

Fracture Embolism of *In-situ* Guidewire–Bewildering Aetiology of Protracted Pyrexia in a Patient with End Stage Renal Disease!

Abstract

Guidewire embolism during venous access for haemodialysis is not uncommon yet potentially avoidable iatrogenic complication. Unrecognised, long-standing *in-situ* guidewire may predispose to thrombosis and become a nidus for infection. This entity should always be borne in mind and considered as one of the differentials of unexplained pyrexia in patient on maintenance haemodialysis. In this context, we report a patient on maintenance dialysis who presented with fever of 6 weeks duration with no localising history and failed response to empirical antibiotics. On imaging, he was detected to have *in-situ* guidewire with fracture embolism into inferior vena cava and right external iliac vein and soon patient became afebrile following guidewire retrieval using gooseneck snare device, thereby retrospectively confirming causality.

Keywords: Fracture embolism, *in-situ* guidewire, pyrexia, end-stage renal disease

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Introduction

Guidewire embolism is a preventable complication, provided simple measures are stringently practised using the Seldinger technique. Human error in perusing post-central line insertion check radiograph is usually responsible for the delay in diagnosis.^[1] *In-situ* guidewire usually is asymptomatic, thus may remain unnoticed for a significant period of time,^[2] however, can result in various complications including arrhythmia, perforation of the vessel wall and guidewire fracture embolism.

Case Summary

A 22-year-old male with end-stage renal disease (ESRD), on maintenance haemodialysis (MHD) for 8 weeks, presented with low-grade fever for 6 weeks. He denied history of cough, night sweats, weight loss, skin rash, musculoskeletal, gastrointestinal or urinary tract symptoms. Initial vascular access for dialysis was an uncuffed central venous catheter (CVC) in the right internal jugular vein (IJV), and subsequently, a left radio-cephalic arteriovenous fistula (AVF) was created. Because of fever, suspecting catheter-related bloodstream infection (CRBSI), the catheter was removed 4 weeks ago. Blood and catheter tip culture was not

done at that time. However, given persistent fever with leucocytosis (15,900/mm³), he received empirical broad-spectrum intravenous antibiotics for 2 weeks. Initial imaging including chest X-ray and ultrasonography of the whole abdomen was normal, and sentinel cultures including blood and urine were sterile. The patient remained febrile and in absence of possible localisation, received 4 weeks of empirical antitubercular treatment (ATT), before referral to this institute where investigations revealed leucocytosis (16,700/mm³; polymorph - 85%), procalcitonin - 6 ng/mL with normal transoesophageal echocardiography. Contrast-enhanced computed tomography (thorax and abdomen) for alternative aetiology baffled us with a linear hyperdense foreign body in inferior vena cava and right external iliac vein (EIV) suggestive of a guidewire [Figures 1 and 2]. Guidewire embolization was possibly following IJV cannulation as he denied any attempts of femoral cannulation. An unforeseen time delay might have resulted in guidewire migration to EIV. Pre-intervention venogram didn't reveal any thrombus and guidewire was retrieved using a gooseneck snare device under fluoroscopy [Figure 3], following which the patient became afebrile. ATT was discontinued, and he underwent renal transplantation and is doing fine with normal graft function at present.

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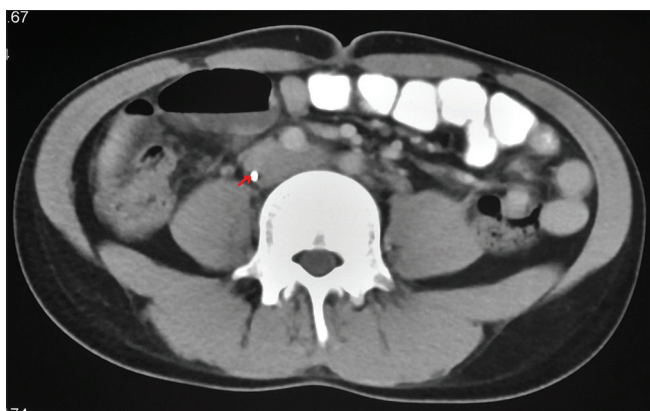


Figure 1: Contrast-enhanced computed tomography (thorax and abdomen) showing linear hyperdense foreign body (red arrow) in inferior vena cava

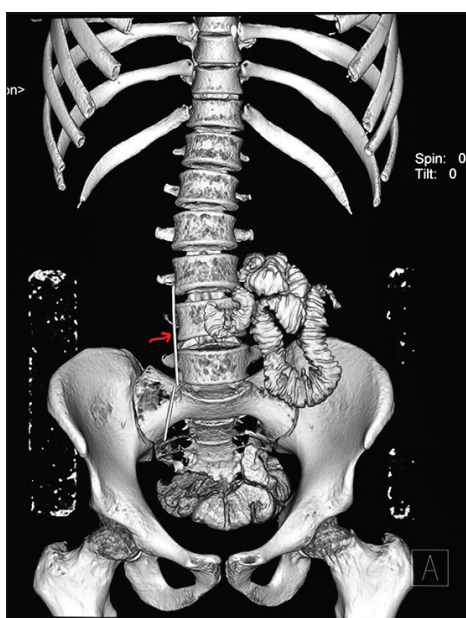


Figure 2: 3D reconstructive images to show linear hyperdense foreign body (red arrow) in inferior vena cava and right external iliac vein (EIV) measuring 8.3 cm and 4.9 cm (982 HU), respectively

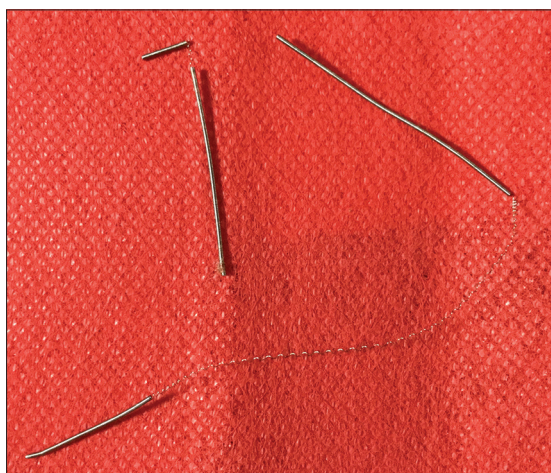


Figure 3: Retrieved guidewire from inferior vena cava and EIV

Discussion

We report a case of retained guidewire following right IJV catheterisation complicated by fractured guidewire embolism, presenting as unexplained pyrexia, managed successfully by radiological intervention.

Central venous catheterisation presents with many complications such as arterial puncture, awkward catheter position, local hematoma, haemothorax, pneumothorax and infection. The *in-situ* guidewire is a rare and hazardous complication^[3] with mortality rate of 20%. Complications of *in-situ* guidewire include thrombosis, infections, post-phlebotic syndrome, pulmonary embolism, vascular damage^[4] etc. The index case had *in-situ* guidewire, complicated by guidewire fracture and embolism, which manifested as unexplained fever.

Ideally, CVC insertion should be done under ultrasonography guidance so as to avoid various local complications followed by ensuring the presence of guidewire in the tray and check X-ray of the chest, so as to locate the tip of the catheter. In the index case, CVC insertion was done outside the hospital and an X-ray check was not done following the procedure. Even after current admission in our hospital, we missed the presence of *in-situ* guidewire on chest X-ray, as guidewire had already migrated to IVC and EIV.

Guidewire inserted beyond 18 cm may result in embolic complications.^[5] Even though the catheter was removed suspecting CRBSI, catheter-related infective nidus may remain and act as a focus for development of catheter-associated right atrial thrombus (CRAT) if a new catheter is inserted.^[6] However, the index patient received subsequent MHD through AVF and denied any attempts of femoral cannulation.

In case of a superficial guidewire (palpable in the vessel-IJV/femoral) embolus; a venous cut down can be performed to extract the guidewire. However, if it has embolised distantly (as in index case) imaging is required to determine the position. Percutaneous extraction through interventional radiology techniques include Dormia-basket, gooseneck snare or endovascular forceps and are the preferred method for retrieval, but surgery has a role especially if percutaneous extraction fails^[7] or such facilities/expertise are lacking.

Nephrologist who is inserting a CVC must be familiar with its complications, particularly a retained guidewire. Ensuring presence of complete guidewire in a catheter set at the end of the procedure and taking a post-procedure chest X-ray is mandatory. Once there is suspicion of a retained guidewire,^[8] one should take immediate consultation with an expert surgeon/interventional radiologist to tackle the problem.^[3]

Conclusion

Routine use of ultrasound with fluoroscopic guidance if available and following stringent measures during venous catheterisation using the Seldinger technique potentially avoids iatrogenic complications. Guidewire embolism may

remain unnoticed and can be a potential nidus for infection, resulting in fever. Most cases, however, can be safely dealt with percutaneous endovascular techniques.

Learning points

1. Routine post-insertion check radiograph is must, not only to confirm the position of catheter tip but also to detect any incidental guidewire embolization in the central vasculature.
2. The upper limit of safe guidewire insertion in an adult patient should not be beyond 18 cm for a right-sided approach and 20 cm for a left-sided approach.^[9]
3. *In-situ* guidewire-related sepsis should always be borne in mind and considered as one of the differentials of unexplained pyrexia in patient with end stage renal disease.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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