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"Central Venous Catheter Related Blood Stream Infection Rate In Critical Care Unit In a Tertiary Care Centre"

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Abstract: *Blood stream infections related to central venous catheterization are one of the major device-associated infections reported. Patients admitted in critical care units requiring central venous catheterization and presenting with signs of septicemia during catheterization period were investigated for catheter-related blood stream infections (CRBSI). Approximately 200,000 cases of Bacteraemia occur annually with mortality rate ranging from 20% to 50%. Site of insertion of catheter and duration of catheterization did not show the influence on the CRBSI rate. Since central venous catheters are increasingly being used in the critical care, regular surveillance for infection associated them are essential.*

Keywords: *Central venous catheter, blood stream infections*

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I. Introduction

Microorganisms present in circulating blood whether their continuously, intermittently or transiently are a threat to every organ in the body. Microbial invasion of blood stream can have serious immediate consequences including shock, multiple organ failure disseminated intravascular coagulation and death. Thus, invasion of blood stream by microorganisms constitutes one of the most serious situation in medicine.[1]

Central venous catheter (CVC) is often used as a portal for the delivery of medications, parenteral nutrition, collection of blood samples and monitoring hemodynamic variables in critically ill patients. Noninfectious and infectious complications are frequently reported with central venous catheterization[2]. Blood stream infections related to central venous catheterization constitute one of the major nosocomial device associated infections [2,3,4] .For the surveillance of device-associated infections, the data needs to be expressed as the number of device-associated infections per 1000 device days as per the recommendations from the Center for Disease Control and Prevention, USA. [5].

II. Method& Material

This study was conducted at Microbiology department, MGM Medical College & Hospital, Navi Mumbai, a tertiary care teaching institute in the state of Maharashtra for a period of one year (June 2012 – June 2013). Patient presenting with clinical symptoms and signs of septicemia after central venous catheterization were surveyed for blood stream infections. Data pertaining to age, sex, clinical diagnosis, site of insertion of CVC, treatment received, duration of CVC catheterization, duration of hospitalization and clinical outcome were recorded in each patient.The catheter tip culture was done in all the patients at the time of removal of catheter. Isolation of >15 CFU was taken as cut-off for positive tip culture.Peripheral blood cultures were collected from the patients with clinical evidence of sepsis. For this 1 to 5 ml blood was collected under aseptic precautions in Hartley's blood culture broth and cultures were processed by standard microbiological methods.[6]Bacterial isolates recovered from the blood cultures and corresponding tip cultures were subjected to antibiotic sensitivity testing as per CLSI 2009 guidelines.[7] CRBSI was defined as a positive blood culture obtained from a peripheral vein with clinical evidence of sepsis and with no apparent source of septicemia except tip and catheter tip colonization with same organism as in blood culture.[8]

III. Result And Discussion

During the study period, 75 CVCs were used in 52 patients in various critical care units who developed signs of septicemia during catheterization period. The maximum patients requiring CVCs were from ICU [Table 1]. Ten (10) culture-proven blood stream infections occurred in 52 patients of which three (3) were classifieds CVC-related blood stream infections.[8].National nosocomial infection surveillance system of the Center for Disease Control and Prevention, Atlanta, USA, reports a CRBSI rate of 5.8 per 1000 catheter days.[5]. As the patients receiving critical care were on the antibiotic treatment, the rate of CRBSI in the present study is likely to be influenced by this factor. The two sites, femoral (62 catheters) and subclavian (13 catheters) employed for the placement of catheters showed CRBSI of (2/62) and (1/13), respectively. The site of insertion did not appear to influence the rate of CRBSI in this study. Femoral site has been reported to be the safest site by many workers.[2]

("fig"1)

Type of ICU	No.of patients	Catheter days	No.of CRBSI
NICU	12	75	01
ICU (medical)	40	288	02

A total of 30 catheter tips were colonized with bacteria and fungi. The microbial pattern of catheter colonization revealed maximum colonization with Candida spp. all belonging to non-albicans type [figure 2].

Different Organisms colonizing CVCs ("fig" 2)

Organism	Number	Percentage%
Escherichia coli	02	3.70
Klebsiella pneumoniae	07	13.00
Pseudomonas aeruginosa	06	16.88
Proteus vulgaris	01	1.87
CONS [coagulase negative staphylococcus]	05	9.43
Non albicans candida spp.	09	16.99
Total	31	100

Klebsiella pneumoniae were the major 30% cause of CRBSI followed by Pseudomonas aeruginosa and non-albicans Candida spp. in one case each. All these four organisms are known to produce biofilms, which are reported to be universally present on CVCs[10.]All the bacterial isolates were multidrug-resistant showing resistant to more than two different classes of antibiotics. Mortality in CRBSI was observed in 20%cases compared to 10% mortality in cases of BSI in catheterized patients CRBSI are reported to be associated with attributable mortality in the range of 20% TO 50%.[9].Since CVCs are increasingly being used in the critical care and have direct bearing on the mortality and morbidity and cost of treatment in the catheterized patients, regular surveillance needs to be undertaken for the formulation of appropriate infection control practices.

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