Annals of Medicine and Surgery 33 (2018) 44–46

Contents lists available at ScienceDirect

Annals of Medicine and Surgery

journal homepage: www.elsevier.com/locate/amsu

Case report

Self-inflicted and iatrogenic peripheral intravenous cannula fracture: A case report

Phong Jhiew Khoo*, Ken Leong Tay, Atiqah Al-Aqilah Jamaluddin, Durkahshinii Gunasaker

Department of General Surgery, Labuan Hospital, Federal Territory of Labuan, 87020, Malaysia

ARTICLE INFO

Keywords:
Case report
Peripheral intravenous cannula
Intravascular foreign body
Fractured catheter
Iatrogenic
Self-infliction

ABSTRACT

Introduction: We present a case of broken peripheral intravenous catheter/cannula (PIVC), a well-known, underreported complication of PIVC placement. The fractured cannula could have resulted in intravascular foreign body retention, which is usually iatrogenic.

Presentation of case: In this case, we conceded that both iatrogenic and self-infliction were culpable. The intoxicated, aggressive patient forcefully removed the inserted cannula after repeated attempts by medical personnel to place it. The same cannula was used for multiple attempts. After the location of the fractured catheter was reconfirmed with radiological imaging, venotomy and removal of the foreign body were performed.

Conclusion: Due to potentially devastating consequences, early detection, adherence to standard operating procedures for peripheral venous access, management of aggressive patients, and meticulous teamwork must be upheld.

1. Introduction

Fracture of the peripheral intravenous catheter/cannula (PIVC) is a well-known, underreported complication of peripheral intravenous (PIV) cannula placement [1,2]. Although PIV cannulation is a common invasive procedure for intravascular access, it poses complications ranging from localised reaction (e.g., thrombophlebitis) to limb and life-threatening conditions [1–5]. The broken cannula could be retained as an intravascular foreign body, which is usually iatrogenic [4,5]. Self-infliction is not reported as a cause in our literature review.

In this case, we conceded that the cause was contributory of both iatrogenic and self-infliction. The intoxicated, aggressive patient forcefully removed the inserted cannula after repeated attempts by medical personnel to place it. The same cannula was used for multiple attempts. After the location of the fractured catheter was reconfirmed with radiological imaging, venotomy and removal of the foreign body were performed. The following case report has been reported in line with the SCARE criteria [6].

2. Case report

We present the case of a 30-year-old female with intravascular retention of a fractured PIVC. She was brought into the accident and emergency department (A&E), as her friends found her acting weirdly. Prior to the complaint, the patient and her friends were binge drinking. They noticed the patient was restless and incoherent after she drank a cocktail offered by a stranger.

Upon presentation to the A&E, she was assessed by medical personnel and a decision for PIV cannulation was made for blood sampling, administration of drugs, and parenteral hydration. The patient was restless and aggressive due to intoxication. Multiple attempts of PIV cannulation were performed by medical personnel using a 16-gauge PIVC. The same cannula was used with multiple reinsertions of the guide needle. After successful placement of the cannula in a right dorsal metacarpal vein, the cannula was secured with adhesive dressing. The secured catheter was forcefully removed by the patient. After achieving haemostasis of the puncture site, the removed cannula was inspected, finding a truncated cannula (Fig. 1). Clinically, the broken cannula was palpable proximal to the puncture site. Immediate steps were taken to prevent embolisation of the fractured catheter, including skin marking and dorsiflexion of the right wrist with a splint. Subsequently, X-ray of the right hand and wrist identified a radiopaque linear foreign body in the soft tissue between the second and third metacarpal bones (Fig. 2).

The general surgery team was referred for assessment and further intervention. After assessment, the patient was called to the emergency operating theatre. A venotomy and removal of the fractured cannula were performed under local anaesthesia (Fig. 3). Intra-operatively, the broken catheter was found lodged in the sub-cutaneous tissue within

* Corresponding author.
E-mail address: cool87jason@yahoo.com (P.J. Khoo).

https://doi.org/10.1016/j.amsu.2018.08.004
Received 16 July 2018; Accepted 14 August 2018

Fig. 1. Truncated cannula.

Fig. 2. Lateral view of right hand and wrist X-ray showing a radiopaque linear foreign body.

the affected dorsal metacarpal vein (Fig. 3). The fractured cannula was inspected and matched the truncated cannula and valve (Fig. 4). The patient had an uneventful recovery.

3. Discussion

Generally, PIV cannulation is a common and easy invasive procedure for venous access [3–5]. Although the simple and benign procedure is performed daily by medical personnel, various complications may occur [1–5]. In our case, cannulation was executed by a senior A&E medical officer. The complications range from non-life-threatening localised conditions (e.g., thrombophlebitis and haematoma) to potentially grievous circumstances, including fractured catheter and embolism [1–5].

Fractures of the central venous catheter are more frequently reported that for PIVC [1,2]. The dreadful consequences of a fractured catheter are usually associated with fragment embolisation [1–3,5]. Multiple complications may arise, including arrhythmia, cardiac perforation, myocardial infarction, thrombosis, and sepsis [1,2,5]. The fragment is commonly embolised to the central venous system proximally, but distal embolisation can happen [3]. In this case, the broken cannula did not migrate.

The cause of cannula fracture is largely iatrogenic and may occur during cannula placement or removal [1–3]. Causes can include multiple unsuccessful cannulation attempts, poor technique, and compromised catheter structural integrity from repeated attempts with the same cannula or substandard cannula quality or prolonged cannulation [3–5]. We did not uncover any report describing self-infliction as a probable cause during our literature review. This might be due to the underreporting of such cases. In our case, the probable mechanism of fracture might involve loss of catheter structural integrity due to repeated reinsertions of the guide needle, and the partially transected cannula was completely broken when the patient forcefully removed it. The mechanism was similar to a case published by Glassberg et al. [2]. They proposed that partial transection was caused by reinsertion of the guide needle into the advanced cannula or advancing both cannula and needle with the needle partially withdrawn [2]. They indicated that the transection might have occurred during removal of the cannula, leaving the broken fragment behind [2].

No standardised guidelines for investigations and management of PIVC fracture currently exist during the writing of this report. Several articles recommended radiological imaging as part of the investigation [3–5]. Clinically, the fractured cannula might not be palpable, and embolisation needs to be considered; thus, radiological imaging prior to surgical intervention is essential [3–5]. Computed tomography is the most widely used modality [3–5]. X-ray might not be helpful if only the radiolucent part of the cannula is involved [5]. Surgical removal is the mainstay of treatment, and intervention should be provided upon identification of the exact location [1–5]. In our case, the fragment was palpable clinically. Subsequent X-ray reconfirmed the location, and the fractured catheter was removed surgically on the same day.

Adherence to local protocols and guidelines for PIV cannulation is paramount [7]. With good technique and appropriate practice of peripheral venous access, including insertion, removal, and maintenance of the catheter, complications can be minimised [1,3,4,7].

Encountering and managing aggressive/violent patients, especially in the A&E department, is common [8,9]. The abnormal behaviours of these patients might be due to psychiatric disorders, medical conditions, or substance intoxication/withdrawal [8,9]. In our case, we highly suspected that drug intoxication might have caused her aggression. Several methods can be applied for management, which include mechanical restraint, pharmacological rapid tranquilisation, and non-pharmacological approaches involving verbal de-escalation and distraction techniques by trained medical personnel [8,9]. Local protocols and response guidelines on managing aggressive patients should be established to prevent self-inflicted injuries and potential hazards for medical personnel and other patients [8,9].

4. Conclusion

Ultimately, due to the potentially devastating consequences of a fractured PIVC, early detection, adherence to standard operating procedures of peripheral venous access, management of aggressive patients, and meticulous teamwork must be upheld.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Ethical approval

Ethical approval has been exempted by our institution as this publication is a case report and not a randomized trial or a case series, provided that the patient gave her written consent both for operation and the publication of this case.

Sources of funding

No source of funding.

Author contribution

Phong Jhiew Khoo is the main/first author and corresponding author of this paper. Phong Jhiew Khoo and Ken Leong Tay were involved

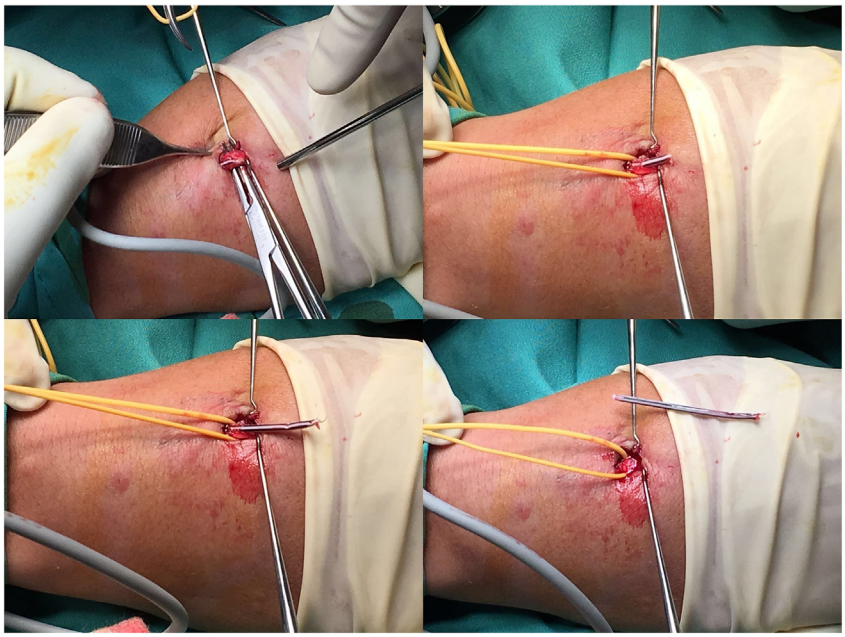

Fig. 3. Serial photographs demonstrating venotomy and removal of fractured cannula.

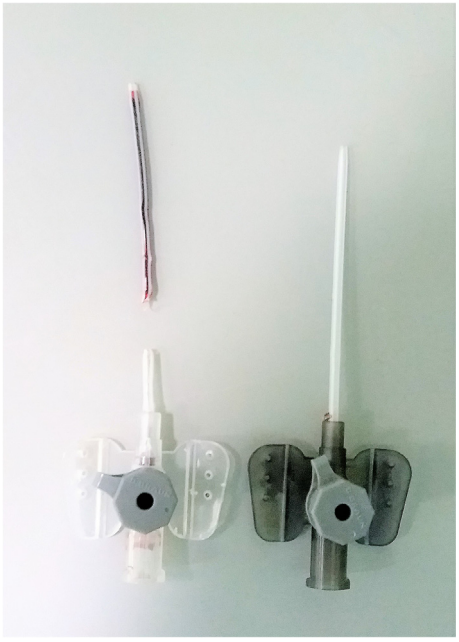

Fig. 4. Comparison of truncated cannula with fractured segment and intact 16-gauge cannula.

in the surgery. Phong Jhiew Khoo, Ken Leong Tay, Atiqah Al-Aqilah Jamaluddin, and Durkahshinii Gunasaker participated in the writing of this paper. All authors read and approved the final manuscript.

Conflicts of interest

No conflicts of interest.

Trial registry number

Not applicable.

Guarantor

Phong Jhiew Khoo.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.amsu.2018.08.004.

References

[1] O. Arun, B. Oc, E. Gunduz, M. Oc, A. Duman, Fracture of an intravenous cannula in the vein due to reinsertion of the guide needle: a case report, J. Cardiovasc. Surg. 2 (2) (19 July 2014) 28–29, https://doi.org/10.5455/jcvs.2014224.
[2] E. Glassberg, G. Lending, B. Abbou, A.M. Lipsky, Something's missing: peripheral intravenous catheter fracture, J. Am. Board Fam. Med. 26 (2013) 805–806, https://doi.org/10.3122/jabfm.2013.06.130097.
[3] M.F. Khadim, D. Leonard, R.A. Moorehead, C. Hill, Back to basics: iatrogenic intravenous cannula embolus, Ann. R. Coll. Surg. Engl. 95 (2013) 1–2, https://doi.org/10.1308/003588413X13629960047830.
[4] A. Singh, A. Kaur, M. Singh, S. Kaur, CT guided removal of iatrogenic foreign body: a broken intravenous cannula, J. Clin. Diagn. Res. 9 (9) (September 2015) 28–29, https://doi.org/10.7860/JCDR/2015/14344.6549.
[5] K. Baliga, E. Sujindra, Iatrogenic complications: a Line's share, Int. Surgery J. 3 (4) (October-December 2016) 2250–2253 https://doi.org/10.18203/2349-2902.isj20163040.
[6] R.A. Agha, A.J. Fowler, A. Saetta, I. Barai, S. Rajmohan, D.P. Orgillfor the SCARE Group, The SCARE Statement: consensus-based surgical case report guidelines, Int. J. Surg. 34 (October 2016) 180–186 https://doi.org/10.1016/j.ijsu.2016.08.014.
[7] P. Ingram, I. Lavery, Peripheral intravenous cannulation: safe insertion and removal technique, Nurs. Stand. 22 (1) (September 2012) 44–48.
[8] G. Fulde, P. Preisz, Managing aggressive and violent patients, Aust. Prescr. 34 (August 2011) 166–168, https://doi.org/10.18773/austprescr.2011.061.
[9] C. Mantovani, M.N. Migon, F.V. Alheira, C.M. Del-Ben, Managing agitated or aggressive patients, Rev. Bras. Psiquiatr. 32 (2) (October 2010) 96–103.