

Case Report-III

Migration of Entire Peripherally-Inserted Central Catheter to Pulmonary Arteries: an Unusual Complication

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ABSTRACT

Use of central and peripheral access devices is an integral part of modern oncology care. Peripherally-inserted central catheter (PICC) is a cost effective, commonly employed method for prolonged IV infusional chemotherapy and it is a reliable alternative to short-term venous catheter. The advantages and limitations are well established. Amongst the complications, fragmentation and migration with risk of thrombo-embolism is the most serious one. We report a case of migration of entire PICC line into pulmonary vasculature and its uncomplicated retrieval.

INTRODUCTION

Prolonged chemotherapy and supportive care over many months in modern oncology practice has necessitated the use of many types of central catheters - open ended or closed ones; centrally inserted or peripherally inserted. Peripherally-inserted central catheter (PICC) is a commonly used for its ease, cost and convenience. These catheters are made up of various materials, such as Teflon, Polyurethane and Silicone elastomer. Certain types of PICCs known as "POWER PICCs", approved by the US

FDA are used in radio contrast studies as they can withstand high pressures.¹ Silicone elastomer catheters are the most commonly used ones and have low risk of complications. Lack of peripheral access, venous thrombosis, presence of infection and allergy to the material of the device are few contraindications for usage of PICC.

Use of PICC has many advantages. They can be employed for long-term infusional chemotherapy, total parenteral nutrition, administration of antibiotics and rehydration therapy. They facilitate administration of any infusate, regardless of osmolarity, pH, or other chemical properties of the solution or medication. Peripheral vein damage by vesicants and irritants is also avoided. Pneumothorax, a complication seen with subclavian and internal jugular percutaneous catheters² is not a matter of concern. They can be inserted in out patient department within a short time and are easy to maintain. With proper maintenance, they can remain in situ up to an year. Complications arising of the use of PICC are listed in Table-1.^{2,3} Complete one-piece migration of PICC is a rare complication and it holds the risk of pulmonary thromboembolism which can be fatal. The overall potential risk of death or serious complications from retained catheter fragments is 71%.⁴

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Table 1:

Common Complications	Uncommon Complications
1) Phlebitis	1) Catheter fracture
2) Vein thrombosis	2) Catheter embolization
3) PICC occlusion	3) Pericardial effusion
4) Leaking/broken catheter	4) One-piece migration
5) Accidental removal	6) Catheter malposition
7) Allergy to the material of the PICC	

CASE: A 41-year-old male, patient of Adenocarcinoma of Rectum (MAC-stage D) had uneventful PICC line insertion (4 Fr., Bard Inc.) under aseptic conditions to facilitate palliative chemotherapy. After proper anchoring PICC line in the left antecubital fossa, his PICC line was maintained with weekly dressings and flushing with heparin. He had three cycles of ILF regime (Irinotecan, 5-FU, leucovorin) till first week of August 2006 and due to progression, chemotherapy was changed to second line FOLFOX4 (leucovorin, 5-FU, oxaliplatin) with bevacuzimab. On completion of first cycle of second line chemotherapy on 22/08/ 2006 he was discharged after the routine maintenance and dressing of the PICC line exit site.

At home, the same day, he had complaint of transient breathlessness and mild cough. Next day morning, on realizing the butterfly lying loose on the bed, he palpated the PICC line and found it missing. He returned to the out patient department and examination confirmed absence of PICC line at the exit site and along the veins in the arm. His general condition was good and vitals were normal. Systemic examination did not reveal any abnormality. X-ray Chest (Fig 1 and Fig 2) revealed migrated PICC line in pulmonary vasculature looping across the right ventricle.

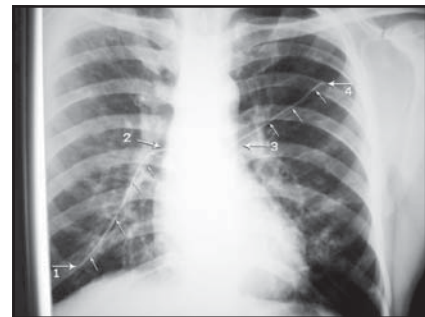


Fig-1. Chest Radiograph PA view revealing the PICC in the pulmonary vasculature (marked by white arrows).
 1-2: Right arm of the catheter in the right pulmonary artery.
 3-4: Left arm of the catheter in the left pulmonary artery.
 2-3: Catheter in the right ventricle, which is better seen in Fig 2.

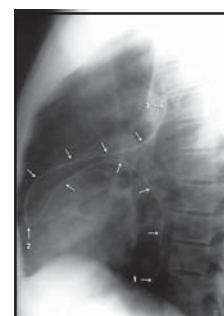


Fig. 2 Chest Radiograph lateral view revealing migration of entire PICC line (marked by white arrows).
 1-3: Entire extent of the catheter.
 2: Loop of the PICC across the right ventricle into bilateral pulmonary arteries.

The retrieval of PICC was carried out by interventional radiological technique using loop snare and pigtail catheter via percutaneous transfemoral venous approach. The PICC line was retrieved in one piece without any

complications. Check radiograph after PICC removal revealed absence of any fragment of the catheter. He was discharged after 24 hours of observation. The patient is currently undergoing further chemotherapy and is asymptomatic.

DISCUSSION

PICC has been established as a reliable and cost-effective, long-term venous access. Optimal usage of PICC is possible with proper maintenance. To maintain the PICC line, periodic (weekly) dressings and flushing are required. In addition careful inspection of the

Groshong; Boston Scientific PASV) flushing is done with normal saline.² A 10-cc or larger syringe should be used while flushing to prevent catheter damage.

Although complications are relatively lower with the PICC usage, some may arise which could be serious. The risk of complications increases, due to factors like long dwell time, central placement and long length. The commonly encountered, but avoidable complications are that of bleeding, phlebitis and thrombosis. Catheter migration, fragmentation

Table 2: Preventive measures to avoid PICC migration

A) Before Insertion:

(1)	Before the insertion the catheter should be checked for any damage or fracture.
(2)	Change in position (abduction and adduction) of the arm should be considered during final catheter tip positioning.

B) After Insertion:

(1)	Sharp instruments should be used carefully for adjusting the length of the PICC after insertion.
(2)	Proper securing of the PICC with suture wings and adhesive dressing should be carried out.
(3)	During every dressing, inspection of the exit site should be carried out for any loose sutures, fracture or damage of the catheter.
(4)	Accessories and components used in conjunction with this device should incorporate Luer lock connections

PICC exit site for signs of infection, fragmentation of the catheter or loosely attached butterfly with their rectification is essential. Change of wet, soiled, or loose dressing should be carried out as and when required. Protocols for flushing vary according to the type of PICC. When not in use, periodic flushing is carried out with heparin. In closed end types of PICC with pressure-sensitive valves (Bard

and its retention in the vascular structures, even though rare, has been proved to be fatal in some. These can be avoided by certain preventive measures as highlighted in Table 2.

In the index case, it appears that the catheter was accidentally detached from its connector (Fig 3) and then it migrated and embolized in one piece through the long veins in

DIAGRAMMATIC REPRESENTATION OF PARTS OF IN SITU PICC LINE

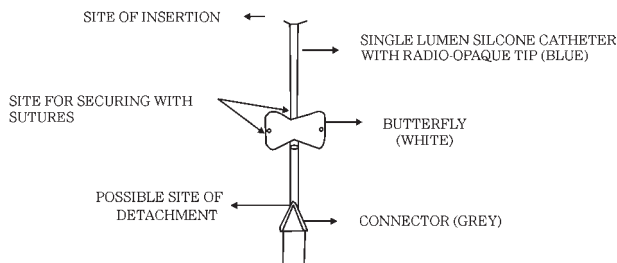


Figure-3

the arm to IVC, right atrium, moving to the right ventricle. It then unwound itself to loop across the right ventricle into bilateral pulmonary arteries. Fortunately, the patient did not have any cardio-pulmonary complications. The catheter was successfully retrieved using a nonsurgical technique with out any further complications.

Catheter retrieval is by surgical or nonsurgical methods.⁴ Nonsurgical method is minimally invasive, safe and effective procedure. Mostly nonsurgical methods are employed for catheter retrieval using interventional radiological techniques (loop snares, hooked guide wires and Forgathy balloon catheters) and surgical intervention is undertaken, rarely. In the early 1980s, retrieval of catheter fragments was mostly attempted with a Dormia basket or with a self-made wire snare while today the nitinol gooseneck snare loop enjoys almost exclusive application. Even

though nonsurgical methods of catheter retrieval are safe, few technical problems are encountered. Loss and breakage of guide wire, unsuccessful attempts at retrieval and fracture of embolized catheter into two have been reported. Guide wire breakage was seen mainly in homemade snares. Initial retrieval failures, which were successful at later attempts, have occurred because of venospasm and arterial spasm. Unavailability of catheter free ends or the wire getting fractured caused majority of retrieval failures. Other non-technical common problems related with the PICC are cardiac arrhythmias and excessive back bleeding at the operative site.

Even though PICC is now being used frequently in cancer patients, one must not overlook the serious complications related to its use. Majority of the complications can be avoided by proper maintenance.

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