

# Femorally inserted central catheter, migration and catheter damage during contrast media injection: A case report

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## Abstract

Femorally inserted Central Catheters are increasingly used also for medium and long-term catheterization as an alternative to Centrally and Peripherally inserted Central Catheters. If certified as “power injectable,” they may be used for contrast media injection during radiological examinations. It is important to consider the risk that, as with other types of catheters, the injection of contrast media could cause migration or damage to the device. The case of a Femoral catheter migration in hepatic vein, during CT scan, is described.

## Keywords

Nursing, femoral catheter, tip migration, ultrasound, contrast media, internal migration

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## Introduction

Femoral approach for central venous access devices is used as an alternative to Peripherally Inserted and Centrally Inserted Central Catheters (PICCs and CICC), when their insertion is not possible or not indicated. The tip of the Femorally inserted central catheter (FICC) can be placed both in the inferior vena cava (IVC) at the junction with the right atrium (RA) and in IVC above the iliac veins and below the renal veins.<sup>1</sup>

FICC, if certified as “power injectable,” may be used for contrast media injection during radiological examinations.

Most venous catheters inserted in the past years via femoral veins were the same used for jugular or subclavian vein approach (20 cm long, up to 7 Fr and rarely with the tip in IVC, therefore without the main characteristic of a central catheter). They were quite stiff and not prone to easily move in the vascular bed. Nowadays PICC catheters or similar, long enough to reach IVC, inserted via the femoral route are used more often.<sup>2–4</sup> They are thinner, longer, and more flexible so for FICCs too, migration of the catheter tip during contrast media injection is possible as may happen to PICCs.<sup>5–7</sup>

## Description

The patient’s informed consent was obtained before collecting and analyzing the data. The use of the data is part of the OVASC study protocol authorized by local Ethics Committee (resolution 561, 2021-12-9, Brianza Ethics Committee).

Seventy-three years old surgical patient, height 160 cm and weight 52 kg, without adequate veins in the arm for a PICC, had a tunneled FICC inserted for infusion therapies and total parenteral nutrition. Catheter inserted was a Poliuretane Picc Power Injectable made by Teleflex® Medical Europe—Dublin—Ireland, 50 cm, 2 lumens (5 Fr).

FICC was inserted according to current guidelines. A systematic ultrasound (US) assessment of the veins in the

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**Figure 1.** Catheter position pre/post contrast media injection.

inguinal area and mid-thigh was performed and the right Common femoral vein in the inguinal groove was chosen as ideal for venipuncture. The procedure was performed after a thorough disinfection of the skin with chlorhexidine 2% and maximum sterile barrier precautions adoption. The US guided venipuncture was performed with a 21G needle and e 0,018 nitinol guidewire. A 9 cm subcutaneous tunnel was created to move the exit site to mid-thigh. The tip of the catheter, inserted for 39 cm from inguinal groove, was placed in the IVC at the junction with the RA, in the so called Inferior Cavo-Atrial Junction (ICAJ) area, with US visualization by subcostal window, of the tip in the target place.

After 15 days from insertion the patient needs a CT scan of thorax and abdomen. The local Vascular access team was called the day after CT scan due to a malposition of the FICC, visualized in a hepatic vein during CT and because the FICC was malfunctioning (distal lumen occluded and Persistent Withdrawal Occlusion in the proximal lumen).

Looking the CT images, in the previous scout scan, before contrast media injection, FICC was clearly visible in IVC. In the venous coronal CT scan, after contrast media injection, FICC was clearly and deeply inserted in a hepatic vein (Figure 1). Unfortunately, no data about contrast media temperature, flow rate, and injection pressure were available.

No US windows allowed a clear direct visualization of the catheter in the hepatic vein, so bubble test in the wrong position has been performed, with a delay time of the

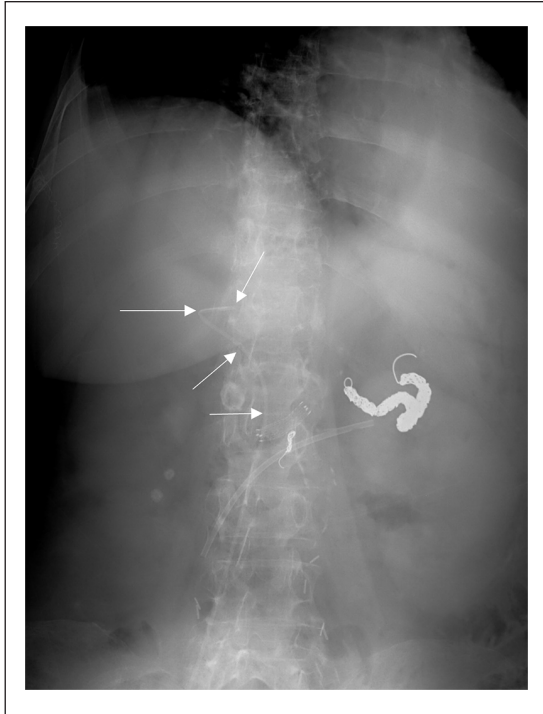
bubbles in RA up to 2 s. The vascular access specialist retracted the catheter of 7 cm. A new bubble test showed a delay time of about 1 s (compatible with middle IVC position). This maneuver did not solved the malfunction, so an abdomen X-ray was obtained to clarify this problem.

The abdomen X-ray showed a catheter projection like the same position seen in the CT scan and the Radiologist hypothesized in the report the presence of the catheter in a hepatic vein (Figure 2).

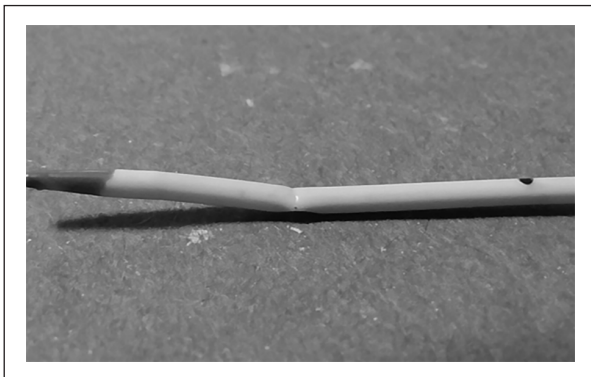
Since it is unlikely that the catheter was, after retraction, in the same previous position, a problem related to the catheter itself was therefore hypothesized. The catheter was then removed and a new tunneled FICC was inserted in the right common femoral vein, exactly with the same methods and measures as the previous one, without other complications. After removal, a persistent kneeling, about 1.5 cm proximal to the tip, and a persistent abnormal curvature of the last 10 cm of the catheter was found (Figure 3). At the time of the submission the new FICC were still in place, no other complications were recorded and indicators of liver function did not change significantly.

## Discussion

The shape of the removed catheter was similar to the projection visualized radiologically, both during CT and abdomen X-ray. It appears likely that, after retraction, the



**Figure 2.** Catheter position after 7 cm retraction.



**Figure 3.** Catheter tip after removal.

catheter retained a shape memory that simulated the presence in the hepatic vein while in IVC and persistent kneeling was the cause of the malfunction.

It is important to check the position of the tip of the FICC after injection and, more importantly, check the position of the tip after radiological examinations with contrast media that do not include any image of the catheter. It would be desirable a post procedural tip location protocol after contrast media injection to identify any unrecognized migrations of the catheter, US guided tip location could represent an unexpansive and quick opportunity. As for PICCs,<sup>5-7</sup> the same migration risk can also be assumed for the FICCs, especially if the catheter is very flexible.

We don't know how frequent these events are because the use of FICCs with the tip in IACJ is not so widespread and there is no evidence for them. We do not even know if

it is possible to attempt to reposition the catheter by injection of normal saline, as described for PICCs.<sup>8</sup> Surely, the malfunction of the FICC with the tip in ICAJ, after contrast media injection, should be carefully evaluated to exclude migration or damage to the catheter.

### Author contributions

Elli S.: data collect, manuscript writing. Laura S.: manuscript writing. Cavalli S., Mastroianni G., Rondelli E.: data collect.


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