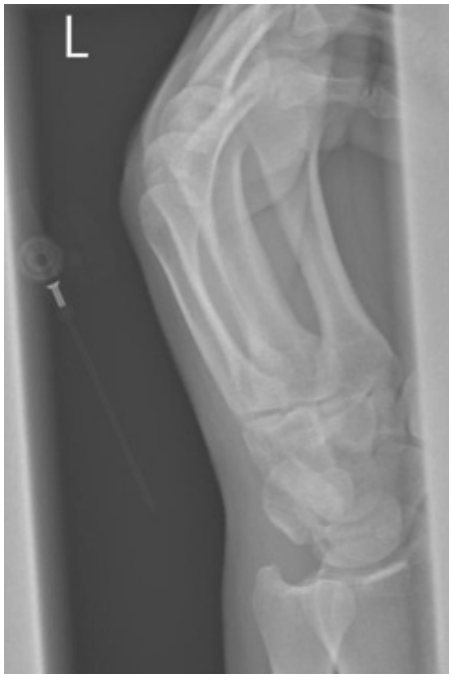
The foreign body that never was: the effects of confirmation bias

Introduction

A 46-year-old man presented with foreign body sensation at a recent cannulation site on his left hand. The patient was adamant that a piece of cannula had been left behind 2 weeks earlier. Initial assessment revealed a tender, firm superficial vein on the dorsum of the left hand. Initial X-ray did not identify a radio-opaque foreign body. As the patient remained adamant that a cannula fragment was present, ultrasound imaging was arranged and identified a cylindrical foreign body within the lumen of the vein which the radiologist considered to be consistent with a retained cannula. Exploration and venotomy was performed under local anaesthesia and subsequently abandoned because it failed to identify any retained cannula and yielded only thrombus. Further X-rays and ultrasound imaging were negative. The patient re-presented a few weeks later. Subsequent computed tomography pulmonary angiography was negative. This article describes how human factors contributed to this sequence of events and an unnecessary and disfiguring procedure.

Figure 1. Initial X-ray with control cannula. No cannula fragments identified in soft tissue.



Dr Dominic Pang, Core Surgical Trainee, Department of Surgery, Aberdeen Royal Infirmary, Aberdeen

Dr Anthony Bleetman, Locum Consultant in Emergency Medicine, Emergency Department, Rotherham General Hospital, Rotherham S60 2UD

Mr David Bleetman, Core Surgical Trainee, Department of Surgery, Bristol Royal Infirmary, Bristol

Mr Max Wynne, Undergraduate Student, School of Biochemistry, Biomedical Sciences Building, University of Bristol, Bristol

Correspondence to: Dr A Bleetman (a.bleetman@gmail.com)

CASE REPORT

A 46-year-old man presented to the emergency department complaining of pain and a foreign body sensation at a previous cannula site on the dorsum of his left hand. He had undergone an elective ear, nose and throat procedure 17 days previously during which a green (BD Venflon 18 gauge, 45 mm long) cannula had been placed in the dorsum of his left hand. At the time of cannula removal, the patient thought that the cannula looked short and estimated its length to have been only 12 mm. He challenged the nurse who removed the cannula and was reassured that the cannula looked intact but it was discarded immediately. The patient perceived this to have been a defensive action; the nurse being unwilling to show him the removed cannula.

Initial assessment revealed a tender, firm and straight superficial vein on the dorsum of the left hand, lending weight to the concern that there might have been a retained portion of cannula within it. An X-ray of the hand with an 18 gauge cannula placed externally as a control (*Figure 1*) did not identify a radio-opaque foreign body.

Subsequent ultrasound imaging (*Figure 2*) performed by a radiologist identified the presence of a foreign body within the vein. Although this was slightly irregular and did not look like a hollow cannula, the radiologist, misled by the patient's insistence of a cannula fragment, reported the finding of thrombus as a foreign body consistent with a retained cannula in his hand. Medical staff were concerned that the retained cannula fragment might have migrated during exploration and requested X-rays of the arm and chest. These did not identify any radio-opaque foreign body.

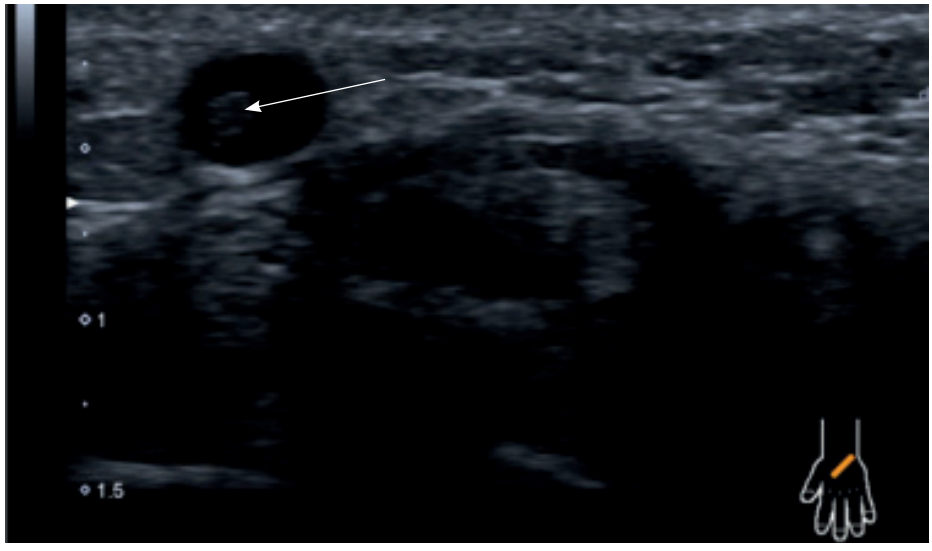
Vascular surgery advice was sought. After discussion with the on-call vascular consultant, the vascular registrar explored the vein under local anaesthetic. A tourniquet was applied to prevent potential migration of the suspected cannula piece. Exploration and venotomy identified some thrombus which was subsequently removed. With the assistance of the emergency department consultant, the surgical wound was extended proximally to explore the veins around the cannula site. The tourniquet was removed to reduce bleeding at the operation site. The exploration was unsuccessful, with only a little more thrombus removed. The procedure was eventually abandoned and the 4 inch surgical wound was closed with interrupted sutures. There was concern that the removal of the tourniquet during the exploration may have permitted migration of a retained cannula piece.

Further imaging using a repeated duplex ultrasound of the arm and multiple X-rays failed to identify the foreign body. The patient remained well throughout.

The patient was discharged but re-attended weeks later concerned, following an internet search, that the fragment might have migrated to his lung and posed a threat to life. Medical staff requested computed tomographic pulmonary angiography, which failed to identify any abnormality. The patient was discharged and later formally complained that medical staff had failed to identify a cannula fragment within his body.

The patient was discharged and advised to re-attend should further symptoms develop. He re-presented to the emergency department several months later with further concerns about the retained cannula. Another computed tomographic pulmonary angiogram was performed which was negative. No foreign body was ever identified.

Figure 2. Duplex ultrasound image – presence of a cylindrical foreign body in vein (arrow) leading to perception of a retained cannula piece.



LEARNING POINTS

- Cannula fracture is rare but potentially dangerous. Clinicians need to take each case of suspected cannula fragmentation seriously and ensure that any suspected fragment is searched for and removed (where it exists).
- This case demonstrates that patient internet searches may serve to reinforce erroneous and uninformed fears. Clinicians should be wary of the adverse influence of assertive patients whose misinformed preoccupations may adversely impact clinical decision making.
- An articulate and adamant patient may adversely mislead medical staff with his/her own erroneous perception, leading to unnecessary and harmful investigations and procedures.

Discussion

Cannula fracture is rare and tends to occur when the cannula is damaged during an attempt at reinsertion using the needle (Glassberg et al, 2013). A retained cannula fragment is potentially dangerous and once recognized, attempts need to be made to remove the fragment to prevent embolization.

In this case, the negative X-ray with the control cannula should have given assurance that a retained foreign body was very unlikely and that the firm nature of the vein was likely caused by thrombus within it. In retrospect, the ultrasound demonstrated thrombus within the vein rather than a retained cannula. The radiologist, the emergency physician and the vascular registrar were all influenced by the patient's insistence that the cannula removed from his hand was shorter than the cannula that was inserted. The behaviour of the nurse who had removed the cannula described by the patient reinforced the patient's perception and subsequently the medical team's belief that something was wrong.

Most clinicians will have recognized a similar degree of bias within their own practice. In this case, the patient underwent an unnecessary, disfiguring surgical procedure and significant radiation exposure in the form of multiple X-rays and a subsequent computed tomography pulmonary angiogram because successive members of the medical team were pursuing the improbable diagnosis of a retained body.

This case is presented to highlight the risks of not processing and interpreting objective evidence systematically during assessment of a patient where the presentation is unusual or unclear or in cases in which the patient coerces the clinical team to pursue an erroneous approach. Not only were the decisions of individuals directly involved in this case influenced by the patient's history; the decision making of other members of the clinical team, including the radiologist on duty who incorrectly reported the ultrasound image, was also influenced by an incorrect hypothesis presented by the patient.

Confirmation bias is the tendency to search for, interpret, favour and recall information in a way that confirms one's preexisting beliefs or hypotheses, while giving disproportionately less consideration to alternative possibilities (Plous, 1993).

It is a type of cognitive bias and a systematic error of inductive reasoning. People display this bias when they gather or remember information selectively, or when they interpret it in a biased way. It is a term increasingly used in the parlance of human factors experts within medicine. In this case, a very plausible and adamant patient led successive clinicians to attempt to fit the clinical scenario to an incorrect initial assessment. Excessive credence was attributed to evidence supporting the presumed diagnosis while strong negative indicators were ignored. Whether it is patient persistence, or a fear of litigation in missing something as potentially catastrophic as an embolic fragment of cannula, the authors would urge doctors to be vigilant against the risk of pursuing an initial assessment in the face of conflicting empirical evidence. **BJHM**

Glassberg E, Lending G, Abbou B, Lipsky AM (2013) Something's missing: peripheral intravenous catheter fracture. *J Am Board Fam Med* **26**(6): 805–806. https://doi.org/10.3122/jabfm.2013.06.130097

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