Acridine orange leukocyte cytospin(aOLC(test for rapid diagnosis of catheter related blood stream infection versus other methods

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Catheter-related bloodstream infections represent one of the main causes of hospital-acquired bacteremia. The mortality attributable to CR-BSIs is around 10%, mostly due to endocarditis, septic shock, metastatic lung infection, and septic thrombophlebitis.The diagnostic approach to CR-BSI consists of clinical evaluation and microbiologic confirmation. The clinical features are often non-specific and up to 85% of those catheters removed on clinical grounds alone are subsequently proven to be sterile.The methods for the in-situ diagnosis of CR-BSIs are expensive, time-consuming, and relay on microbiologic culture techniques that require 24 to 48 hours for in-vitro culture to confirm the diagnosis of CR-BSI.In the present thesis, we assessed the accuracy of the Gram stain-acridine orange leucocyte cytospin (AOLC) test as a rapid, simple and feasible tool for the detection of CR-BSI in comparison to other conventional methods as paired quantitative blood culture methods , pour plate technique (in-situ methods), roll plate and tip flush method (catheter removal methods).This study was carried out at Benha University Hospital; clinical pathology department.It was conducted on 36 patients from ICU and dialysis department. There were 24 males and 12 females with their ages ranged from 20 years and 68 years with the mean age 51.3□14.9.The incidence of CR-BSI was found to be -91.6%.Among risk factors that was found to be associated with high incidence of CR BSI, the duration of catheter insertion, location of catheter insertion as it was 100% (high) when inserted at dialysis room, 75% when inserted at ICU and 60% at operating room. The CR-BSI was high (100%) when the catheter was inserted in the internal jugular vein than in the subclavian vein. The application of maximal sterile barrier precautions during the catheter insertion and the daily care of the catheter also highly affect the incidence of CR-BSI. The CR-BSI was 100% in patients who was not receiving antimicrobial therapy. When the parentral fluid was infusated through the catheter lumen the incidence of CR-BSI was 71.4% and it increased up to 100% when the blood was added.The incidence of CR-BSI was not affected by the sex of patients, indication for catheter application, different underlying diseases of the patients and the number of catheter lumens.In the present study different methods were used to diagnose CR-BSI as roll plat, tip flushing, paired quantitative blood culture method, pour plate and AOLC/G test.The roll plate method proved that 33 catheters out of 36 catheters were infected and 3 catheters were free, so it was unnecessary to remove them.The roll plate method was used as a reference

method to which other methods are evaluated.The tip flush method succeeded to diagnose 27 (75%) cases out of 36 cases but it failed to diagnose 6 cases with sensitivity of 81.8% and specificity of 100%. The same results were obtained by paired quantitative blood culture methods.The pour plate technique succeeded to diagnose 21 (58.3%) cases out of 36 cases but it failed to diagnose 12 cases with sensitivity of 63.6% and specificity of 100%.The AOLC/G test succeeded to diagnose 26 (72.2%) cases out of 36 cases but it failed to diagnose 7 cases with sensitivity of 78.8% and specificity of 100%, a PPV of 100% and a NPV of 30%It can be concluded from this study that: CR-BSI is a serious complication with a risk of high morbidity and mortality for the patient. Diagnosing CR-BSI is difficult if blood cultures remain sterile or skin contaminant such as CoNS are isolated. Rapid and accurate diagnosis of CRI is therefore essential for providing both optimal patient care, management, and reducing additional healthcare costs, related anti- microbial therapy and extended hospitalization. The roll plate method is a more sensitive predictor for catheter related infection but the major disadvantage of roll plate and tip flush method is that the CVC must be removed for diagnosis to be made. The paired quantitative blood culture method is accurate test in diagnosis of CR-BSI but -it is very expensive test and requires a large volume of blood. The Gram stain acridine orange leukocyte cytospin (AOLC) test, done on blood samples withdrawn through the CVC was proved to be effective in the rapid diagnosis of CR-BSI . This technique has the advantage for both the rapid detection of microorganisms (bacteria or fungi) and allowing targeted antibiotic therapy .The Gram stain has the obvious advantage of enabling preliminary identification of pathogens. The test has a suggested absolute threshold of 103 to 104 CFU/ml blood, which is consistent with the microbiological cut-off of various diagnostic methods for CR-BSI. The subclavian vein was found to be the preferred access site for placing a CVC and maximal sterile barrier precautions must be respected.