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Identification of MRSA in the Pre-Admission Clinic in Patients Scheduled for Lower Limb Arthroplasty

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Introduction

Since the introduction of superior surgical techniques for lower limb arthroplasty including total knee replacement (TKR) and total hip replacement (THR) surgeries, many patients have benefitted from the advanced surgical techniques of Prosthetic Joint Replacement. However, with the increase in number of surgeries performed there is an increasing risk of arthroplasty revision [1] due to Peri-Prosthesis Joint Infection (PJI) and surgical site infection (SSI).

SSI are one of the most common causes of nosocomial infection and complicate up to 10% operations [2]. Among the pathogens coagulase negative staphylococcus is most prevalent organism which causes SSI in orthopedic surgeries [3]. Staphylococcus Aureus (SA) is the most commonly cultured bacteria from SSI [4] and preoperative nasal colonisation of SA is one of the most common risk factors for SSI [5,6]. Out of all the people presenting for elective surgery approximately 28% have SA colonisation and out of which 1.8% have methicillin resistant Staphylococcus Aureus (MRSA) [7].

Over the past decade there has been an increase in MRSA, a subpopulation of the bacterium with unique resistance and virulence characteristics. Furthermore, there is an economic burden related to SSI following orthopedic surgery, with MRSA-associated SSI leading to longer Hospital stays and increased hospital costs. However, some controversy does exist about the effectiveness of screening and eradication programme before surgical admission in order to reduce the risk of SSI [1].

Aim

The aim of this study was to identify the MRSA-colonized patients in the pre-admission clinic, followed by their treatment and follow up these patients for superficial and deep post-operative infection with MRSA.

Material and Methods

We included the cohort of patients assessed in pre-assessment clinic awaiting lower limb arthroplasty from January 2010 to December 2012. Data collected included resident status, age, gender, and the results of nasal swab for MRSA and treatment carried out. The subset of patients with initial positive MRSA swabs were treated using standard protocols and were subsequently followed up for any superficial and deep infection in the post-operative period. The protocol used for treatment, followed the national infection guidelines and consisted of Bactroban nasal ointment three times a day for five days. Three negative swabs were necessary before declaring the patient MRSA free. The Patients with positive nasal swabs were stratified and were followed over time post operatively to look for post of MRSA wound infection.

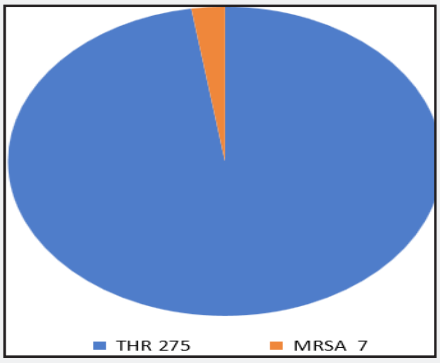

Figure 1: Data showing THR 275 and MRSA 7.

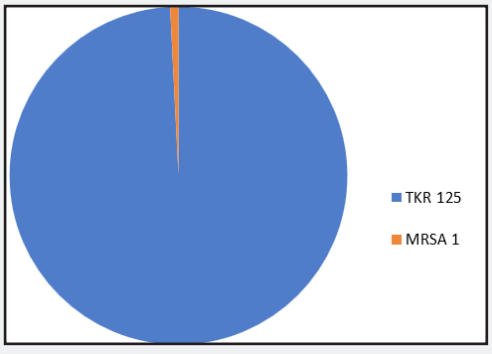

Figure 2: Data showing TKR 125 and MRSA 1.

Results

A Cohort of 396 patients were screened for MRSA of which 271 patients were total hip and 125 were for total knee arthroplasty. 8 patients were detected to have positive nasal swab MRSA at the time of their assessment in the preadmission clinic. None of the patients developed SSI with MRSA. All the patient presented to us were from home (Figures 1 & 2).

Discussion

Methicillin was licensed in England in the treatment of penicillin-resistant S. aureus infections in 1959. Just as bacterial evolution allowed microbes to develop resistance to penicillin, strains of S. aureus evolved to become resistant to methicillin. The first MRSA isolates were reported in 1961 in a British study followed by similar detections in western Europe and Australia between 1961 to 1967 [2]. MRSA, possesses the mecA gene and the penicillin bindingprotein PBP2a, making it resistant to methicillin and oxacillin. [3].

Our study data shows consistent result with approximately 2% patient having MRSA colonisation. At any given point SA colonizes 25-30% population [8] and carriers are at higher risk of infection after invasive surgical procedure. Most commonly colonized sites are Anterior nasal nares however other sites that can be colonized are rectum, throat, groin and axillae. In orthopedic patients the anterior nares are frequently colonized and approximately 25-30% with methicillin sensitive S. Aureus (MSSA) [9,10] and 2-6% with MRSA [10]. There's is a fourfold increase in risk of SSI in patients with MRSA positive colonisation compared to MSSA [11]. MRSA colonisation is more common in certain population such as elderly, immunocompromised, patient on dialysis and patients who are frequently hospitalized. According to a study male population is at increased risk of colonisation and among all the ethnicities, Caucasian males were at the highest risk [12]. Male Patients with BMI > 30 and history of asthma have also been associated with increased risk of both MRSA and MSSA colonisation [12].

Orthopedic surgeries are advancing every day with increasing number or procedures done, it is estimated that annually 436,736 THR, 680,839 TKR and 413,171 spinal fusion procedures are performed [13]. With an increase in surgeries performed the risk of revision surgeries due to PJI and SSI also increasing. It is estimated that orthopedic surgery SSI account for 38,000 complications, out of which 0.7%-4.1% due to spinal fusion infection rate, 0.67%-2.4% from Hip replacement infection rate and 0.68%-1.6% from knee replacement infection rate [14]. With such a high number of orthopedic SSI that not only increases morbidity and mortality but also increases the length of hospital stay and cost. MRSA has become the primary cause of health care–associated infections throughout Europe, Asia, Australia, and The United States. Incidentally Ireland has one of the highest nosocomial MRSA colonisation rates in the European Community [15]. With such a high number of orthopedic SSI, primary focus should be on to prevent the number of infections rather than to treat it by revision surgeries. As revision surgeries are done in 2 stages, first by removing the implant and second surgery to re implant the prosthesis, this not only increases the cost but also increases patient morbidity and mortality.

Prevention of SSI by screening for nasal MRSA colonisation pre-operatively and treating it significantly reduces the rate of SSI in orthopedic patients. Pre-operative screening is not only cost effective but overall reduces the rate of re hospitalization and increase patient morbidity and mortality. Since 1999, Ireland has participated in the European Antimicrobial Resistance Surveillance System (EARSS), which shows that MRSA levels vary throughout Europe. A significant contribution was made by the Strategy for the Control of Antimicrobial Resistance in Ireland (SARI), to stabilize the increase in MRSA cases, an initiative focusing on surveillance of antimicrobial resistance [16]. The chief measures to control MRSA are proper hand hygiene, restricted use of antibiotics and the detection and appropriate isolation of infected colonised patients.

Conclusion

As per our study, the frequency of MRSA infection post primary lower limb arthroplasty was found to be 0%. The result shows that, MRSA screening in PAC is an important adjuvant to the MRSA reduction protocol in patients undergoing lower limb arthroplasty. However, a positive correlation was failed to be established. The question now arises as to if its MRSA screening could be safely excluded from the pre-operative care of patients or not. Further assessment is however needed in this regard to establish a definitive outcome.

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Conflict of Interest

The authors declare no conflict of interest.

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