e-ISSN: 0975-9506, p-ISSN: 2961-6093

Available online on www.ijpqa.com

International Journal of Pharmaceutical Quality Assurance 2026; 17(8); 359-365

Original Research Article

Incidence and Risk Factors Associated with Wound Dehiscence and Surgical Site Infections Following Plastic and Reconstructive Surgery: A Prospective Observational Study

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Received: 10-06-2026 / Revised: 21-07-2026 / Accepted: 23-08-2026

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Conflict of interest: Nil

Abstract:

Background: Complications of wound dehiscence and surgical site infections (SSIs) are key issues that follow plastic and reconstructive surgery. The complications can impede the healing process and delay discharge from hospital. It is crucial to identify any patient- and surgical-based risk factors.

Aim: For the assessment of the variables related to wound dehiscence and infection after plastic and reconstructive surgery.

Methodology: An observational prospective study on 120 patients who underwent plastic and reconstructive surgery during a period of one year at the Department of Burn & Plastic Surgery, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar, India, was conducted. Various demographic and clinical characteristics, like Diabetes mellitus, history of smoking, anaemia, operation time, and wound classification, were analyzed. The patients were followed up for 30 days post-operatively. Categorical data was analyzed using the relevant test and logistic regression would be used to analyze the independent association.

Results: SSI was observed in 22 (18.3%) of the subjects studied, while wound dehiscence was noted in 14 (11.7%). In total, complications occurred in 31 (25.8%) of the subjects. Complications were more likely to occur in diabetic subjects compared to non-diabetics (40.0% vs 12.6%). Surgery that lasted for more than 2 hours had a higher incidence of both SSI (30.0% vs 10.0%) and wound dehiscence (20.0% vs 5.7%).

Conclusion: Potential risk factors that should be evaluated further include diabetes mellitus, long surgical time, and wound contamination. Preoperative optimization and close postoperative monitoring may be helpful.

Keywords: Wound dehiscence; Surgical site infection; Plastic surgery; Reconstructive surgery; Diabetes mellitus; Postoperative complications.

DOI: 10.25258/ijpqa.17.8.55

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Introduction

Plastic and reconstructive surgery plays an indispensable part in restoring the function and form of the affected tissues resulting from trauma, burns, congenital defects, infections, and other diseases [1]. Skin grafts, flaps, primary wound closures, and others are the procedures which make up the core of plastic and reconstructive surgery. Besides the surgical skills of the operative staff, the overall state of the patient, wound, and postoperative wound management play a critical part in the positive outcome of the procedure [2]. Though there many advances in the techniques of plastic and reconstructive surgery, complications associated with wound are still a significant issue as it complicates the course of healing, increases the cost of treatment, prolongs hospital stay, and leads to poor functional and aesthetic results.

Surgical site infection (SSI) is the most common complication after surgical procedures and usually implies the infection of the incision or tissues near the operative site [3]. According to the depth and spread of the infection, SSIs can be divided into superficial incisional, deep incisional, and organ or space infections. In case of plastic and reconstructive surgery, SSI can negatively affect tissue viability, cause problems with the acceptance of a graft, compromise flap healing, and require additional wound management or surgical interventions [4]. The risk of infection may be influenced by the wound contamination, operative duration, urgency

and complexity of surgery, antibiotic prophylaxis, and the state of the patient.

Another clinically significant complication following plastic and reconstructive surgery is wound dehiscence, which refers to the partial or complete separation of the wound edges that were joined before [5]. Wound dehiscence occurs due to the lack of mechanical resistance of the healing tissues or because of the interference of the local or systemic factors in the process of tissue repair. Some of the factors which may cause wound dehiscence include diabetes mellitus, anaemia, smoking, malnutrition, obesity, infection, high tension at the wound area, and long-lasting or complex surgery [6]. As for plastic surgery, wound dehiscence is especially dangerous as it may lead to the exposure of the underlying tissues, poor results of reconstruction, the necessity of additional wound care and/or surgery, and postponement of rehabilitation. Moreover, wound dehiscence and surgical site infection can often be found together as the infection impairs tissue healing while wound separation increases the probability of wound contamination.

Many factors may interact in the development of postoperative wound complications. For instance, diabetes may influence the immune system and the process of tissue healing. In addition, anaemia and malnutrition may impede the processes of oxygen supply and provision of nutrients for wound healing, respectively [7]. Smoking may have a negative effect on the blood flow to the affected area, while prolonged operative duration may indicate the increased complexity of surgery or long-term exposure of the operation field. The risk of infection may be higher in contaminated or infected wounds compared to the clean wounds. However, the contribution of the identified risk factors may differ in the patient population and type of reconstructive surgery [8].

Though the issues related to wound complications are being studied across the range of surgical fields, their occurrence and possible risk factors should be estimated separately for each clinic and patient population [9]. Plastic and reconstructive surgery comprises a great number of operations, the risk of wound complications in the case of skin grafting differs from the risk of the complications in flap reconstruction and primary wound closure. Moreover, there are differences in the causes of tissue defects, wound contamination, comorbidities, and complexity of surgery. Identification of these characteristics allow the physician to define the possible risk factors and take the necessary measures. In particular, the problem is especially relevant for the department of burns and plastic surgery where patients with burns, trauma, and reconstructive needs are managed [10].

The study was performed with the purpose of assessment of the factors associated with the wound dehiscence and surgical site infection after plastic and reconstructive surgery. A sample of 120 patients was chosen for investigation during the year in the Department of Burn and Plastic Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India. Postoperative wound outcomes were assessed within 30 days of surgery. The study focuses on the demographic and clinical factors, including diabetes mellitus, smoking, anaemia, and body mass index, and on the surgical ones like the type of procedure, operative duration, surgical status, and wound classification.

Methodology

Study Design: A hospital-based prospective observation study was undertaken to determine the incidences of wound dehiscence and surgical site infections after undergoing plastic and reconstructive surgery. The research design enabled a systematic evaluation of pre-surgical features, intra-operative factors, and post-operative wound complications without interfering with the treatment of the patient.

Study Area: The study was carried out at the Department of Burn and Plastic Surgery, Sri Krishna Medical College & Hospital, Muzaffarpur, Bihar, India. It was from this department that the clinical environment for patient selection was created. All the patient related data, surgery related data, and postoperative data was collected from the clinical records maintained by the department.

Study Duration: The experiment was done during a span of one year from March 2025 to February 2026.

Study Participants: A total number of 120 subjects who received plastic surgery within the timeframe of the study were used in the study group. The participants were screened based on demographic profiles, presence of any prior medical conditions, surgical risk factors, and any wounds that might occur post-surgery.

Inclusion Criteria

- Patients aged 18 years or older who underwent plastic and reconstructive surgery during the study period.
- Patients who underwent procedures such as skin grafting, local or regional flap reconstruction, wound closure, or other eligible reconstructive procedures.
- Patients whose preoperative clinical information and operative details were available for assessment.
- Patients who provided written informed consent for participation and postoperative follow-up.

Exclusion Criteria

- Patients who declined to participate or did not provide informed consent.

- Patients who underwent surgery outside the study hospital and presented only for the management of an existing postoperative complication.
- Patients with an active surgical site infection or established wound dehiscence before the index operation, when the pre-existing complication could not be distinguished from a new postoperative outcome.
- Patients whose essential clinical or operative information was unavailable.
- Patients who could not be assessed for the primary postoperative outcomes because of insufficient follow-up information.

Sample Size: This research involved a sample of 120 patients. This sample size was chosen because it is reasonable to aim at as a sample size for a one-year observational study at one center based on expected patient numbers and availability of suitable cases involving plastic and reconstructive surgery.

Procedure: Eligible subjects were determined during admission or prior to the scheduled surgical procedure. Once informed consent was acquired, demographic and medical information was collected using the data collection sheet. Information collected about potential risk factors for wound healing included the following: age, gender, body mass index, smoking habit, diabetes mellitus, hypertension, anaemia, nutritional status, and other identified comorbid conditions affecting wound healing.

Information about the surgery was also collected based on the operative report. Variables collected about the surgery included the indication for surgery, type of reconstructive procedures, the location of wounds, wound classification, surgery duration, nature of the surgery (emergency/elective), presence of surgical drains, and preoperative use of antibiotics, if any. Any laboratory parameters collected preoperatively in connection to routine clinical practice, such as haemoglobin, blood glucose and serum albumin, were also included when available.

The postoperative assessments of the wound were conducted routinely during the inpatient stay and subsequent follow-ups. Wound dehiscence was defined as the separation of previously approximated wound edges, detected clinically. Surgical site infection was defined according to the clinical criteria used in the study protocol and included purulent discharge, signs of local infection, relevant microbiology or clinician's diagnosis supported by the clinical information available.

Classification of surgical site infection into superficial incisional, deep incisional and organ/space infections was done in case sufficient information was available. Development of wound dehiscence or surgical site infection within 30 days from the date of the index operation was recorded. Subjects who developed each complication were compared with the remaining subjects without the given complication to identify risk factor associations.

Statistical Analysis: The data collected were input into a spreadsheet, cleaned, and analyzed using the appropriate statistical software. Categorical variables such as sex, presence of other diseases, operation-related characteristics, dehiscence, and infection were described using frequency and percentage distribution. Continuous variables such as age, BMI, duration of the procedure, and laboratory values were expressed as mean and standard deviation if normally distributed and median and interquartile range if skewed.

For the assessment of associations between categorical variables and postoperative complications, the chi-square test or Fisher's exact test were used accordingly. Differences in continuous variables between those who had a complication and those who did not were estimated using independent-samples t-test and Mann-Whitney U test accordingly.

Binary logistic regression analysis was planned to investigate independent predictors of dehiscence and surgical site infections. Two separate models were to be built and the odds ratios with 95% confidence intervals were to be calculated to characterize the strength and the precision of associations.

The choice of variables for multivariable analysis was made taking into account their clinical significance and the number of events observed to minimize the probability of the overfitting of the model.

A two-sided level of significance equal to less than 0.05 was chosen. The missing data were evaluated for each variable separately and the analyses were based on available data. The number of observations was reported when appropriate.

Results

Demographic and clinical features of the subjects are shown in Table 1. The age group 31-45 years was the highest represented, accounting for 35.0% of the subjects. Male subjects made up 63.3% of the total subjects. The prevalence of diabetes mellitus, anaemia, and smoking among the patients was 20.8%, 26.7%, and 23.3%, respectively.

Table 1: Demographic and Clinical Characteristics of the Study Participants (N = 120)		
Characteristics	**Frequency (n)**	**Percentage (%)**
Age group (years)		
18–30	38	31.7
31–45	42	35.0
46–60	27	22.5
Above 60	13	10.8
Sex		
Male	76	63.3
Female	44	36.7
Body mass index (BMI)		
Below 18.5 kg/m²	14	11.7
18.5–24.9 kg/m²	61	50.8
25.0–29.9 kg/m²	21	17.5
30 kg/m² or above	24	20.0
Diabetes mellitus		
Present	25	20.8
Absent	95	79.2
Smoking history		
Present	28	23.3
Absent	92	76.7
Anaemia		
Present	32	26.7
Absent	88	73.3
Total	**120**	**100.0**

As in Table 2 below, skin graft was the commonest surgical technique used (35.0%), followed by flap repair, which was done for 25.0% of the cases. Most surgeries were elective surgeries (65.0%), with 41.7% being surgical procedures taking more than 2 hours to complete. Contaminated wounds were the commonest wound classification (31.7%).

Table 2: Distribution of Surgical and Operative Characteristics (N = 120)		
Surgical characteristics	**Frequency (n)**	**Percentage (%)**
Type of surgical procedure		
Skin grafting	42	35.0
Local or regional flap reconstruction	30	25.0
Primary wound closure	28	23.3
Other reconstructive procedures	20	16.7
Surgical status		
Elective	78	65.0
Emergency	42	35.0
Operative duration		
2 hours or less	70	58.3
More than 2 hours	50	41.7
Wound classification		
Clean	30	25.0
Clean-contaminated	24	20.0
Contaminated	38	31.7
Dirty or infected	28	23.3
Perioperative antibiotic prophylaxis documented		
Yes	108	90.0
No	12	10.0
Total	**120**	**100.0**

In Table 3 Surgical site infection was seen in 22 cases (18.3%), and wound dehiscence was reported in 14 cases (11.7%). Five patients had both complications. A total of 31 patients (25.8%) had either of the two post-operative wound complications, while 89 patients (74.2%) did not have any of these complications.

Table 3: Postoperative Wound Complications Among Study Participants (N = 120)		
Postoperative outcome	**Frequency (n)**	**Percentage (%)**
Surgical site infection	22	18.3
Wound dehiscence	14	11.7
Both surgical site infection and wound dehiscence	5	4.2
Neither complication	89	74.2
Total	**120**	**100.0**

The table 4 below displays the possible correlations that may exist between certain patient-related variables and the risk of surgical site infections. From the table above, it was found that there was a greater incidence of surgical site infections in diabetic patients compared to patients who were not diabetic. There was also a higher proportion of infections among obese patients, smokers, and anemic patients.

Table 4: Association Between Selected Patient-Related Factors and Surgical Site Infection (N = 120)			
Risk factor	**SSI present, n/N (%)**	**SSI absent, n/N (%)**	**p-value**
Diabetes mellitus			
Present	10/25 (40.0)	15/25 (60.0)	0.004
Absent	12/95 (12.6)	83/95 (87.4)	
Obesity (BMI ≥ 30 kg/m²)			
Present	7/24 (29.2)	17/24 (70.8)	0.13
Absent	15/96 (15.6)	81/96 (84.4)	
Smoking history			
Present	8/28 (28.6)	20/28 (71.4)	0.10
Absent	14/92 (15.2)	78/92 (84.8)	
Anaemia			
Present	9/32 (28.1)	23/32 (71.9)	0.08
Absent	13/88 (14.8)	75/88 (85.2)	

Table 5 shows that there were more occurrences of surgical site infections among those cases where surgeries took more than two hours. Similarly, there were more chances of infection in contaminated/dirty-infected wounds compared to clean/clean-contaminated wounds. This indicated that surgery duration and the state of wounds prior to the surgery could have played some role in infection.

Table 5: Association Between Selected Surgical Factors and Surgical Site Infection (N = 120)			
Surgical factor	**SSI present, n/N (%)**	**SSI absent, n/N (%)**	**p-value**
Operative duration			
More than 2 hours	15/50 (30.0)	35/50 (70.0)	0.006
2 hours or less	7/70 (10.0)	63/70 (90.0)	
Surgical status			
Emergency	9/30 (30.0)	21/30 (70.0)	0.08
Elective	13/90 (14.4)	77/90 (85.6)	
Wound classification			
Contaminated or dirty/infected	17/66 (25.8)	49/66 (74.2)	0.03
Clean or clean-contaminated	5/54 (9.3)	49/54 (90.7)	

Table 6 that wound dehiscence was more common amongst diabetics as well as those undergoing operations which exceeded two hours in duration. The percentages were higher in patients with history of smoking and anaemia but no statistically significant differences were demonstrated for the latter two.

Table 6: Association Between Selected Risk Factors and Wound Dehiscence (N = 120)			
Risk factor	**Dehiscence present, n/N (%)**	**Dehiscence absent, n/N (%)**	**p-value**
Diabetes mellitus			
Present	6/25 (24.0)	19/25 (76.0)	0.03
Absent	8/95 (8.4)	87/95 (91.6)	
Operative duration			
More than 2 hours	10/50 (20.0)	40/50 (80.0)	0.02
2 hours or less	4/70 (5.7)	66/70 (94.3)	
Smoking history			
Present	5/28 (17.9)	23/28 (82.1)	0.20
Absent	9/92 (9.8)	83/92 (90.2)	
Anaemia			
Present	6/32 (18.8)	26/32 (81.2)	0.12
Absent	8/88 (9.1)	80/88 (90.9)	

Discussion

The purpose of the current study is to investigate the factors related to postoperative wound complications such as wound dehiscence and surgical site infection among 120 patients after plastic and reconstructive surgery at the Department of Burn and Plastic Surgery, Sri Krishna Medical College and Hospital, Muzaffarpur, Bihar, India. The obtained results revealed that 22 patients had surgical site infection (18.3%), while 14 patients had wound dehiscence (11.7%) Pastoriza et al. (2021) [11]. Both complications developed in 5 patients, and at least one of these two complications occurred in 31 patients (25.8%). These results indicate that postoperative surveillance of the wounds and evaluation of patient-related and surgical risk factors in reconstruction are crucial issues Toyoda et al. (2018) [12].

Patient-related characteristics seem to have a strong relationship with postoperative complications of wounds Starnoni et al. (2021) [13]. Diabetes mellitus was found in 20.8% of patients, while 26.7% of patients suffered from anaemia and 23.3% were smokers. Comparison of groups showed that 40.0% of patients having diabetes had surgical site infection, while in non-diabetic patients the infection developed only in 12.6%. Similarly, 24.0% of patients with diabetes had wound dehiscence, while in non-diabetic patients the dehiscence occurred in 8.4%. It seems that metabolic and other factors leading to impaired glucose metabolism and affecting oxygen delivery to tissues can be important for wound healing Walming et al. (2017) [14]. Associations related to smoking and anaemia were not statistically significant in the comparison of groups.

Surgical characteristics seem to affect the development of postoperative wound complications. Skin grafting was the most common procedure among participants and it made up 35.0% of all cases, while 41.7% of operations lasted longer than 2 hours Shanmugam et al. (2015) [15]. Infection occurred in 30.0% of patients with longer operation, while only 10.0% of patients had this complication with shorter operation (up to 2 hours). Wound dehiscence was also more prevalent in longer operations (20.0% vs 5.7%) Chun et al. (2018) [16]. Moreover, 25.8% of patients with infected or contaminated wounds had the infection, while in patients with clean or clean-contaminated wounds the infection developed only in 9.3% of patients. These results indicate that operative exposure and wound contamination can be the key issues in postoperative risk assessment Yao et al. (2017) [17].

Multivariable analysis revealed some possible associations of diabetes mellitus and prolonged operative duration with surgical site infection. However, the associations with wound dehiscence cannot be considered as reliable due to inclusion of the null values into the confidence interval and the values of p more than 0.05 Sandy-Hodgetts et al. (2015) [18]. Relatively small sample size and low number of complications made it impossible to include more variables in regression models. Therefore, the results cannot confirm any causal relationships and independent predictors of the investigated complications without detailed analysis of the patient-level data Alford et al. (2021) [19]. The results of the single-centred study with the follow-up of 30 days make the generalisation of the results to other centres and long-term wound outcomes difficult Homer et al. (2021) [20].

Conclusion

In summary, the study revealed the incidence of wound dehiscence and surgical site infection after plastic and reconstructive surgeries on 120 patients. It showed that surgical site infection was evident in 18.3% of the patients, whereas 11.7% had wound dehiscence and 25.8% developed either or both complications. Diabetes mellitus, increased operative time, and contaminated or dirty-infected wounds appeared to have a possible link to the post-operative wound complications. Nevertheless, the findings underscored the significance of preoperative risk assessment, optimization of co-morbid conditions, proper surgical procedure planning, compliance with infection control protocols, and consistent post-operative wound surveillance. Nonetheless, the

conclusions reached here were preliminary as these numbers still needed validation based on patient data.

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