

Re-confirming PICC Tip Location

Question:

We frequently hear that we should obtain a repeat chest x-ray to confirm the tip location of PICCs. What is the recommended interval for obtaining a repeat chest x-ray while a PICC or any central venous catheter is in place?

Answer:

This is a great question, but unfortunately we do not have any recommendations or guidelines that identifies a specific frequency for the repeat chest x-ray.

All types of central venous catheters have the potential for tip migration or spontaneous secondary displacement. The catheter is properly placed with the correct tip location verified immediately after insertion. At some point during the dwell time, the catheter tip moves from the desired location into another vein. The ipsilateral jugular vein is the most commonly reported location when the intravascular catheter portion migrates, resulting in a retrograde tip location. The entire catheter can be dislodged with alteration of external catheter length indicating a change in the original tip location. The latter event is easy to detect by simple measurement of the external catheter with each dressing change, however the former often presents with no or very few signs and symptoms.

Routinely checking the catheter tip location would appear to be a reasonable approach to identify migrated catheter tips, however identifying the optimal time interval is almost impossible. The time interval between catheter insertion and tip migration ranges from days to months. The tip may remain in the new location or it could spontaneously move back to the original position with a short period.

The causes of catheter tip migration include many aspects of patient movement, flushing techniques, and pressure changes, however the exact mechanism is still undetermined. Strenuous physical activity of the upper extremities, congestive heart failure, and changes in intrathoracic pressure related to coughing or vomiting have been proposed as the cause.

The primary concern is that a migrated catheter tip might go undetected, resulting in further complications. At the present time, research has not provided answers to your question about the specific time interval for follow-up chest x-rays. The word “periodic” is used in multiple publications, but no article states what that period should be. Given this situation, we have to rely on clinical signs and symptoms.

This places a great importance on the nursing assessment of each central venous catheter before each use. The patient may complain of hearing a gurgling sound or a running stream in the ear on the side of catheter insertion. Pain in the chest, shoulder, or back can occur with infusion. Partial or complete catheter occlusion is indicated by the lack of blood return from the catheter, resistance during injection, or alterations in gravity flow

rates. Malpositioned catheters may also have signs of venous thrombosis such as edema of ipsilateral extremity, difficulty moving the jaw, or engorged peripheral veins in the extremity or chest wall. Fluid leakage or other signs of extravasation may be present. Dyspnea or pain when swallowing could also indicate a problem with catheter position. All vascular access specialists and generalist nurses must be educated about assessing for these signs and symptoms with each use of the catheter.

As the use of ultrasound evolves, we may be able to use this technology to assess tip location in the future. A recent French study used ultrasound following catheter insertion. In 85 catheters inserted, there were 10 misplaced catheter tips and one pneumothorax. Ultrasound successfully identified the pneumothorax and 9 of the misplaced tips. The time required for ultrasound assessment was a mean of 6.8 minutes compared with a mean of 80 minutes of the traditional chest x-ray. (1)

A chest x-ray with both anterior-posterior and lateral views should be obtained when there is any question about catheter function. Another strategy is to request confirmation of catheter location when chest x-rays are obtained for other diagnostic purposes. Although migrated catheter tips may be asymptomatic, it may be difficult to justify a routine chest x-ray in the absence of clinical indications.

1. Maury E, Guglielminotti J, Alzieu M, Guidet B, Offenstadt G. Ultrasonic examination: An alternative to chest radiography after central venous catheter insertion? *American Journal of Respiratory Critical Care Medicine*. 2001;164(3):403-405.

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