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COMPARISON BETWEEN CENTRAL VENOUS CATHETER SECUREMENT DRESSING WITH CHLORHEXIDINE GLUCONATE DRESSING AND ELASTIC ADHESIVE DRESSING IN INCIDENCE OF CRBSI AND CATHETER DISLODGEMENT IN ICU PATIENT: A RETROSPECTIVE STUDY.

Anesthesiology

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ABSTRACT

INTRODUCTION: central venous catheterization is now a very common procedure conducted in critically ill patients. There are various methods and sites for central venous catheter (CVC) placement which are done under aseptic precautions. After placement securement of CVC line is commonly done by tegaderm, adhesive elastic dressing, leucoplast dressing or by micropore. Dislodgement of central line requiring resuturing or catheter related blood stream infection are the areas of concern. The objective of this study was to analyze the incidence of catheter-related bloodstream infection (CRBSI) and dislodgement in patient admitted to our ICU.

MATERIAL AND METHOD: This is a retrospective observational study done in our 4- bed ICU over a period of 16 months. Out of 84 patients admitted during this period 46 patients were randomly chosen for study. Patients who had chlorhexidine gluconate (CHG) dressing was designated as Group T and patients who had elastic adhesive dressing was designated as Group E. both the group has 23 patients each. Any incidence of line dislodgement or CRBSI was noted and managed accordingly.

RESULTS: The two groups were comparable in terms of duration of ICU stay. The incidence of dislodgement requiring resuturing was found to be significant with p value of 0.04. CRBSI in both the groups were insignificant.

KEYWORDS

Central Venous Catheter, Chlorhexidine Gluconate CRBSI.

INTRODUCTION:

Central venous catheterization has long history way back in 1733, introduced by Stephen Hales in a mare. Venous devices for central venous catheterization were first introduced by Werner Forssmann, in 1929.[1] The contributions by Dr. Sven-Ivar Seldinger made the central line cannulation much easier and popular. The technique popularly known as "Seldinger technique" in the 1950s, and nowadays, is the main method in use.[2] The use of central venous catheters (CVCs) became a routine procedure in the emergency rooms, Intensive Care Units (ICUs), and operation rooms, despite the evolution of central venous access techniques.

Dressings and securement of CVCs aim to prevent dislodgement or fall out, provide a barrier protection from microbial colonisation and infection, and be comfortable for the patient. There is a large range of dressing and securement products available for clinicians to use.

Infection of CVC leads to increased morbidity and costs in health-care systems. [3]Site of placement and care systems are directly related with incidence of infection. [4][5] Many types of dressing (gauze, transparent material, frequency of change) and care systems are described, although the optimal type cannot be recommended due to the lack of evidence.

The frequency of change in dressing are helpful in preventing bacterial colonization but also it may cause dislodgement of catheter requiring resuturing or replacement of catheter. In present study we have analysed the incidence of CRBSI and dislodgement when CVCs are secured with either chlorhexidine gluconate impregnated dressing or elastic adhesive dressings.

MATERIAL AND METHOD:

A 17 months retrospective study was performed that included all patients admitted to our ICU of HCG –Curie Abdur Razzaque Ansari Cancer Institute, Ranchi, India between 1st December 2016 to 30th April 2018. Out of 83 patients admitted to our 4 bed ICU 46 patients were randomly selected for study.

The catheters used were not antimicrobial-coated, but were radiopaque polyurethane triple lumen catheters. The placement and maintenance of catheters were performed according to the following protocol. The catheters were inserted by anaesthesiologist with the following sterile-barrier precautions: use of large sterile drapes around the insertion site, surgical antiseptic hand wash, and sterile gown, gloves, mask and cap. Decontaminating the skin at the insertion site with chlorhexidine gluconate (CHG) in 70 % alcohol and anesthetized with 5ml of 2% lignocaine before inserting a central catheter. The site of insertion was right subclavian vein in all the subjects. The catheters were percutaneously inserted using the Seldinger technique and were fixed to the skin with 2-0 silk suture at 4 points. After the line insertion, the area surrounding the catheter was cleaned with sterile gauze soaked with povidone-iodine and allowed to dry. A chlorhexidine gluconate impregnated dressing was applied or a dry sterile gauze occlusive elastic adhesive dressing covered the site. No topical antimicrobial ointment was applied to insertion sites. Date of placement was mentioned over the dressing.

The percutaneous entry sites were examined for the presence of local inflammation and purulence, and were cared for in the same manner daily by the ICU nurse assigned to the patient. Catheter dressings for elastic adhesive were changed every 48 h, or sooner at the discretion of the nurse caring for the patient if the dressing was contaminated. The chlorhexidine gluconate dressings were changed every 96 hrs or sooner if the dressing is no longer intact or moisture collects under it. During dressing changes, the CVC insertion site and surrounding skin should be decontaminated, using CHG in 70 % alcohol, and allowed to air dry [6].The connecting lines were changed every 48 h. Also, the percutaneous entry sites were examined daily by the ICU nurse assigned to the patient to avoid accidental catheter removals [7] in order to minimize infection risk associated with the reinsertion of the catheter.

The decision to remove the catheter was made by the intensivist. Catheters were removed when they were no longer needed or if a systemic or local complication occurred. CVCs were routinely replaced every 12 days. We routinely replace catheter at different site usually right internal jugular vein. All catheter tips removed were routinely cultured.

The following data were collected: age, sex, diagnosis, APACHE-II score, ICU admission and discharge dates, catheter access, catheter insertion and removal dates, cause of catheter removal, development

of CRBSI. The following two groups of CVCs were studied: chlorhexidine gluconate (CHG) dressing and elastic adhesive dressing.

Catheter-related infection was defined according to catheter tip colonization, CRLI or CRBSI. Catheter tip colonization was the significant growth of a microorganism (>15 colony-forming units) from the catheter tip. CRLI was any sign of local infection (induration, erythema, heat, pain, purulent drainage) and catheter tip colonization. CRBSI was a positive blood culture obtained from a peripheral vein, and signs of systemic infection (fever, chills, and/or hypotension), with no apparent source of bacteremia except the catheter, and catheter tip colonization with the same organism.

Data from the included studies were extracted by one reviewer and checked by a second. There were no significant differences in the baseline characteristics of patients in each group within each study. Both studies recruited critically ill adult patients requiring intravascular access within an ICU unit setting. Statistical analysis was performed with SPSS 11.0 and students t test and chi square test was applied for analysis.

RESULTS:

During the study period, 83 patients were admitted to our ICU form which 46 patients were included in study. Group T and group E included 23 patients each. Length of stay in Group T was 11.13 ± 5.03 and in group E was 11.83 ± 6.30. The p value was 0.34 (>0.05) which showed that the two groups were comparable (table 1). The incidence of CRBSI was 1 in group T and 3 in group E which was insignificant with p value of 0.29 (>0.05). Catheter dislodgement reported in group T was in 1 patient while 6 patient reported to have dislodged catheter in group E. the results were significant with p value of 0.04 (<0.05) table 2.

The study results show that securing a CVC with a dressing with CHG reduces catheter-related bloodstream infection compared with a dressing without medication. [14]

TABLE 1. length of stay in ICU

	Group T	Group E
n	no of days	no of days
1	10	14
2	14	14
3	8	12
4	16	12
5	7	13
6	8	14
7	15	6
8	17	2
9	11	8
10	23	35
11	8	10
12	3	11
13	9	14
14	12	9
15	5	6
16	15	5
17	12	12
18	14	13
19	1	9
20	10	11
21	9	18
22	11	16
23	18	8
mean	11.13	11.82
SD	5.03	6.3
p value	0.34	

Table 2. incidence of dislodgement and infection

	GROUP T	GROUP E	p value
Dislodgement	1	6	0.04
CRBSI	1	3	0.29

DISCUSSION:

There are various studies which showed catheter related complications.[8][9] As per CDC guidelines of 2011 reviewed in 2017, CVC insertion at the subclavian site is recommended rather than at the femoral or jugular sites to minimize infection risk. Chlorhexidine impregnated dressings with an FDA-cleared label that specifies a clinical indication for reducing catheter-related bloodstream infection (CRBSI) or catheter-associated bloodstream infection (CABSI) are recommended to protect the insertion site of short-term, non-tunneled central venous catheters. [10] ***(Category IA recommendation)***

In our study gauge dressing covered with elastic adhesive were changed every 48 hrs which was recommended by CDC guidelines in 2002 but at the cost of increased risk of infection. Also frequent removal of dressings may cause detachment of sutures from skin and promotes bacterial colonization. Without removing the dressing the chlorhexidine impregnated dressings allow us to examine the insertion site. The use of chlorhexidine impregnated dressing reduces catheter colonization and catheter-related bloodstream infection, however, further research is necessary to assess the impact of these measures in CVC infectious complications. [11][12][13]. According to Ulman et al medication-impregnated dressing products reduce the incidence of catheter-related blood stream infection relative to all other dressing types. Our study has few limitations. In a small sample we studied only one insertion site, our study was not randomly assigned and the absence of a multivariate analysis to control for possible confounders. In our study incidence of CRBSI was comparable in both groups and was insignificant.

To conclude we can say that CHG is superior to elastic adhesive dressing there by decreasing incidence of catheter dislodgement, however to comment on incidence of catheter related infections larger study is required.

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