ORIGINAL RESEARCH PAPER
Volume - 9 | Issue - 8 | August - 2020 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

SURGICAL SITE INFECTION RATES AT A TERTIARY CARE CENTRE AFTER BREAST SURGERY

General Surgery

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ABSTRACT

Background: Surgical site infection (SSI) after breast procedures may result in significant morbidity, psychologic trauma, and additional cost. A prospective study was performed to identify risk factors for infection. **Methods:** A case patient was defined as any patient having a breast procedure from june 2017 through May 2018 with culture of a pathogen from surgical site drainage or aspiration or with skin changes like erythema or presence of cellulitis treated by incision and drainage and/or antibiotic therapy.All patients received pre as well as peri-operative antibiotic prophyllaxis. Randomly selected control patients were matched by time and procedure. There were 40 case patients and 78 control patients. **Results:** The factors associated with SSI were obesity (78% of cases vs 40% of controls; p = 0.02) and older age (mean 56 years in cases vs 45 years in controls; p = 0.005). **Conclusions:** Host factors as well as nosocomial factors may contribute to SSI in breast procedures.

KEYWORDS

INTRODUCTION :

SSIs have also been associated with the emergence multi-drug resistant bacteria.(1) SSIs after surgery in patients having breast procedures may result in increased patient morbidity, psychological trauma, and significant cost. Most studies on breast infections have focused on mastectomy procedures with rates of infection ranging from 1.4% to 18.1%.(2) Few investigators have studied surgical site infections after simple breast biopsy or lumpectomy. However, the incidence of SSIs in India has not been systematically studied. Therefore, there are neither global SSI rates nor SSI rates stratified by surgical procedure (SP) according to the to the ninth edition of the International Classification of Diseases(ICD-9) criteria(3–5) that enables a basis for international benchmarking.(6)In our study the rate of surgical site infection was higher than expected after surgery in patients having breast biopsy, partial mastectomy, or modified radical mastectomy. Reason may be that most studies have been done in comparatively developed or higher income group countries. According to the World Bank's categorization based on the 2012 gross national income per capita, 68% of the world countries are low-income and lower middle-income economies, which can also be referred to as lower-income countries, or developing countries.(7) The incidence of SSIs in limited-resource countries has not been systematically assessed in these settings.(8,9)

MATERIALS AND METHODS

Case definition and ascertainment

A case patient was defined as any patient at the RIMS, Ranchi, who had a breast procedure performed by june 2017 to may 2018,, with (1) isolation of a pathogen from culture of drainage or of aspirate from a surgical wound and/or (2) with presence of erythema or cellulitis treated by incision and drainage and/or antibiotic therapy.

Observation and interview

We observed breast procedures performed by the surgical team for any obvious breaches in sterile technique. The surgical team was also interviewed to determine whether there had been any changes in surveillance, surgical procedures, or surgical personnelCase-control study For every case patient, two control patients were randomly selected from a list of consecutive patients who had no surgical site infection during the study period. Case and control patients were matched by breast procedure. A retrospective review of the medical records of case and control patients was conducted. Data abstracted included the following: age, sex, and race; previous breast surgery; history of irradiation or chemotherapy; history of diabetes mellitus; obesity (body mass index ≥27); smoking history (tobacco use within last 10 years); dissection of axillary lymph nodes; pre- operative needle localization; type of anesthesia; American Society of Anesthesiologists (ASA) preoperative classification score; duration of surgery; use of indwelling catheters, invasive lines, and perioperative antibiotics; surgical skin preparation; and presence, type, and location of surgical drains.

Surgical skin preparation :The agent for routine surgical skin preparation in all breast procedures was chlorhexidine followed by povidone-iodine

Laboratory cultures: Cultures from the hands and anterior nares of the primary breast surgeon and the surgical assistant were obtained. Cultures were plated to select for bacterial growth.

Statistical methods: Data were collected and analyzed by using the SPSS 16.0 (IBM, Chicago, IL, USA).Relative risk (RR) ratios, 95% confidence intervals and p-values were determined for all primary and secondary outcomes. P-values <0.05 were reported as statistically significant. Univariate analysis wasperformed by using a chi-square test or Fisher's exact test when appropriate. Differences were considered significant when the p value for a two- tailed test was ≤ 0.05.

RESULTS

40 breast procedures from through june 2017 to may 2018, and 6 case patients were identified .The overall rate of infection for all breast procedures was 15% (6 out of 40). Rates of infection, stratified by breast procedure, were 5% for breast biopsy (1 out of 20); 10% for partial mastectomy (1 out of 10); and 40% for modified radical mastectomy (4 out of 10).

Observation and interview

Observation of breast procedures performed by the primary surgeon and interviews with the surgical team did not reveal any breaches in sterile technique or changes in patient population. Antibiotic prophylaxis had been used routinely before any breast procedure.

Case patient characteristics

All the patients were women; the mean age was 48 years (range 30 to 68 years). 4 of the 40 (10%) had diabetes mellitus, and 8 (20%) were obese. 20 of the 40 (50%) had simple biopsy, 10 (25%) had modified radical mastectomy, and 10 (25%) had partial mastectomy. The predominant signs and symptoms of infection in the 6 case patients were erythema, in 5 (83.3%), and pain, in 1 (16.6%). 3 of the 6 (50%) had purulent drainage, and 1 (16.6%) had fever (temperature >38° C). The mean duration from surgery to diagnosis of surgical site infection was 8 days(range 5 to 14). All the six patients were kept in the hospital for treatment of infection.

Pathogens

Pathogens were primarily gram-positive cocci. 3 of the 6 case patients (50%) had coagulase-AJIC negative Staphylococcus. In 2 of the 6

cases (33.3%), either the culture showed no growth or no material was cultured. In 1 case, the pathogen was gram-negative bacilli Escherichia coli.. S. aureus was not cultured from the hands and anterior nares of any member of the surgical team.

Case-control study

Risk factors significantly associated with surgical wound infections in the univariate analysis were obesity (64% of cases vs 40% of controls; p= 0.03), older age (mean age 56 years forcases vs 45 years for controls; p = 0.004). No other risk factors were significantly associated with surgical site infection.

DISCUSSION

During the last few decades, the CDC has been the only available source to provide a basis for comparison of hospital infection rates worldwide. In contrast, the comparison of CDC's hospitals' rates and those of hospitals with limited-resources or with sufficient available resources, but without enough experience in the field of infection control, should involve the consideration of the mentioned disadvantages in terms of socio-economic factors. The higher SSI rates found in our study, in comparison to the rates for CDC's hospitals, have also been influenced by such factual background. The relation between the HAI rates and the type of hospital (public, academic and private), and the relation between HAI rates and the country's socio-economic level (defined as low-income, mid-low-income and high- income) have been analyzed and published by the INICC.(10,11)

At our institution there was no formal surveillance for infections after breast procedures. An initial investigation did not reveal a common source of infection. Age and obesity were identified as significant risk factors for infection, but these host factors are not amenable to intervention. Researchers have investigated the usefulness of antibiotic prophylaxis in breast surgery. Considerations in using antibiotic prophylaxis must include the possibility of adverse reactions, the potential for selecting resistant organisms, cost, and increased personnel time. These factors must be weighed against the risk of infection, morbidity, and the cost for treating infections.4 Although actual costs were not determined in our study, an analysis to estimate costs shows that prophylaxis with a single dose of ceftriaxone is cost effective in our patient population. Further study might elicit other risk factors that could be targeted by prophylaxis.

Limitations to our study include the relatively small patient population and the inherent problems of a retrospective study. In addition, because our institution is a regional referral center, our findings may not be generalizable to other institutions. Chlorhexidine and alcohol followed by povidone –iodine are more effective antiseptics against gram-positive organisms and have better residual activity than povidone-iodine alone. Another factor that cannot be dismissed is the potential for the Hawthorne effect, because increased attention toward breast procedures may have prompted more attention to technique.

In conclusion, age and obesity may contribute to the risk of surgical site infection after surgery in patients having breast procedures.

ACKNOWLEDGMENTS

We are thankful to our faculty members for their proper guidance and the staffs of the Surgery department, RIMS for their support and help.

Funding: No funding sources
Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committe

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