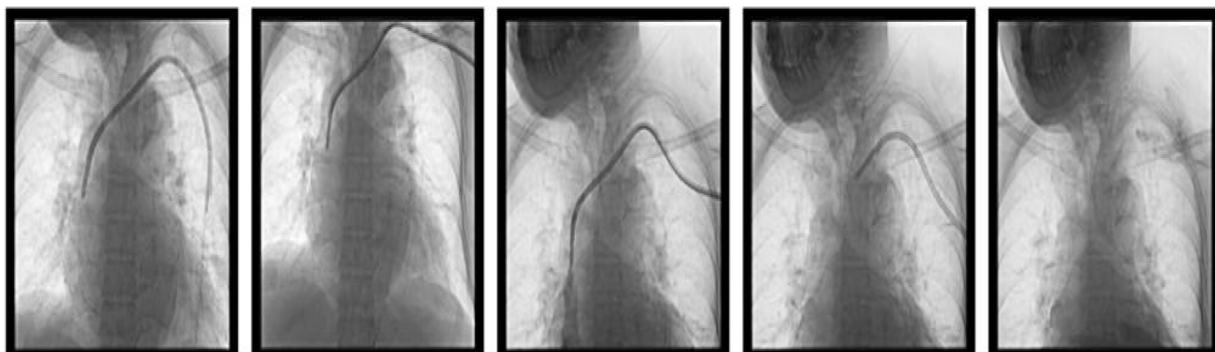


Fig. 3. Radiographic sequence of removing stuck hemodialysis catheter.

human autopsy studies, suggested that this may be due to adhesion of the fibrous sheath that formed over the catheter to the vessel wall [7,8]. Theoretically, if the catheter material is more biocompatible or resulted in a decreased tissue fibrous reaction, this could decrease the risk of this complication [2].

Access to the vasculature, afforded since the advent of the Quinton-Scribner shunt and the cannulation of the central venous system, has made hemodialysis possible for the last half-century. Given the problems with infectious and mechanical complications, as well as the higher mortality associated with them, central venous catheters (CVC) are reserved only for patients who are unable to start hemodialysis [2].

There are several methods to remove stuck hemodialysis catheter including surgical approach, laser, and non-laser sheath method and recently endoluminal dilatation technique [9]. Surgical approach is a straightforward technique but has a lot of potential complication. Moreover, not all patients can tolerate the procedures. Laser approach is a technique using a laser sheath advanced over stuck catheter and using laser energy to release the catheter from fibrin sheath. Endoluminal dilatation technique is a new technique introduced by Hong in 2011 [10]. In this technique an angioplasty balloon is inserted inside stuck hemodialysis catheter. Then the angioplasty balloon is dilated to break surrounding adherence, then allowing removal of the stuck hemodialysis catheter [11].

Nowadays endoluminal dilatation technique is considered as the easiest and safest technique to remove hemodialysis catheter. Talreja H et al. in 2017 found that from 15 patients underwent endoluminal dilatation technique to remove stuck hemodialysis catheter, there were no significant complication found [2]. This technique can easily be performed by surgeons experienced in interventional access procedures and can become a crucial armamentarium in the management of uremic patients on hemodialysis.

Our case is the first stuck hemodialysis catheter reported in Indonesia and probably the first case that happen and treat with endoluminal dilatation technique in our country. In this case we use a 6 × 60 mm Scoreflex balloon. The procedure was successful without any observed complication.

4. Conclusion

After this case report published, we hope endoluminal dilatation technique can be another favourable technique in removing stuck hemodialysis catheter. More case report and case series is needed to comprehend our understanding about endoluminal dilatation technique.

Declaration of Competing Interest

There is no conflict of interest throughout the process of preparing this case report.

Sources of funding

There is no sources of funding sponsor throughout the process of preparing this case report.

Ethical approval

Our study is exempt from ethical approval in our institution, Faculty of medicine, University of Indonesia/National Hospital dr Cipto Mangunkusumo.

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Consent

Yes, the fully informed written consent had been made.

Author contribution

Patrianf Darwis: Study concept, writing the paper, data analysis.

Yuliyardy Limengka: Writing the paper and data collection.

Akhmadu Muradi: Writing the paper, data analysis.

Rizky Saputra Telaumbanua: Writing the paper.

Karina: Writing the paper and data collection.

Registration of research studies

Not applicable.

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References

- [1] M. Lodi, R.F. Ebrahimi, P. Pezzotti, L. Carbonari, The removal of a stuck catheter: an alternative to Hong's technique, *J. Vasc. Access* (2016).
- [2] H. Talreja, S.E. Ryan, J. Graham, M.M. Sood, A. Hadziomerovic, E. Clark, et al., Endoluminal dilatation for embedded hemodialysis catheters: a case-control study of factors associated with embedding and clinical outcomes, *PLoS One* (2017).
- [3] R.A. Agha, T. Franchi, C. Sohrabi, G. Mathew, for the SCARE Group, The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines, *Int. J. Surg.* 84 (2020) 226–230.
- [4] S. Perandini, A. Lucarelli, A. Beleù, S. Montemezzi, Totally percutaneous endoluminal ballooning of stuck hemodialysis catheters: one-year experience of a referral center, *J. Vasc. Access* 21 (May (3)) (2020) 395–398.
- [5] J. Graham, S. Hiremath, P.O. Magner, G.A. Knoll, K.D. Burns, Factors influencing the prevalence of central venous catheter use in a Canadian haemodialysis centre, *Nephrol. Dial. Transplant.* 23 (November (11)) (2008) 3585–3591.
- [6] L.M. Miller, E. Clark, C. Dipchand, S. Hiremath, J. Kappel, M. Kiaii, et al., Hemodialysis tunneled catheter-related infections, *Can. J. Kidney Health Dis.* [Internet] (2016), Sep 27 [cited 2021 Jan 4];3. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5332080/>.
- [7] A.R. Forauer, C.G.A. Theoharis, N.L. Dasika, Jugular vein catheter placement: histologic features and development of catheter-related (fibrin) sheaths in a swine model, *Radiology* 240 (August (2)) (2006) 427–434.
- [8] A.R. Forauer, C. Theoharis, Histologic changes in the human vein wall adjacent to indwelling central venous catheters, *J. Vasc. Interv. Radiol.* 14 (September (9 Pt 1)) (2003) 1163–1168.
- [9] C. Adeel Ebad, S. Davitt, R. Gnanasekaran, A. Khan, A.-M. Moran, Application of Hong's technique for removal of stuck hemodialysis tunneled catheter to pacemaker leads, *Radiol. Case Rep.* 12 (March (1)) (2017) 97–101.
- [10] J.H. Hong, A breakthrough technique for the removal of a hemodialysis catheter stuck in the central vein: endoluminal balloon dilatation of the stuck catheter, *J. Vasc. Access* 12 (December (4)) (2011) 381–384.
- [11] P. Cerini, G. Guzzardi, A. Galbiati, C. Stanca, B. Del Sette, A. Carriero, Endoluminal dilatation technique to remove stuck Port-A-Cath: a case report, *Ann. Vasc. Surg.* 43 (August) (2017) 317.e1–317.e3.