

Routine post-operative chest radiographs provide little diagnostic value for pediatric patients undergoing central venous catheter placement

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Background: Central venous line placement (CVL) is a common procedure in pediatric patients. Post-operative chest x-rays (CXR) are routinely performed at many institutions to evaluate for complications related to CVL placement, namely pneumothorax, hemothorax, and CVL malposition. Given patient size and predominance of long-term CVLs placement in children, intraoperative fluoroscopic guidance is used for CVL placement. Concerns regarding cost, perception of low frequency of complications, and radiation exposure to children spurred a review of central venous catheter placements at our institution in an effort to determine the utility of routine post-operative CXR.

Methods: We performed a retrospective observational study of all pediatric patients (age 0-17 years) undergoing CVL placement by a pediatric surgeon between 2010 and 2013 at the Medical University of South Carolina. Inclusion criteria consisted of non-tunneled and tunneled central lines, hemodialysis lines, or access port placements using Common Procedural Terminology (CPT) codes. CVLs not placed under fluoroscopy, femoral vessel access, or those placed by interventional radiology were excluded. Electronic medical records were reviewed for demographic data, operative details, and complications.

Results: A total of 430 CVLs were placed during the study period. Of those, 348 patients had CVLs placed with fluoroscopic guidance and a postoperative CXR. The types of CVLs that were placed were as follows: Percutaneous, non-tunneled (27, 6.3%), Hemodialysis (5, 1.2%), Percutaneous, tunneled (211, 49.1%), Port (187, 43.5%). Vein access locations were also determined to be the following: Right internal jugular (120, 28.1%), Left internal jugular (38, 8.9%), Right external jugular (19, 4.4%), left external jugular (18, 4.2%), right subclavian (62, 14.5%), left subclavian (148, 34.7%), right femoral (15, 3.5%), left femoral (2, 0.5%). For those patients in whom a CVL was placed with fluoroscopic guidance and a post-operative CXR was performed, 1.4% (n=5) experienced a complication, which included pneumothorax 1.1% (n=4), hemothorax 0.3% (n=1). In all but one case, the patients were asymptomatic and required no additional imaging or intervention. One patient (0.29%) experienced shortness of breath and chest pain, and underwent tube thoracostomy placement.

Conclusion: In this series, the incidence of complications detected on post-operative CXR was 1.4%, most of which did not require intervention. In the patient that did require intervention, symptoms would likely have prompted an elective CXR. With an estimated average hospital fee of \$246 for an inpatient one view CXR, eliminating routine post-operative CXR after CVL placement would result in an estimated cost savings of \$21,955 per year. In this series, if CVLs are placed using fluoroscopic guidance in the operating room, the number of post-operative CXRs needed to diagnose one complication requiring intervention in patients is 348. The total cost to diagnose one complication requiring intervention is estimated to be \$85,608. Given these findings, abandoning routine post-operative CXRs following CVL placement with fluoroscopic guidance in pediatric patients should be considered, and should be supplanted by a symptom-driven approach to post-operative imaging.