Surgical site infections after breast surgery: Alexandria medical research institute hospital experience

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Background

Surgical site infections (SSIs) are major sources of adverse operation-related events in patients undergoing surgery and include increased morbidity, psychological trauma, additional cost, and delay of postoperative adjuvant therapies. This study aimed to identify the rate, degree, treatment, and causative organisms of SSIs after breast surgery in the hospital of Medical Research Institute, University of Alexandria.

Patients and methods

The study prospectively included all patients admitted during the period from February 2013 to July 2013 who were selected for breast surgery. Patients were followed up for 30 days after surgery if they had no implant and for up to 1 year if they had an implant placed during the operation. The rate, degree, treatment, and causative organisms of SSIs after breast surgery were registered.

Results

The study included 146 patients; SSIs were diagnosed after 17 (11.6%) operations. All patients who had SSIs after breast surgery were identified during the outpatient follow-up. Six (35.2%) of the 17 patients who had SSIs after breast surgery needed to be readmitted for management of SSIs. *Staphylococcus aureus* was the most common pathogen (isolated from 41.2% of patients).

Conclusion

SSIs are important and common complications after breast surgery. They can occur after any type of breast surgery. Microbiological diagnosis is an essential tool for proper management.

Keywords:
breast cancer, breast surgery, Southampton wound scoring system, surgical site infection

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Introduction

Breast cancer is the most common site-specific cancer in women and is the leading cause of death from cancer among women. It accounts for 33% of all female cancers and is responsible for 20% of the cancer-related death in women [1,2]. In Egypt, breast cancer is a significant public health problem, accounting for ~29% of newly diagnosed cancers [3,4]. Sixteen percent of all cancer-related death among women is attributed to breast cancer, making it the second leading cause of cancer-related death [3,4]. The standard definition of surgical site infection (SSI), developed by the Centers for Disease Control and Prevention (CDC), which is used by most hospital epidemiologists and infection control practitioners worldwide, specifies surveillance for SSIs for 30 days after operation in procedures without implants and for 1 year after operation when an implant is placed [5]. The rate of breast SSIs ranges from 1 to 30%, depending on the definition of SSIs, the type of operation, comorbidities of the patient, time of follow-up, perioperative therapy, and reporting institution. The incidence of SSIs in breast surgery is higher than that in other clean operations in which the infection rate is less than 5% [6–9]. The development of SSI can lead to prolonged hospital stay with increased costs, poor cosmetic results, psychological trauma, and, occasionally, a delay in postoperative adjuvant therapies [10]. A variety of risk factors for SSI after breast surgery have been reported, [11–14] including older age, obesity, heavy alcohol use [13], smoking, diabetes, malignant tumor, previous open biopsy [15,16], previous chemotherapy or radiation therapy [14,17–21], trainee surgeon responsible for the operation [22], seroma development, prolonged duration of drainage after operation [14,21], immediate reconstruction, and lack of antibiotic prophylaxis at the time of operation [23–25]. This study aimed to identify the rate, degree, treatment, and causative organisms of SSI after breast surgery in the hospital of Medical Research Institute, University of Alexandria.

Patients and methods

The study prospectively included all patients admitted to the Department of Surgery, the hospital of Medical Research Institute, University of Alexandria, from

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February 2013 to July 2013 who had been selected for different types of breast surgeries. Prospective detection of SSI was used to identify patients with SSIs. The type of operation submitted was registered and patients were followed up for 30 days after surgery if there was no implant and for 1 year when an implant was placed during the operation. The grade of SSI was identified using the Southampton wound scoring system [26]. Diagnosis was based on information from patients' medical records, including clinical data (symptoms and signs), investigations (laboratory, histopathology, radiological, etc.), microbiological culture and sensitivity results, and medication charts, in addition to the medical records of the infection control team in the hospital. Infections were identified either during the original surgical admission, at readmission to the hospital, or during outpatient follow-up of the surgical wound. All patients who were submitted for any procedure received third-generation cephalosporin antibiotic immediately before the procedure. Causative organisms were recorded from the microbiological reports. The method of management of these infections was also recorded.

Results

The study included 146 patients who were admitted to the Department of Surgery, hospital of Medical Research Institute, University of Alexandria, from February 2013 to July 2013 who were selected for breast surgery; the distribution of these cases according to the type of surgery is shown in Table 1.

SSIs were diagnosed in 17 (11.6%) surgical cases. The distribution of patients who had SSIs after breast surgery according to the type of surgery submitted is shown in Table 2.

All patients who had SSIs after breast surgery were diagnosed during the outpatient follow-up within the first 3 weeks after surgery, except two: one patient with an implant who was diagnosed 3 months after surgery and another patient with an expander who was identified 9 months after surgery. Regarding the age of patients who had SSIs after breast surgery; it ranged from 36 to 67 years and in those patients who had severe Southampton score (grade IV and V); the age was greater than 60 years. Six (35.2%) of the 17 patients who had SSIs after breast surgery were diabetic and they developed SSIs of Southampton score grade III or more and two of them needed to be readmitted for management of SSIs. Five (29.4%) of the 17 patients who had SSIs after breast surgery received neoadjuvant chemotherapy and they also developed SSIs of Southampton score grade III or more. The distribution of patients who had SSIs after breast surgery on the basis of the degree of infection according to the Southampton wound scoring system is shown in Table 3. Six (35.2%) of the 17 patients who had SSIs after breast surgery needed to be readmitted for management of SSIs: two patients for secondary suture after debridement and four patients for incision and drainage. Seven (41.2%) of the 17 patients who had SSIs after breast surgery needed aspiration to drain seroma; two of them needed insertion of a second tube.

Staphylococcus aureus was the most common pathogen (isolated from 41.2% of patients). Gram-negative bacteria were collectively isolated from 29.4% of patients. The distribution of patients who had SSI after breast surgery according to the type of isolated bacteria is shown in Table 4. All patients received antibiotics according to culture and sensitivity results.

Discussion

SSIs are major sources of adverse operation-related events in patients undergoing surgery, and include increased morbidity, psychological trauma,

Table 1 Distribution of breast surgery patients admitted during the period from February 2013 to July 2013 according to the type of surgery submitted

Type of surgical procedures	Number of cases (%)
Excisional biopsy	48 (32.9)
MDE	14 (9.6)
Nipple reconstruction	5 (3.4)
Lipofilling	11 (7.5)
Mastectomy	42 (28.8)
Reduction mammaplasty	8 (5.5)
TRAM	2 (1.4)
LD	6 (4.1)
Implant	6 (4.1)
Expander	4 (2.7)
Total	146 (100)

LD, latissimus dorsi myocutaneous flap; MDE, major duct excision; TRAM, transverse rectus abdominis myocutaneous flap.

Table 2 Distribution of patients who had surgical site infection after breast surgery according to the type of surgery submitted

Type of surgical procedures	Number of cases (%)
Excisional biopsy	1 (6)
MDE	2 (12
Mastectomy	8 (46)
Reduction mammaplasty	2 (12)
TRAM	1 (6)
Implant	2 (12)
Expander	1 (6)
Total	17 (100)

MDE, major duct excision; TRAM, transverse rectus abdominis myocutaneous flap.

Table 3 Distribution of patients who had surgical site infection after breast surgery according to the degree of infection as per the Southampton wound scoring system [26]

Degrees of infection	Number of cases (%)
Southampton score	
IIB	2 (11.8)
IIC	3 (17.6)
IIIB	2 (11.8)
IIIC	2 (11.8)
IIID	2 (11.8)
IVA	3 (17.6)
IVB	1 (5.8)
V	2 (11.8)
Total	17 (100)

Table 4 Distribution of patients who had surgical site infection after breast surgery according to the type of isolated bacteria

Isolated bacteria	Number of cases (%)
Staphylococcus aureus	7 (41.2)
Streptococcus pyogenes	3 (17.6)
Pseudomonas aeruginosa	3 (17.6)
Morganella morganii	2 (11.8)
No pathogen isolated	2 (11.8)
Total	17 (100)

additional cost, and delay of postoperative adjuvant therapies [27,28]. We reported a higher incidence of SSIs (11.6%) compared with that reported by Degnim *et al.* [29] (2.7%), Leinung *et al.* [30] (4.5%), and Olsen *et al.* [31] (4.7%), but lower than that reported by Vilar-Compte *et al.* [32] (18.9%). Further, our rate of SSIs is higher than that reported by Omar *et al.* [33] (2.3%), who believed that the rate of SSI in their study may be higher than reported. As the postoperative length of stay is decreasing, the follow-up of the patient is mainly carried out on an outpatient basis. During outpatient visits, when the SSI develops and requires no readmission, surgeons may not document the infection in the patient's records and may not request microbiological sampling of the wound. This is primarily because of fear of medical malpractice claims or negligence especially in a surgery classified as a clean one like breast surgery [33]. However, we believe that this bias is not present in our study because all of the authors are surgeons and we follow up all cases of breast surgery after the operation in the breast clinic, which is conducted every week in our department. In our study, six (35.2%) of the 17 patients who had SSI after breast surgery needed to be readmitted for management of SSI: two patients for secondary suture after debridement and four patients for incision and drainage. In other study, 62.5% were readmitted for management of SSI [13]. This is because in our study only six (35.2%) patients out of the 17 who had SSI after breast surgery had severe grades of SSIs. In our study, all of the SSIs were diagnosed after patients' discharge. With the current trends favoring a shortened postoperative hospital stay, most of our patients with SSI were managed on an outpatient basis (64.8%) and only six (35.2%) needed to be readmitted for management of SSIs. In the present study, despite the fact that *S. aureus* was the primary pathogen isolated from SSIs (41.2%), Gram-negative bacteria were isolated in 29.4% of cases, representing a significant finding. Other studies have reported the same results [34]. However, Mukhtar *et al.* [35] reported Gram-negative bacteria as the most common isolated pathogen. These findings support the importance of the use of empirical broad-spectrum antimicrobial (not only targeting *S. aureus*) coverage until culture results become available.

Conclusion and recommendations

SSIs are important and common complications after breast surgery and can cause adverse operation-related events. They can occur after any type of breast surgery. Microbiological diagnosis is an essential tool for proper management of such patients and therefore we recommend culture and sensitivity testing for every patient with SSI and the use of empirical broad-spectrum antimicrobial (not only targeting *S. aureus*) coverage until culture results become available. Because there are a lot of risk factors that may affect their incidence, we recommend further studies with a larger volume of cases to identify these independent risk factors that can be modified to decrease the incidence of SSIs. Also, we recommend pooling of these data in multivariate analysis to identify these risk factors.

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Conflicts of interest
None declared.

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