CASE REPORT

Needle breakage as an unusual complication of intravenous therapy: A case report

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Abstract

Residual intravenous foreign bodies following hand trauma are relatively rare; only a few previous reports of this situation are available. It has been reported that foreign bodies often migrate to the heart and atrium dextrum. Herein, we report a recent case of needle breakage in the dorsal vein of the hand that was removed with lignification using an intraoperative C-arm fluoroscopy machine and tape tourniquet to avoid proximal movement during removal. The mandate should be to remove within the capacity allowed so that rare cases and terrible complications can be avoided.

The case was seen at The Yanji City, Jilin Province, China at the Yanbian University Hospital emergency at February 20, 2023.

Keywords: Complications, Needle breakage, Foreign body, Intravenous therapy, Case report.

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Introduction

In current medicine, intravenous therapy is a common procedure.[1] Metallic fragments and broken needles can embolise distally along the blood flow, resulting in lethal pulmonary embolisms, infection, bleeding, and thrombosis.[2] In uncommon cases, a broken intravenous needle remains inside the vasculature. It has been previously reported that foreign bodies migrate to the heart and atrium dextrum.[3] C-arm fluoroscopy machines are critical for accurately locating foreign bodies before an attempt is made to remove them.[4,5] Currently, minimally invasive procedures are the most effective ways to remove intravascular foreign bodies.[6] In addition, complications caused by needle breakage after intravenous therapy are extremely rare. Moreover, removing a broken needle may cause additional serious complications because it flows back to the right atrium. In the case reported below, an intrathecal broken needle was removed from a patient using tourniquet, and under C-arm fluoroscopy machine guidance.

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Case Report

A 46-year-old woman was seen at The Yanji City, Jilin Province, China at the Yanbian University Hospital emergency on February 20, 2023 with a history of needle breakage following hand trauma during intravenous therapy complained of opisthenar pain that occurred regardless of posture. The patient had received intravenous therapy in a local clinic for cold after hand trauma and pain in hand two hours prior. No medical history was observed with inconsequential laboratory tests. The patient's neurological examination was inconsequential, and she displayed no signs of tendinous involvement. There was no apparent bleeding, though a small amount of haematoma was observed, and the patient was referred to a local clinic. On conventional radiography, a needle-shaped foreign body was detected (Figure 1), however attempts at removal in the local clinic emergency failed.

Based on the history of intravenous therapy, it was decided that the foreign body was a broken intravenous needle that remained in the patient's body. The patient underwent

Figure-1: Conventional AP view of the hand, a needle-shaped foreign object was noted on X-ray between 4th and 5th metacapral and middle shaft areas. (Figure 1-a) In lateral view, a needle-shaped foreign object was observed on the radiograph at the dorsal side of the metacarpal (Figure 1-b).

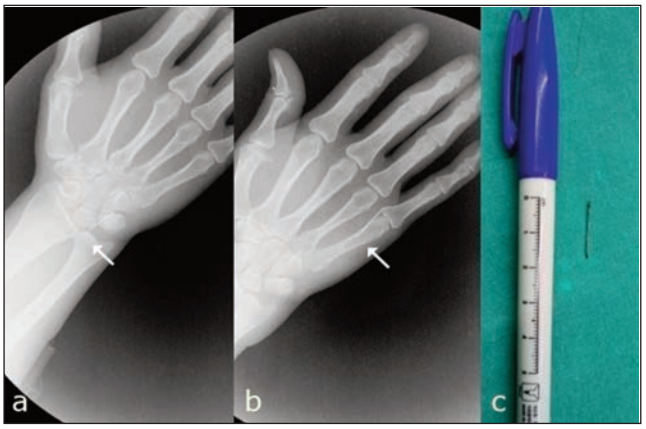

Figure-2: Using C-arm fluoroscopy AP view, a needle-shaped foreign object from carpal bone area was moved to 5th metacarpal head area by massage procedure (Figure 2 a-b). One piece of the metallic foreign body—a broken needle with length 16mm was removed (Figure 2-c).

surgery, which was performed under C-arm fluoroscopy under local anaesthesia in supine position. The needle eye, as the centre of the wound, was extended distally and proximally by 5mm. The surrounding soft tissue was passively stripped with mosquito forceps, but no needle-like foreign body could be seen. The vein at the centre of the incision was obviously swollen, and there was a puncture hole but no foreign body, such as the needle, was visible or felt. C-arm fluoroscopy revealed that the needle-shaped foreign body had retracted to the dorsal side of the wrist (Figure 2-a-b).

Considering that a needle-like foreign body was present in the vein and could flow back to the right atrium, a tape tourniquet was used to bind the forearm to prevent it from flowing back. Massage was continued using C-arm fluoroscopy to push the needle to the level of the metacarpophalangeal joint. Probe was placed from the needle eye to the far side of the vein and finally the needle-like foreign body was touched. The injured vessel was resected along with the foreign body, the needle-like foreign body was completely removed, and the C-arm fluoroscopy machine was rechecked to see there was no foreign body. Figure 2-c shows the needle-like foreign body. According to the patient's medical history, the foreign body was a broken needle from an intravenous drip. The operation lasted approximately half-an-hour, and there was only one 1cm incision on the dorsal side of the hand.

The patient was back home without complications or pain on the same day and returned to daily activity one day after the operation. In two weeks, the patient returned to work without any complications.

Discussion

Intravenous injection is a common procedure, with an extremely rare case of breakage and the remaining broken needle inside the vessel. Many previous studies have reported iatrogenic foreign bodies with possible migration, embolism, thrombosis, and sepsis.[7,8] Common intravascular foreign bodies are iatrogenic, and these include plastic, metal, and broken needle, among others.[9,10] Intravenous foreign bodies such as a broken needle after hand trauma during intravenous therapy are extremely rare, but there is the risk that they can migrate to the heart. The atrium dextrum has an approximately 2% mortality rate.[11]

Conventional X-rays are the typical imaging examination for tentative diagnosis. If we consider migration, many imaging examinations such as computed tomography or ultrasound can be used to accurately determine the position of the foreign body, which is a good choice because when a foreign body is non-metallic MRI and X-rays cannot be used as they cannot catch plastic material.[3]

Needle-shaped foreign bodies can be caught with imaging and are typically observed as a "black pin" inside the vasculature. Foreign body removal, vascular anastomosis, ligation, and resection have been previously reported.[2,3,11,12] Removal of the foreign body before proximal migration can significantly reduce the complication rates.[2,3] In this study, the foreign body was lodged in the vein and there was no proximal migration over the wrist level, but it could cause more serious complication as blood flows back to the right atrium. In this case an intravascular broken needle was retrieved with minimal invasion, using tourniquet, and under C-arm fluoroscopy machine guidance, with high patient satisfaction and excellent results.

Conclusion

It is imperative to meticulously examine the history of the broken needle in the blood vessel to determine the mechanism of needle breakage. C-arm fluoroscopy machine is critical for accurately locating foreign bodies before attempting to remove them. The mandate for early removal should be within capacity allowed so that terrible complications can be avoided.

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Conflict of Interest: None.

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References

1. Khadim MF, Leonard D, Moorehead RA, Hill C. Back to basics: iatrogenic intravenous cannula embolus. Ann R Coll Surg Engl. 2013; 95:110-1. Doi:10.1308/003588413X13629960047830
2. Song M, Wei M, Song Z, Li L, Fan J, Liu M. A foreign body in the cephalic vein: a case report . Medicine (Baltimore). 2018; 97:e11144. Doi:10.1097/MD.0000000000011144
3. Gschwind CR. The intravenous foreign body: a report of 2 cases. J Hand Surg Am 2002; 27:350-4. doi: 10.1053/jhsu.2002.31148.
4. Adeosun PO, Abdulazeez AT, Okeke UI, Ehinmosan OE, Eze EG. CT-guided retrieval of a fractured intravenous cannula in a toddler: a case report. Afr J Emerg Med. 2020; 10:277-80. Doi: 10.1016/j.afjem.2020.06.010
5. Singh A, Kaur A, Singh M, Kaur S. CT guided removal of iatrogenic foreign body: a broken intravenous cannula. J Clin Diagn Res. 2015; 9:PD28-9. Doi:10.7860/JCDR/2015/14344.6549.
6. Rossi UG, Rollandi GA, Ierardi AM, Valdata A. Pinna F, Pescatori LC, et al. Materials and techniques for percutaneous retrieval of intravascular foreign bodies. J Vasc Access. 2019; 20:87-94. Doi:10.1177/1129729818785051
7. Kumar RR, Ranjan P. Case report: iatrogenic fracture of intravenous cannula during removal with proximal migration. Int J Surg Case Rep. 2020; 76:562-5. Doi:10.1016/j.ijscr.2020.09.037
8. Dr Sharma N, Dr Chandel A, Dr Ahluwalia B, Dr Shilpi, Dr Verma A. A rare case of intravenous catheter fracture. J Med Sci Clin Res. 2021; 9:47-8. doi.org/10.18535/jmscr/v9i2.08
9. Leite TFO, Pazinato LV, Bortolini E, Pereira OI, Nomura CH, Filho JMDML. Endovascular removal of intravascular foreign bodies: a single-centre experience and literature review. Ann Vasc Surg.2022; 82:362-76. doi: 10.1016/j.avsg.2021.12.003.
10. Masood A, Malik MJ, Khan MI. A foreign body in the cephalic vein: broken piece of intravenous cannula. Cureus. 2021; 13:e18813. doi: 10.7759/cureus.18813.
11. Marcello P, García-Bordes L, Méndez López JM. Peripheral venous embolised intracardiac foreign body. Interact Cardiovasc Thorac Surg. 2009; 9:1043–4. doi: 10.1510/icvts.2009.213579.
12. Utkan A, Koçer B, Gencer B, Köse CC, Özkurt B. Unexplained pellets in the heart after shotgun wound through the hip: a case report. J Surg Med. 2020; 4:248–50.

Author Contribution:

YQL: Concept and design.
HXX: Operator of this surgery and acquisition, interpretation.
LYF: Drafting, revision, final approval.
JW: Assist of this surgery and writing.
HZC: Imaging physician of this surgery and image acquisition.
XZQ: Writing, correction and translating English.