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Original Research

Evaluation of surgical site infection in breast cancer surgery: An observational study

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Abstract

Background: To assess the surgical site infection in breast cancer surgery subjects. **Materials & Methods:** Present study was conducted in department of General Surgery and Department of Microbiology, Sukhsagar Medical College and Hospital, Jabalpur. A total of 100 subjects were enrolled. The participants were categorized into groups based on the type of breast surgery they underwent, including Mastectomy (without breast-saving techniques), breast-conserving surgery, breast reconstruction through the Lattismus Dorsi (LD) flap method, and subcutaneous amputation with simultaneous reconstruction using an artificial prosthesis. Surgical site infection was evaluated. All the results were analyzed by SPSS software. **Results:** Overall SSI was found to be present in 11 percent. The recorded number of patients diagnosed with surgical site infection (SSI) in each treatment group revealed a notably higher incidence in those who underwent subcutaneous amputation with simultaneous reconstruction using an artificial prosthesis (27.2%).**Conclusion:** Surgical site infection (SSI) poses a significant concern, warranting emphasis on preventive measures.

Keywords: Breast cancer, Surgical Site,Infection

Introduction

Surgical site infection (SSI) is one of the most common and serious complications following surgery. The occurrence of SSI varies according to the type of operation, wound cleanliness, and the operative field. This complication can lead to prolonged hospitalization, which increases the cost of treatment. [1,2] SSI occurs frequently following breast surgery because such surgery is mainly performed to treat breast cancer, and consequently the tissue is subjected to chemotherapy and/or radiotherapy. [3] Current surgical options include breast-saving techniques, mastectomy, autograft techniques, use of an acellular dermal matrix, implantation of breast implants, and a combination of these methods. [4,5] The risk of complications, including SSI, is affected by the type of breast surgery and whether breast reconstruction is performed. A variety of risk factors for SSI following breast cancer surgery have been reported, including older age, obesity, alcohol abuse, smoking, diabetes, malignancy, previous open biopsy, breast-conservation surgery, previous radiation therapy or chemotherapy, surgeon experience, seroma development, prolonged duration of drainage, immediate reconstruction, and lack of antibiotic prophylaxis at the time of surgery. [6] Surgical site infections (SSI) impact the oncologic care of breast cancer patients due to delays in additional therapy in some cases, increases in the cost of care, failed reconstructions, and potentially an increase in cancer recurrence rates. [7] The reported rates of SSI after breast operations range dramatically from 0.8–26% in the literature. [8-10] SSIs following breast cancer surgery (BCS) are dreaded complications which occur at a frequency approximately varying within a 0.8% to 26% range. [11- 14]Hence, this study was conducted to assess the surgical site infection in breast cancer surgery subjects.

Materials & Methods

Present study was conducted in department of General Surgery and Department of Microbiology, Sukhsagar Medical College and Hospital, Jabalpur. A total of 100 subjects were enrolled. The participants were categorized into groups based on the type of breast surgery they underwent, including classic breast surgery (without breast-saving techniques), breast-conserving surgery, breast reconstruction through the Lattismus Dorsi (LD) flap method, and subcutaneous amputation with simultaneous reconstruction using an artificial prosthesis. SSI was defined as any episode of clinical symptoms of infection following surgery, or when SSI was diagnosed by the surgeon. Antibiotic use was as per surgeon's discretion. Early and late SSI were defined by whether the onset of symptoms occurred within 30 days or more than 30 days after surgery, respectively.The age, body mass index, hospitalization duration,

smoker status, and comorbiditiesof patients diagnosed with SSI were assessed. Cases of minimal erythema treated with a course of outpatient antibiotics were not considered SSI by either old or new criteria. Samples were acquired from these patients for microbiological evaluation. The microorganisms responsible for SSI were determined. Categorical data were assessed through the chi-square test and Fisher's exact test. Statistical significance was defined as p-values less than 0.05. The entire statistical analysis was conducted using SPSS software.

Results

Overall SSI was found to be present in 11 percent. The recorded number of patients diagnosed with surgical site infection (SSI) in each treatment group revealed a notably higher incidence in those who underwent subcutaneous amputation with simultaneous reconstruction using an artificial prosthesis (27.2%) and breast reconstruction via the LD flap method (22.2%) compared to the other two groups. The majority of infections were attributed to Gram-positive bacteria, with Staphylococcus strains being the predominant isolates.

Table 1: Surgical site infection in breast cancer subjects who underwent breast surgery

SSI	Mastectomy (n=30)	Breast conserving surgery (n=50)	Breast reconstruction via the LD flap mehod (n=9)	Subcutaneous amputation with simultaneous reconstruction (n=11)	P value
All SSI	2 (6.7%)	4(8%)	2 (22.2%)	3(27.2%)	0.001*
Early SSI	1(3.4%)	3 (6%)	1(11.1%)	2(18.1%)	0.003*
Late SSI	1(3.4%)	1 (2%)	1(11.1%)	1(9.1%)	0.001*

*: Significant, SSI: Surgical site infection, LD: Lattismus Dorsi

Table 2: Microorganisms responsible for surgical site infection in breast cancer subjects

Microorganism	Mastectomy(n=30)	Breast conserving surgery (n=50)	Breast reconstruction via the LD flap mehod (n=5)	Subcutaneous amputation with simultaneous reconstruction (n=15)	P value
MSSA	1(50%)	1(25%)	1(50%)	1(33.4%)	0.61
CNS	0	0	0	1(33.3%)	0.52
Enterococcus faecalis	0	1(25%)	1(50%)	0	0.02*
Enterobacteriaceae	1 (50%)	1(25%)	0	1(33.3%)	0.02*
Anaerobes	0	1(25%)	0	0	0.47

*: Significant, MSSA, methicillin-susceptible Staphylococcus aureus; CNS, coagulase-negative Staphylococcus.

Discussion

Although the majority of breast procedures are considered clean operations, the SSI rates reported in the individual studies remain higher than would be expected. Olsen et al. reported that SSI rates in mastectomy without immediate reconstruction, mastectomy with implant reconstruction, and mastectomy with autologous flap reconstruction were approximately 3%–18%, 0.4%–17%, and 1%–12%, respectively. [6] Staphylococci are the organisms isolated most commonly in SSI after breast surgery (60%), whereas Gram-negative bacilli and anaerobes account for 40%. [15] Susceptibility testing of the staphylococcal isolates found drug resistance in 63%. [15] In patients with breast implant infection, the vast majority of isolates are Gram-positive microorganisms (83%), with the rate of methicillin-sensitive staphylococci of 49% and a much lower proportion of infections due to methicillin-resistant vs. susceptible Staphylococcus aureus (MRSA vs. MSSA, 3.5% vs. 30.6%, respectively). [16] Hence, this study was conducted to assess the surgical site infection in breast cancer surgery subjects. In the present study, overall SSI was found to be present in 11 percent. The recorded number of patients diagnosed with surgical site infection (SSI) in each treatment group revealed a notably higher incidence in those who underwent subcutaneous amputation with simultaneous reconstruction using an artificial prosthesis (27.2%) and breast reconstruction via the LD flap method (22.2%) compared to the other two groups. A study by Palubicka A et al, aimed to assess SSI after breast surgery over five

years in a single center in Poland. They concluded that reconstruction using an artificial prosthesis or via the LD flap method is connected to increased SSI incidence. Further studies are required to prevent SSI following breast surgery. [17]In the present study, the majority of infections were attributed to Gram-positive bacteria, with Staphylococcus strains being the predominant isolates. A study by Louis MY et al, aimed to assess the SSI incidence rate in BCS and to identify some risk factors.Data collection concerned BCS, classified I or II in the Altemeier classification, associated or not to immediate breast reconstruction. The survey concerned at least 100 consecutive BCS performed in each of the 15 participating comprehensive cancer centres in the first semester of 2011. Data were collected for 2883 BCS, including 2766 initial BCS. The kind of surgery was available for 2731 initial BCS: 1527 (56%) lumpectomies, 563 (21%) mastectomies, 143 (5%) and 170 (6%) immediate and secondary reconstructions, respectively, 35 (1%) node dissections, 293 (11%) breast mammoplasty surgeries.The SSI incidence rate was 2.86%as compared to 4.1% in 2008, corresponding to a 30% decrease. S. aureus was identified in 58 cases.[18]In another previous study conducted by Cappelli S et al, evaluated how the measures to contain the SARS-CoV-2 spreading affected the surgical site infections (SSIs) rate in patients who underwent nondeferrable breast cancer surgery (BCS). They observed significant evidence of higher SSIs, both in terms of CDC and ASEPSIS score, in patients having undergone breast reconstruction compared with patients not undergoing immediate reconstruction. The restrictive measures issued during the lockdown period seemed to lower the SSIs rates in patients undergoing nondeferrable BCS. [19]

Conclusion:

Surgical site infection (SSI) poses a significant concern, warranting emphasis on preventive measures. The use of artificial prosthetics or the LD flap method in reconstruction is associated with a higher incidence of SSI.

References:

1. Bratzler D.W., Houck P.M. Antimicrobial prophylaxis for surgery: An advisory statement from the national surgical infection prevention project. Clin. Infect. Dis. 2004;38:1706–1715.
2. Mangram A.J., Horan T.C., Pearson M.L., Silver L.C., Jarvis W.R. Guideline for prevention of surgical site infection. Infect. Control Hosp. Epidemiol. 1999;20:247–280.
3. Pałubicka A., Wekwejt M., Świeczko-Żurek B., Zieliński J. Powikłania po rekonstrukcji piersi: Problem zakażeń i strategii prewencyjnej—Przegląd literaturowy. Chir. Plast. I Oparzenia. 2017;5:89–97.
4. Gil-Londoño J.C., Nagles-Pelaez J.A., Maya-Salazar W.A., Madrid J., Maya-Restrepo M.A., Agudelo-Perez R.A., Ochoa J. Surgical site infection after breast cancer surgery at 30 days. Infectio. 2017;21:96–101.
5. Zhao X., Wu X., Dong J., Liu Y., Zheng L., Zhang L. A Meta-analysis of Postoperative Complications of Tissue Expander/Implant Breast Reconstruction Using Acellular Dermal Matrix. Aesthetic Plast. Surg. 2015;39:892–901.
6. Olsen M.A., Lefta M., Dietz J.R., Brandt K.E., Aft R., Matthews R., Mayfield J., Fraser V.J. Risk Factors for Surgical Site Infection after Major Breast Operation. J. Am. Coll. Surg. 2008;207:326–335.
7. Indelicato D, Grobmyer SR, Newlin H, et al. Association between operative closure type and acute infection, local recurrence, and disease surveillance in patients undergoing breast conserving therapy for early-stage breast cancer. Surgery. 2007;141(5):645–653.
8. Prospero E, Cavicchi A, Bacelli S, et al. Surveillance for surgical site infection after hospital discharge: a surgical procedure-specific perspective. Infect Control Hosp Epidemiol. 2006;27(12):1313–1317.
9. Edwards JR, Peterson KD, Mu Y, et al. National Healthcare Safety Network (NHSN) report: data summary for 2006 through 2008, issued December 2009. Am J Infect Control. 2009;37(10):783–805.
10. Nahabedian MY, Tsangaris T, Momen B, et al. Infectious complications following breast reconstruction with expanders and implants. Plast Reconstr Surg. 2003;112(2):467–476.
11. Ban KA, Minei JP, Laronga C, et al.. American College of Surgeons and Surgical Infection Society: Surgical Site Infection Guidelines, 2016 Update. J Am Coll Surg. 2017;224:59–74.
12. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR. Guideline for prevention of surgical site infection, 1999. Centers for disease control and prevention (CDC) Hospital Infection Control Practices Advisory Committee. Am J Infect Control. 1999;27:97–132; quiz 133.
13. Wilson AP, Treasure T, Sturridge MF, Grüneberg RN. A scoring method (ASEPSIS) for postoperative wound infections for use in clinical trials of antibiotic prophylaxis. Lancet. 1986;1:311–313.
14. Indelicato D, Grobmyer SR, Newlin H, et al.. Association between operative closure type and acute infection, local recurrence, and disease surveillance in patients undergoing breast conserving therapy for early-stage breast cancer. Surgery. 2007;141:645–653.
15. Throckmorton A.D., Baddour L.M., Hoskin T.L., Boughey J.C., Degnim A.C. Microbiology of surgical site infections complicating breast surgery. Surg. Infect. (Larchmt) 2010;11:355–359.
16. Franchelli S., Pesce M., Baldelli I., Marchese A., Santi P., De Maria A. Analysis of clinical management of infected breast implants and of factors associated to successful breast pocket salvage in infections occurring after breast reconstruction. Int. J. Infect. Dis. 2018;71:67–72.

17. Palubicka A, Jaworski R, Wekwejt M, Swieczko-Zurek B, Pikula M, Jaskiewicz J, Zielinski J. Surgical Site Infection after Breast Surgery: A Retrospective Analysis of 5-Year Postoperative Data from a Single Center in Poland. Medicina (Kaunas). 2019 Aug 21;55(9):512.
18. Louis, MY., Groupe de Prévention des Infections en Cancérologie (GPIC)., Lemarie, F. et al. O054: Surgical site infections (SSI) and risk factors in breast cancer surgery (BCS): French survey surviso 2011. Antimicrob Resist Infect Control 2 (Suppl 1), O54 (2013).
19. Cappelli S, Corallino D, Clementi M, Guadagni S, Pelle F, Puccica I, Barba M, Vici P, Sperduti I, Costantini M, Botti C. Surgical site infections in patients undergoing breast oncological surgery during the lockdown: An unexpected lesson from the COVID-19 pandemic. G Chir. 2022 Jul 25;42(2):e02