Evaluation of Screening and Treatment for Nasal Carriage of Staphylococcus Aureus before Surgery to Prevent Postoperative Surgical Site Infection

Parthasarathy K*

*Corresponding Author: Parthasarathy K

Abstract: Health care associated infections have imposed a huge burden on present medical management. One of the commonest causes for surgical site infection is nasal carriage of Staphylococcus aureus. Decolonization of this organism from nasal and extra nasal sites may reduce the risk of Health care associated infections. A prospective study was conducted, in which all patients undergoing general surgery from January 2017 to December 2017 were included. Preoperatively all patients were screened for nasal carriage of S.aureus by conventional culture method, cefoxitin disc and to detect (Methicillin-Resistant Staphylococcus aureus) MRSA and kit agglutination method to detect Mec A gene of MRSA. The (Surgical Site Infection) SSI was recorded based on the criteria of (Centers for Disease Control and Prevention) CDC guidelines. Screening was performed in 456 cases of which 122 (26.7%) cases had positive nasal swab for S.aureus. Among the positive screened patients 102 (83.6%) were identified as (Methicillin-sensitive Staphylococcus aureus) MSSA carriers and 20 (16.4%) cases were MRSA carriers. All the positive screened patients were treated with intranasal mupirocin application and chlorhexidine bath for 5 days. On postoperative follow up 8 (6.5%) cases developed SSI with S.aureus among carriers and 6 (1.8%) cases developed SSI with S.aureus among non carriers. In conclusion nasal carriers carry increased increase of development of S.aureus SSI compared to non carriers. These patients may benefit by proper preoperative treatment to eradicate nasal and extra nasal carriage.

Date of Submission: 17-07-2018
Date of acceptance: 02-08-2018

I. Introduction

Health care associated infections have imposed a great burden in the management of post operative patients [1]. Surgical site infection are the 3rd most common health care associated infection and these infection increases the morbidity, mortality, increase length of hospitalisation, increase of the cost of health care [1,2,3]. S.aureus contributes to about 25% of HCAI and thereby causing postoperative complications and increasing the cost of hospitalisation [2].

Nasal carriage of S.aureus increases the risk of development of HCAI with the organism especially in post cardiac, orthopaedic, vascular surgeries and peritoneal dialysis cases [4,5,6,7]. Nasal carriers of S.aureus are 2-9 times at higher risk compared to non carriers for surgical site infection [8,9,10]. Preoperative screening for nasal carriage an treatment of the patients with nasal application of 2%Mupirocin calcium and chlorhexidine gluconate bath for extranal sites to decolonize the nasal and extra nasal carriage reduces the risk of SSI [11,12]. This reduces the risk of deep seated infection by 79% and superficial infection by 55% [13,14,15].

For this reason we conducted a prospective study to evaluate the nasal screening preoperatively in general surgery cases for carriage of Staphylococcus aureus and its relation with post operative SSI compared to non carriers.

II. Methodology:

This was a prospective study conducted in our tertiary care centre from January 2017 to December 2017 in general surgery department. The patients were screened for nasal carriage of Staphylococcus aureus in the department of Microbiology. The nasal swabs were obtained with the use of a dry sterile Dacron nasal swab and rotating each nostril for four times and then placed in a sterile tube containing 100μl sterile saline.

Then the swab was inoculated on to 5% Sheep blood agar plates and incubated at 37°C for 24 hours to isolate the organism. If no growth after 24 hours then the plates were incubated until 48 hours. After isolation of organism based on colony morphology, gram staining, coagulase test the organism was identified. Cefoxitin disc was used for screening of MRSA and kit method of latex agglutination test was performed to determine presence of Mec A gene of MRSA [16,17,18].
After the results were obtained the positive screened patients were instructed to do intranasal application of 2% Mupiriocin calcium ointment twice daily and undiluted Chlorhexidine gluconate bath for 5 days including the day of surgery to decolonize the nasal and extra nasal carriage of the organism. On the day of surgery the patients were given preoperative antibiotics according to their carrier state. Injection Cefuroxime were given to non carriers of S.aureus and Inj.Teicoplanin were given to carriers of S.aureus one hour before the incision.

Patients were followed up postoperatively in the surgical OPD for development of SSI which were defined according to CDC criteria for SSI [19]. Postoperatively the SSI cases were treated according to culture and sensitivity reports obtained.

III. Result:

Out of 456 cases included in the study 122 (26.7%) cases were screened positive for nasal carriage of S.aureus and 334 (73.2%) cases were negative for nasal carriage.

Table 1: Incidence of Nasal carriers of Staphylococcus aureus

<table>
<thead>
<tr>
<th>S.no</th>
<th>Patient group</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Screened positive S.aureus</td>
<td>122</td>
<td>26.7%</td>
</tr>
<tr>
<td>2</td>
<td>Screened negative S.aureus</td>
<td>334</td>
<td>73.2%</td>
</tr>
</tbody>
</table>

Among the 122 positive screened cases 102 (83.6%) were MSSA nasal carriers and 20 (16.4%) were identified as MRSA carriers.

Table 2: prevalence of MRSA & MSSA among nasal carriers

<table>
<thead>
<tr>
<th>S.no</th>
<th>Patient group</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MSSA</td>
<td>102</td>
<td>83.6%</td>
</tr>
<tr>
<td>2</td>
<td>MRSA</td>
<td>20</td>
<td>16.4%</td>
</tr>
</tbody>
</table>

Figure 1: prevalence of MRSA & MSSA among nasal carriers

Postoperatively the patients were followed in Surgical OPD and checked for SSI in both carriers and non carriers. Among the 456 cases included in the study 8 out of 122 (6.5%) cases of carriers and 6 out of 334 (1.8%) cases of non carriers developed surgical site infection during the follow up period with S.aureus. Other organisms were also isolated but were not included in the scope of study.

Table 3: Incidence of SSI with S.aureus in nasal carrier screened group

<table>
<thead>
<tr>
<th>S.no</th>
<th>Patient group</th>
<th>Number of cases with SSI</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nasal carriers</td>
<td>8/122</td>
<td>6.5%</td>
</tr>
<tr>
<td>2</td>
<td>Nasal non carriers</td>
<td>6/334</td>
<td>1.8%</td>
</tr>
</tbody>
</table>
IV. Discussion:

The causes for SSI are multifactorial including patient related factor, surgical factors. One of the most common and important organism causing SSI is S.aureus [20,21]. Among the general population approximately 30% are colonized with S.aureus nasally and extranasally which is a significant factor for developing SSI [22,23,24,25]. Hence it is important to decolonize the carriers preoperatively to reduce the risk of SSI. This can be done effectively by screening all the preoperative patients for nasal carriage of S.aureus and decolonization of these positive screened cases preoperatively with a combination of intranasal application of 2% mupirocin ointment and chlorhexidine bath for 5 days [26,27]. This combination is well established in many trials and well tolerated by the patients.

The objective of this study was to evaluate the significance of preoperative screening for nasal carriage of S.aureus and its postoperative complication of causing SSI among carriers and non carriers with that microorganism.

In our study preoperative screening revealed 26.7% cases with nasal carriage of S.aureus which approximately correlates with previous reported studies [27,28,29,30,31]. This study shows that there is significant risk associated with nasal carriage of S.aureus and development of SSI postoperatively than the non carrier state. The patients screened positive for carrier state were given inj. Teicoplanin intra operatively one hour before incision [32,33].

Our study had certain boundaries; conventional methods were used to determine MRSA instead of molecular method which would have been a more sensitive method, patient compliance of decolonization was not checked which would have caused the SSI even after decolonization. The screening was not repeated after 5 days to check for efficacy of decolonization. Further studies will be done to consider these limitations.

V. Conclusion:

The data obtained in our study indicates that pre operative screening and decolonization of MRSA and MSSA carriers for patients who undergo elective surgery by using Mupirocin, Chlorhexidine and intravenous Teicoplanin will help in reduction of postoperative incidence of SSI.

References:

Evaluation Of Screening And Treatment For Nasal Carriage Of Staphylococcus Aureus Before Surgery To Prevent Postoperative Surgical Site Infection