



Use of Ultrasound to Detect Jugular Malposition of PICCs in Pediatric Patients

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Abstract

Wolfson Children's Hospital is a 173 bed hospital in Jacksonville, Florida. The Pediatric Vascular Access Department performs PICC insertions in appropriate patients from neonates to adolescents. Most PICCs are placed at the bedside or in treatment rooms without fluoroscopic guidance. PICC tip malposition in the internal jugular (IJ) vein is fairly common. Previously, this was not detected until the post-insertion x-ray was performed and evaluated. Attempts to detect IJ tip placement prior to the x-ray using methods described by PICC practitioners in adult patients, such as auscultation over the neck with a stethoscope, or by questioning the patient about hearing or feeling the flushing were not reliable in our patient population, or in some cases, not possible with non-verbal children.

A portable ultrasound has been in use for ultrasound-guided MST PICC placement since 2005. PICC nurses at our institution now scan the IJ after insertion is complete, but before the dressing is applied or the x-ray is obtained. If the catheter is visualized in the IJ attempts are made to reposition. Tip identification has been very accurate and reposition frequently successful. Repeat chest x-rays and post-insertion catheter manipulations are often avoided.

Detecting IJ PICC placement with ultrasound in neonatal and pediatric patients is quick, reliable, easily learned, inexpensive, and cost-saving.

Review of Literature

- PICCs inserted without fluoroscopic guidance are frequently malpositioned
- IJ malposition is the most common
- PICCs are highly echogenic and can be easily visualized in the IJ with ultrasound
- Auscultation or patient report may be used to identify IJ PICC tip in adults

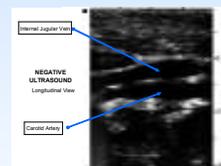
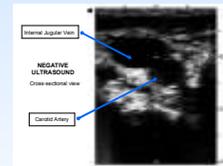
Procedure



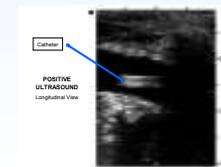
•Following insertion, an assistant auscultates over the ipsilateral neck veins while the inserter flushes the PICC line. Audible gurgling is a positive auscultation



•Portable ultrasound is then used to scan the same area in cross-sectional and longitudinal views. A white spot or linear density is a positive ultrasound



•If the ultrasound is positive, the PICC is repositioned and the scan repeated



•A chest x-ray is done when the scan is negative

Results

n=25

- IJ PICC tip missed with auscultation 25%
- IJ PICC tip missed with ultrasound 8%

Conclusions and Implications

- Neonatal and Pediatric PICC malposition in the IJ vein can be readily visualized by portable ultrasound, and may be a more reliable technique than auscultation for this patient population
- It is useful in practice settings in which ultrasound is used but fluoroscopy is not readily available
- Correcting malposition before the initial sterile field is broken is preferred
- Avoiding repeat x-rays reduces procedure time, cost, and radiation exposure

Limitations

- Small sample size
- Practitioner expertise may effect reliability of results
- Other malpositions are not detected

References