

Repositioning a peripherally inserted central catheter (PICC) using a high-flow flush technique (HFFT) in an adult patient with non-Hodgkin's lymphoma

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Peripherally inserted central catheters (PICCs) are specialised central catheters that can provide reliable venous access in many diverse patient populations^{1,2}. PICCs are a convenient means of administering chemotherapy agents³.

However, misplaced PICCs have been reported in various anatomical positions including the arterial system, jugular vein or axillary vein^{1,3}. Detection of a malposition, when not using navigational and tip positioning techniques, can often be frustrating for the inserting proceduralist during the post-insertion chest x-ray (CXR) review. Navigational and electrocardiogram (ECG)-based technologies have reduced the incidence of primary catheter tip malposition in PICCs¹.

A 45-year-old male presented to the oncology day unit for his seventh cycle of R-CHOP (cyclophosphamide, doxorubicin, vincristine and prednisone). His history included non-Hodgkin's lymphoma and diffuse B-cell lymphoma with extensive abdominal disease. Three attempts of peripheral cannulation were unsuccessful by nursing staff in the oncology day unit and, as a result, his treatment needed to be delayed. Consequently, consent was gained by the medical officer for the insertion of a PICC. The patient's previous presentations had no history of vascular access difficulties and his previous chemotherapy cycles were successfully administered via peripheral cannulas.

The nurse-led bedside PICC insertion team performed ultrasound and located the right basilic vein; however, this was only after two unsuccessful punctures. The right cephalic vein, located using ultrasound scan (USS) guidance, was successfully punctured at first attempt and a guidewire was introduced. An uncomplicated modified seldinger technique was performed and a 5 French dual lumen catheter was inserted with no issues. The nurse-led team used an ECG and tip confirmation system (TCS) to confirm PICC placement. The catheter was inserted to the hub; however, the ECG was indicating that the PICC was not centrally placed in the lower third of the superior vena cava. Various remedies were

attempted unsuccessfully to correct the tip position⁴. Remedies attempted were the abducting of the shoulder to influence the PICC movement and the pulling back of the internal stylet by approximately one inch to allow a floppier catheter tip to follow the direction of the blood flow more easily. Subsequently, the patient was transferred to the Medical Imaging Department (MID) and a CXR was performed to confirm the PICC tip position (see Figure 1).

The optimal PICC tip position is at the cavoatrial junction (CAJ). Malpositioned PICCs outside the optimal position result in treatment delays, and previously required lengthy, expensive

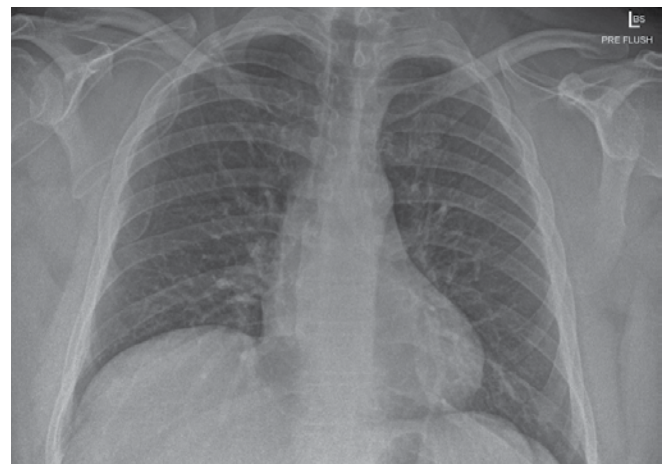


Figure 1. The PICC is looped in the axillary vein and the tip lies at the junction of the axillary and subclavian veins.

procedures to reposition or replace the existing PICC. Traditional repositioning techniques require the use of expensive wires and may further delay treatment^{1,5,6}.

An alternate technique is the high-flow flush technique (HFFT). This is a safe and cost-effective intervention to correct PICC malpositions – it has minimal interference to intravenous therapy and only involves a nominal cost¹. Another similar technique

is a simultaneous rapid saline flush (SRSF)⁵. The SRSF involves flushing both lumens simultaneously with a saline power flush using 10mL syringes. The patient is placed in the high fowler's position and instructed to cough, followed by HFFT or SRSF^{1,5}.

In this case, the radiologist notified the PICC team of the PICC's position and, after a discussion, it was decided to attempt a SRSF while the patient remained in the MID so that a repeat CXR could be performed immediately post-flushing. The decision to use SRSF was based on the patient having a dual lumen 5 French PICC.

The patient was placed in the imaging room and two PICC nurses aseptically connected each lumen with a pre-filled 10mL saline syringe. As aforementioned, the patient was instructed to cough and both lumens were flushed. Immediately, the patient was placed in a standing position to take a post-CXR. In this instance, SRSF was only used once and it was successful, advancing the tip to the CAJ. Post-flush, the control CXR demonstrated a correctly placed PICC with the tip positioned in the superior vena cava (see Figure 2).

In conclusion, instead of repositioning the PICC with time-consuming and costly procedures, such as an over-the-wire exchange, the feasible alternative of a SRSF was successful. The patient received the planned treatment the same day as planned.

DISCLOSURE

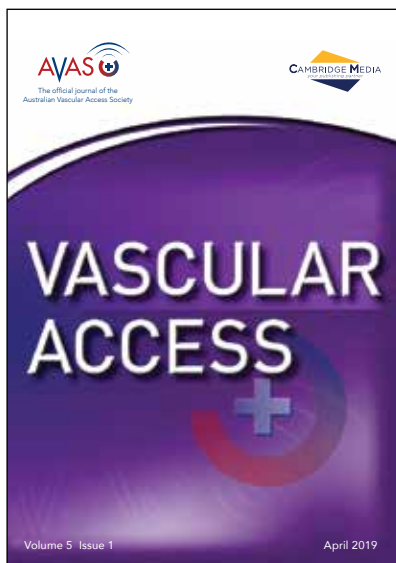
The author was involved in the care of the patient.



Figure 2. Post-flushing, the PICC courses normally from the right upper limb with the distal tip appropriately positioned at the cavoatrial junction.

REFERENCES

1. Spencer TR. Repositioning of central venous access devices using a high-flow flush technique – a clinical practice and cost review. *J Vasc Access* 2017;18(5):419–25.
2. Walker G, Todd A. Nurse-led PICC insertion: is it cost effective? *Br J Nurs* 2013;22(19):S9–15.
3. Song L, Li H. Malposition of peripherally inserted central catheter: experience from 3,012 patients with cancer. *Exp Ther Med* 2013;6(4):891–3.
4. Pittiruti M, Bertollo D, Briglia E, Buononato M, Capozzoli G, De Simone L, et al. The intracavitary ECG method for positioning the tip of central venous catheters: results of an Italian multicenter study. *J Vasc Access* 2012;13(3):357–65.
5. Natividad E, Rowe T. Simultaneous rapid saline flush to correct catheter malposition: a clinical overview. *J Assoc Vasc Access* 2015;20(3):159–66.
6. Wang L, Liu ZS, Wang CA. Malposition of central venous catheter: presentation and management. *Chin Med J (Engl)* 2016;129(2):227–34.



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