CASE REPORT

Percutaneous Intraluminal Intravascular Retrieval of Foreign Body Under Ultrasound Guidance

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Percutaneous retrieval of intravascular foreign body is a safe and effective procedure with the use of various imaging modalities. However, fluoroscopy is used extensively in most of the procedures, because the broken fragments which gets retained in intravascular compartments are radiopaque. In our case, the broken fragment, which was retained in the internal jugular vein, was radiolucent. Retrieval of a radiolucent foreign body under fluoroscopy is not only difficult but also can lead to serious sequelae during retrieval. We report such a case of real time ultrasound-guided retrieval of the foreign body in adjunct with fluoroscopy.

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Introduction

The percutaneous retrieval of intraluminal intravascular foreign body is a real challenge during any interventional or post interventional procedures. The retrieval of radiopaque foreign body has previously been well documented. However, the retrieval of radiolucent intravascular foreign body poses a great challenge to the interventionist. In such cases, ultrasound can aid direct visualization of the foreign body and also its retrieval in real time. A case of such sonography-guided retrieval of foreign body in the internal jugular vein is reported here.

Case report

A 16-yr-old female with a history of pulmonary tuberculosis presented with vomiting, seizure, and altered sensorium. A central venous line (Cavafix, 16 G, 45 cms, Braun, Melsungen, Germany) was secured from the internal jugular vein because it was difficult to access the peripheral line, and
anti-convulsants (eptoin and sodium valproate) were started. Within 2 hours of starting the anti-convulsants, the patient’s general condition improved and she was alert and conscious. Two days later, when the patient was stabilized and was advised for discharge, removal of the central venous line was suggested. During removal, the catheter was mistakenly cut instead of the suture, and part of the central venous catheter remained in the intravascular compartment in the internal jugular vein.

Preliminary investigations were ordered and a chest X-ray was performed. The chest X-ray (Fig. 1) revealed a linear faint radio-opacity in the right para-tracheal region extending from the D2–D5 vertebral level. Ultrasound of the right lower neck region (Fig. 2) confirmed the position of the foreign body in the internal jugular vein at the level of the bifurcation of the carotid vessels with a floating thrombus noted in the internal jugular vein distal to the foreign body. The distal end of the intravascular foreign body could not be localized on ultrasound. Following these preliminary investigations, the patient was taken for emergency retrieval of the intravascular foreign body under fluoroscopy. A percutaneous femoral vein puncture was

Fig. 1 Frontal chest radiograph (left) does not show any foreign body, but it can be seen as a thin radiolucent catheter (arrow) along the right paratracheal region in the enlarged view on the right.

Fig. 2 Ultrasound longitudinal (left) and transverse (right) view of the right lower neck region showing the catheter fragment (black arrow) within the internal jugular vein (white arrow).
taken on the right side and a 5 French (FR) sheath was introduced. Thereafter, an end hole 5 French (F) headhunter catheter was advanced up to the internal jugular vein under fluoroscopy guidance. The 5 FR sheath was replaced by a 10 F sheath over the guide wire and through the large bore sheath a basket snare was advanced through the inferior vena cava up to the superior vena cava. The foreign body was not seen on fluoroscopy, although the snare was clearly seen. The catheter end was then directly visualized using real time ultrasound. Under ultrasound guidance, the catheter tip could be easily fixed by the basket snare (Fig. 3) and was pulled out through the transfemoral route. The foreign body as well as the opening of the prongs of the snare and the trapping of the foreign body could be well appreciated. The placement and closure of the snare was facilitated by ultrasound. The clot and the foreign body were retrieved under ultrasound guidance.

Discussion

Intravascular or catheter embolization of a foreign body, either by fracture or migration, is a rare condition, occurring in approximately 1% of patients [1–4] with complications of retained intravascular foreign bodies, including sepsis, perforation, thrombosis, cardiac arrhythmias, and myocardial necrosis [5]. Such intravascular foreign bodies, if left untreated, may cause serious complications and even death. Due to this high mortality rate, extraction of foreign bodies is strongly recommended even in asymptomatic patients.

The most common sites for the lodging of one of such intravascular foreign bodies are the right atrium, pulmonary artery trunk, and right ventricle [1–4, 6, 7]. The site of lodging of such catheters depends on the vein used as access for the implantation, on the length and flexibility of the catheter, on the blood flow in the vessel or in the cardiac chamber, and on patient positioning at the moment of the incident [5].

Removal of intravascular foreign bodies by percutaneous intervention is usually the best treatment option for such patients. Percutaneous retrieval is a minimally invasive, relatively simple, safe procedure, and carries very low complication rates compared with conventional surgical treatment or removal [1–4, 6–11].

The venous access recommended for the removal of intravascular foreign bodies is the common femoral vein, preferably the right (as suggested by Egglin et al [9]). The advantages of this approach include: ease of handling, it is comfortable for patients, the puncture is facilitated by the blood vessel diameter, the vessel is situated close to the surface of the skin, the presence of posterior bone protection allows for fixation during puncture, and the effective compression is safe following the removal of the objects. This approach also allows access to the main sites of migration of intravascular foreign bodies, and its big vessel lumen allows for the insertion of materials of various sizes. Depending on the degree of difficulty of the procedure, one femoral vein can be used, or both simultaneously, although it is always preferable to use only one access. One of the complications associated with such a procedure is transitory cardiac arrhythmias, which are related to the manipulation within cardiac chambers [4].

Ultrasound guidance for accurate localization of these fragments in real time can be accomplished prior to retrieval by either conventional radiography or fluoroscopy. In our case, a dilemma occurred when the non-opaque intravascular catheter fragment was not demonstrated by the usual radiographic methods or by fluoroscopy. Real time ultrasonography, however, readily located the catheter fragment in our patient. The fact that ultrasonography could be brought to the fluoroscopy unit enabled both modalities to be used together to retrieve the radiographically invisible catheter. The ultrasound can help in the manipulation of the catheter and basket snare dynamically.

Thus, when preliminary investigations failed to properly localize the intravascular fragment, real time ultrasonographic modality was used not only to localize the fragment but also to aid in the manipulation and retrieval, with fluoroscopy used as an adjunct. We conclude here that real time ultrasonography, being a cheaper bedside tool, can be used as an adjunct to fluoroscopy for retrieval of intra- as well as extravascular foreign bodies. It would facilitate reduction of the radiation dose and help in manipulation of the guide wires and catheters in dynamic mode, which

Fig. 3 Ultrasound sagittal view showing catheter end fixed by the basket snare (black arrow). White arrows show the intravascular catheter fragment. The figure on the right shows the in vitro image of the basket snare holding the retrieved catheter fragment.
would decrease the time taken for the cumbersome manipulations under fluoroscopy.

References