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Morbidity of peripherally inserted central catheters in pediatric complicated appendicitis

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ABSTRACT

Background: The purpose of this study was to compare postoperative outcomes of pediatric patients with complicated appendicitis managed with or without a peripherally inserted central catheter (PICC).

Methods: Patients aged ≤18 y in the Pediatric Health Information System database with complicated appendicitis that underwent appendectomy during their index admission in 2000–2012 were grouped by whether they had a PICC placed using relevant procedure and billing codes. Rates of subsequent encounters within 30 d of discharge along with associated diagnoses and procedures were determined. A propensity score–matched (PSM) analysis was performed to account for differences in baseline exposures and severity of illness.

Results: We included 33,482 patients with complicated appendicitis; of whom, 6620 (19.8%) received a PICC and 26,862 (80.2%) did not. The PICC group had a longer postoperative length of stay (median 7 *versus* 5 d, $P < 0.001$) and were more likely to undergo intra-abdominal abscess drainage during the index admission (14.4% *versus* 2.1%, $P < 0.001$), and have a reencounter (17.5% *versus* 11.4%, $P < 0.001$) within 30 d of discharge. However, in the PSM cohort ($n = 4428$ in each group), outcomes did not differ between treatment groups, although the PICC group did have increased odds for the development of other postoperative complications (odds ratio = 3.95, 95% confidence interval: 1.45, 10.71).

Conclusions: After accounting for differences in severity of illness by PSM, patients managed with PICCs had a similar risk for nearly all postoperative complications, including reencounters. Postoperative management of pediatric complicated appendicitis with a PICC is not clearly associated with improved outcomes.

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1. Introduction

Approximately 30% of children diagnosed with acute appendicitis will be identified as having complicated appendicitis [1]. A standard component of the management of this disease is broad-spectrum antibiotic therapy [2,3]. Recommendations for the management of complicated appendicitis in children published in the 1980s called for a 10-d inpatient course of parenteral triple antibiotics [4]. Since then, studies have demonstrated the safety and efficacy of using shorter time courses of antibiotics, single-agent regimens, and completing intravenous (IV) antibiotics at home using a peripherally inserted central catheter (PICC) compared with continued hospitalization [5–8]. Furthermore, there is now evidence that an oral (PO) antibiotic regimen is equivalent to IV administration with respect to disease-related complications, such as intra-abdominal abscesses and wound infections, while reducing overall costs [9–12].

PICCs do have some potential advantages in hospitalized children including providing stable IV access, which decreases the number of peripheral IV insertions throughout the hospital course and allows for blood sample collection without phlebotomy. In addition, PICCs can be used to administer parenteral nutrition to patients who have prolonged postoperative ileus. Despite these potential in-hospital benefits, PICCs are associated with increased costs and health care utilization and several PICC-related complications including thrombosis, line fractures, and both superficial and bloodstream infections [13,14]. These complications occur more commonly in patients receiving more frequent doses of medications and those who have the line in place for shorter periods of time [14].

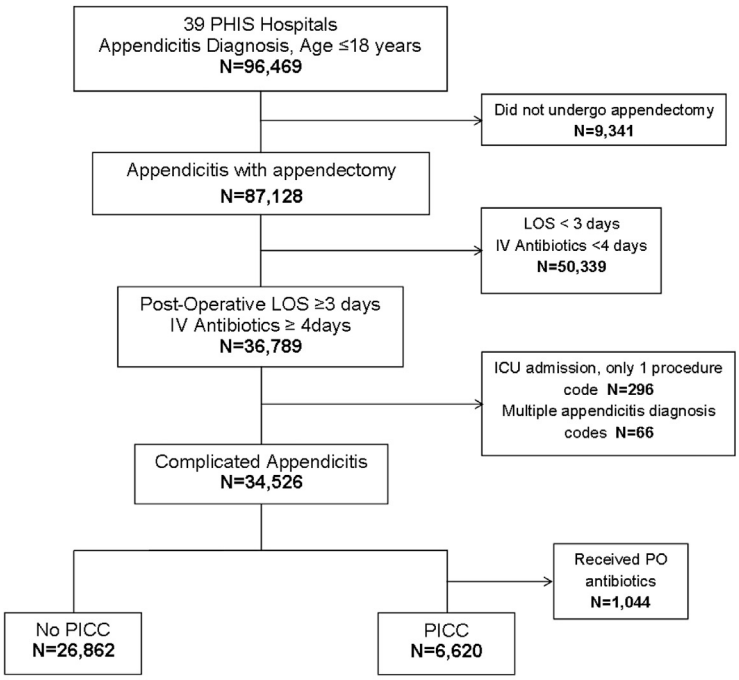
With studies demonstrating equivalence between prolonged home IV antibiotics with a PICC to PO antibiotics in patients with complicated appendicitis, PICC-associated risks may outweigh their potential benefits in terms of improving postoperative outcomes. The objective of this study was to compare postoperative outcomes of a multi-institutional cohort of pediatric patients with complicated appendicitis managed with or without a PICC.

2. Methods

2.1. Cohort and treatment group identification

This multi-institutional cohort study used the Pediatric Health Information System (PHIS), an administrative database managed by the Children's Hospital Association. The database contains inpatient and emergency department data including demographic and payer information, International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) diagnosis codes, and date-stamped procedure and billing codes from 44 freestanding children's hospitals. Encrypted medical record numbers allow for longitudinal tracking of data at the same institution that spans multiple encounters.

The complicated appendicitis cohort was defined by adopting previously published criteria [15]. The Figure displays the cohort development algorithm. Briefly, the complicated appendicitis cohort was developed by including all



Note: ICD-9-CM diagnosis codes for appendicitis: 540.0, 540.1, 540.9; ICD-9-CM procedure codes for appendectomy: 47.01, 47.09, 54.11, 54.21. PHIS=Pediatric Health Information System; LOS=length of stay; IV=intravenous; ICU=intensive care unit; PO=oral; PICC=peripherally inserted central catheter.

Fig. – Identification of study cohort with complicated appendicitis.