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Journal club critique

PICCing the best access for your patient

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Expanded Abstract

Citation

Safdar N, Maki DG: Risk of catheter-related bloodstream infection with peripherally inserted central venous catheters used in hospitalized patients. Chest 2005, 128:489-495 [1].

Background

Peripherally inserted central venous catheters (PICCs) are widely used for intermediate and long-term access, especially in the inpatient setting, where they are increasingly supplanting conventional central venous catheters (CVCs). Data on the risk of PICC-related bloodstream infection (BSI) hospitalized patients are limited.

Methods

Objective: To determine the risk of PICC-related BSI in hospitalized patients.

Design: Prospective cohort study using data from two randomized trials assessing the efficacy of chlorhexidine-impregnated sponge dressing and chlorhexidine for cutaneous antisepsis.

Subjects: PICCs inserted into the antecubital vein in two randomized trials conducted from 1998 to 2000 were prospectively studied; most patients were in an ICU.

Measurements: PICC-related BSI was confirmed in each case by demonstrating concordance between isolates colonizing the PICC at the time of removal and from blood cultures, using restriction-fragment DNA subtyping.

Results: Overall, 115 patients had 251 PICCs placed. Mean duration of catheterization was 11.3 days (total, 2,832 PICC-days); 42% of the patients were in an ICU at some point, 62% had urinary catheters, and 49% received mechanical ventilation. Six PICC-related BSIs were identified (2.4%), four with coagulase-negative staphylococcus, one with *Staphylococcus aureus*, and one with *Klebsiella pneumoniae*, for a rate of 2.1 per 1,000 catheter-days.

Conclusion

This prospective study shows that PICCs used in high-risk hospitalized patients are associated with a rate of catheter-related BSI similar to conventional CVCs placed in the internal jugular or subclavian veins (2 to 5 per 1,000 catheter-days), much higher than with PICCs used exclusively in the outpatient setting (approximately 0.4 per 1,000 catheter-days), and higher than with cuffed and tunneled Hickman-like CVCs (approximately 1 per 1,000 catheter-days). A randomized trial of PICCs and conventional CVCs in hospitalized patients requiring central access is needed. Our data raise the question of whether the growing trend in many hospital hematology and oncology services to switch from use of cuffed and tunneled CVCs to PICCs is justified, particularly since PICCs are more vulnerable to thrombosis and dislodgment, and are less useful for drawing blood specimens. Moreover, PICCs are not advisable in patients with renal failure and impending need for dialysis, in whom preservation of upper-extremity veins is needed for fistula or graft implantation.

Commentary

The use of peripherally inserted central catheters (PICCs) for intermediate and long-term venous access has increased steadily over the past decade. Many intensive care unit (ICU) patients are receiving PICCs even before they are ready to leave the ICU. Most prior studies examining PICC-related blood stream infection (PR-BSI) were retrospective, and nearly all were done in outpatient settings. Based on these studies, PICCs are widely believed to be less prone to infection than conventional CVCs. However, data regarding the risk of infection for PICCs placed in an ICU setting are relatively scarce. In the current

study, Maki and colleagues [1] investigated the risk of PR-BSI in hospitalized patients, 42% of which were in the ICU. They did so by examining BSI rates in patients with newly inserted PICCs, using data from two randomized trials that assessed different skin preparation and care techniques [2,3]. While not the primary point of these trials, the methods used for identifying BSIs and determining if a PICC was to blame were robust. The authors found an incidence of PR-BSI of 2.1 per 1000 catheter-days. This rate of infection was substantially higher than has been seen in outpatients and is equivalent to the rate reported for conventional CVCs. Furthermore, the authors found a similarly high incidence of inpatient PR-BSI when pooling results of other, less methodologically sound, studies.

A few limitations deserve consideration. The two trials from which this study derived its data were only published in abstract form. Thus, we do not know many details of the parent trials that might help in our interpretation of the data, such as how long subjects were in the hospital or ICU, what antibiotics they received prior to PICC insertion, or how long antibiotics were given. Some patients in the parent trials received conventional CVCs. Rates of CVC-related BSI for these subjects were not reported and instead the authors provide reported rates from the literature to put the observed PR-BSI rates in perspective.

PICC-related risks are not limited to BSI, but also include insertion-related complications, phlebitis, thrombosis, and premature dislodgement. Physicians must carefully weigh these risks, as well as those of alternative devices, such as CVCs, when choosing the best access for their patients. Consideration must also be given to the “appropriate” time in the course of illness for PICC insertion and how long a PICC can be left in place without significantly increasing the risk of infection.

Recommendation

We concur with the authors that a better prospective study of PR-BSI in high-risk hospitalized patients is needed. Such a trial should compare PICCs and conventional CVCs. Based on the results of this and other studies, clinicians may want to more strongly consider a PICC as a potential source of infection.

Competing interests

The authors declare no competing interests.

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