

Reconstruction of pressure sores with flap in Bharatpur Hospital, Chitwan: A retrospective study



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ABSTRACT

Background: Pressure sores (pressure ulcers) are a significant concern in healthcare, particularly among individuals with limited mobility. Surgical reconstruction using flaps is a common intervention for severe cases. **Aims and Objectives:** The aims and objectives of the study are to explore the epidemiological profile, complications, and associated factors in flap reconstruction for pressure sores. **Materials and Methods:** A retrospective analysis was conducted on 58 patients who underwent flap reconstruction for pressure sores at Bharatpur Hospital. Sociodemographic variables, comorbidities, smoking status, and surgical techniques were recorded. Post-operative complications were assessed, and statistical analyses, including Chi-square tests and logistic regression, were employed to explore associations. **Results:** The patient population was predominantly middle-aged (35–49 years), predominantly male, with head injuries being the leading cause of pressure sores. Ischial region ulcers were most prevalent. Post-operative complications included dehiscence, deep surgical site infection, and serious fluid accumulation. Smoking status was significantly associated with complications ($P < 0.001$). Age also showed a significant correlation ($P \leq 0.001$), with the middle-age group experiencing fewer complications. No significant gender-based differences were observed in complication rates ($P = 0.572$). **Conclusion:** This study highlights the demographic and clinical characteristics of patients undergoing flap reconstruction for pressure sores. It recommends emphasizing smoking cessation programs and conducting careful risk assessments for older patients. A multidisciplinary approach is essential for effective pressure sore management. Further prospective studies are needed to validate these findings and enhance patient care strategies.

Key words: Flap; Reconstruction surgery; Pressure sore; Bharatpur hospital

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INTRODUCTION

Pressure sores, also known as pressure ulcers or decubitus ulcers, are localized injuries to the skin and underlying tissue caused by prolonged pressure or a combination of pressure, shear, and friction. Constant pressure resulting in “distortion or deformation damage” is probably the most accurate description of a pressure ulcer.¹ Pressure sores most commonly occur on bony prominences, such as the heels, ankles, hips, sacrum, and coccyx.² Pressure

sores are a major health problem, affecting an estimated 1–3 million people in the United States each year, and more than 2.5 million patients of acute care services are under pressure ulcers among them, 60,000 people die each year from complications such ulcers.³

They are particularly common in hospitalized patients, who are at increased risk due to immobility, impaired circulation, and malnutrition. Pressure sores can be difficult to heal and can lead to serious complications, such as infection, bone

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exposure, and even death. Therefore, it is important to prevent pressure sores from developing in the first place. However, when pressure sores do occur, prompt and effective treatment is essential to minimize complications and promote healing.

Flap surgery is a common surgical technique used to reconstruct pressure sores.⁴ A flap is a piece of tissue that is transferred from one part of the body to another. Flaps can be used to cover pressure sores, provide additional cushioning, and improve blood supply to the affected area. Flap surgery has been shown to be an effective treatment for pressure sores. However, it is important to note that flap surgery is not without risk. Potential complications include wound dehiscence, bleeding, infection, and flap failure.⁵ This study results may be helpful for surgeons and other healthcare professionals who are involved in the care of patients with pressure sores. This retrospective study aims to assess the outcomes of flap surgery for pressure sores in Bharatpur Hospital, Chitwan, Nepal.

Aims

To analyze the demographic characteristics, post-operative complications, and associated factors in patients undergoing flap reconstruction for pressure sores at Bharatpur Hospital.

Objectives

- To analyze the sociodemographic data of patients undergoing flap reconstruction for pressure sores and assess the post-operative complications associated with the procedure.
- To investigate the impact of smoking status and age on post-operative complications, evaluate the effectiveness of different surgical techniques, and recommend strategies for smoking cessation and risk assessments for older patients.

MATERIALS AND METHODS

This study utilized a descriptive cross-sectional design, categorized as a quantitative research approach, conducted from August 2024 to December 2024 at the Surgery Department of Bharatpur Hospital in Chitwan. A comprehensive pro forma was developed to collect data on essential variables, including demographic details (such as sex, age, and body mass index), characteristics of pressure sores (including site, size in cm², and depth), types of paralysis, types of flaps utilized, bladder and bowel incontinence, comorbidity status, duration of hospitalization before flap surgery, smoking habits, and pre-operative hemoglobin levels.

Post-operative outcomes were meticulously documented, focusing on complications such as dehiscence, superficial and deep surgical site infections (SSI), sepsis, septic shock, bleeding, graft failure, reoperation, and readmission, with final outcomes categorized by the number of complications experienced. Data collection involved a multi-faceted approach, including reviews of medical records, patient interviews, physical examinations, and photographic documentation of wounds, all guided by the structured pro forma.

Based on a previously reported complication prevalence of 58.7% for pressure sore flap reconstruction, the sample size was calculated to be 58, rounded up for practical considerations. To ensure the pro forma's validity and reliability, it was piloted on a small group of patients, leading to necessary adjustments based on the feedback received. The internal consistency of the pro forma was further assessed using Cronbach's alpha. Data analysis was conducted using the Statistical Packages for the Social Sciences software, employing descriptive statistics to summarize the findings and Pearson's Chi-squared tests to explore relationships between categorical variables.

RESULTS

Table 1 outlines the sociodemographic and clinical profile of the patients. Among the total 58 patients from 21 to 65 years, the mean age was 43.6 ± 12.27 , where, the largest age group was 35–49 years, comprising 43.1% of the patients, followed by 21–34 years (25.9%) and 50–65 years (31.0%). The patient population is predominantly male (67.2%), and the primary causes of pressure sores were head injuries (41.4%) followed by traumatic paraplegia (25.9%) and least causes was tethered cord syndrome (10.3%). Pressure sores were most commonly located in the ischial region (44.8%) followed by sacral pressure ulcer (34.5%) and trochanteric pressure ulcer (20.7%). The main surgical technique employed was posterior medial thigh transposition (36.2%) followed by B/L V-Y advancement (20.7%). The majority of patients had “Bladder/bowel incontinence” as a comorbidity (81.0%). A smaller percentage of patients have “Diabetes” as a comorbid condition (10.3%) and least percent of patients had “No comorbidity” (8.6%). This part of the table indicates the smoking status of the patients. A significant proportion of patients was non-smokers (81.0%), while a smaller portion reported as “smokers” (19.0%).

Table 2 provides a comprehensive overview of the post-operative complications following a flap reconstruction surgery at Bharatpur hospital. Among the complications listed, dehiscence emerges as the most common, occurring

Table 1: Epidemiology of patients undergoing pressure sore reconstruction

Description	Frequency (%)
Age category (years)	
21–34	15 (25.9)
35–49	25 (43.1)
50–65	18 (31.0)
Sex	
Male	39 (67.2)
Female	19 (32.8)
Cause	
Head injury	24 (41.4)
Fracture femur	5 (8.6)
Meningomyelocele	4 (6.9)
Pelvic fracture	4 (6.9)
Tethered cord syndrome	6 (10.3)
Traumatic paraplegia	15 (25.9)
Location of pressure sore	
Ischial pressure ulcer	26 (44.8)
Sacral pressure ulcer	20 (34.5)
Trochanteric pressure ulcer	12 (20.7)
Types of flap applied	
B/L V-Y advancement	10 (20.7)
Gluteal rotation	8 (13.8)
Posteromedial thigh transposition	21 (36.2)
TFL	6 (10.3)
Transverse lumbosacral	13 (22.4)
Comorbidity	
Bladder/bowel incontinence	47 (81.0)
Diabetes	6 (10.3)
No comorbidity	5 (8.6)
Smoking status	
Non-smoker	47 (81.0)
Smoker	11 (19.0)

Mean age in years (SD): 43.6±12.27

Table 2: Descriptive statistics on post-operative complications

Complications	Frequency	Percentage
Dehiscence	10	17.2
Serious fluid accumulation	7	12.1
Deep SSI	9	15.5
Septic shock	7	12.1
Bleeding	2	3.4
Graft failure	5	8.6
Flap necrosis	5	8.6

SSI: Surgical site infections

in 17.2% of cases, signifying a substantial occurrence of wound separation post-surgery. In addition, deep SSI is prevalent, affecting 15.5% of cases, underscoring the significance of addressing and managing infections in the post-operative period. Serious fluid accumulation and septic shock are also notable complications, each affecting around 12.1% of cases, indicating the importance of post-operative monitoring and interventions to prevent these severe conditions.

Furthermore, the table highlights the occurrence of relatively less frequent but still significant complications,

including graft failure and flap necrosis, both affecting 8.6% of cases. Finally, bleeding is the least common complication in this study, occurring in 3.4% of cases.

The study findings regarding the distribution of complications are shown here through the pie chart Figure 1. In the study, majority of cases (63.8%) who undergone flap reconstruction surgery experienced no complications, while 15.5% had only one complication, 5.2% had two complications, 12.1% had three complications, and 3.4% had four complications. This breakdown highlights the varying degrees of medical complexity in the study, from relatively straightforward cases with no complications to a smaller subset of cases with multiple concurrent complications, offering insights into the range and prevalence of post-procedure complications within the studied population.

Table 3 presents an analysis of the association between post-surgical complication status and several independent variables in a study population consisting of 58 individuals. The variables examined include age, sex, and smoking status, and their impact on the occurrence of surgical complications is assessed.

The data reveals interesting patterns. First, a statistically significant association is observed between age and post-surgical complications ($P=0.008$). It is notable that the middle-age group (35–49 years) exhibits a notably lower incidence of complications (16.0%) compared to both the younger (46.7%) and older (61.1%) age groups. This suggests that age may play a role in the likelihood of experiencing complications after surgery.

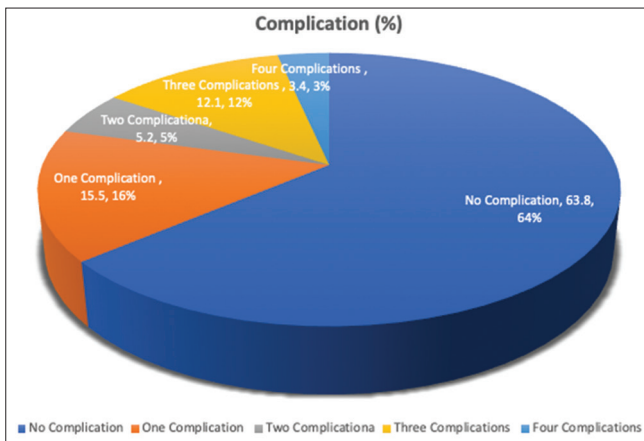
Second, the table assesses the relationship between sex and complications, revealing that there is no statistically significant difference in complication rates between males and females ($P=0.572$). Finally, smoking status is strongly associated with post-surgical complications ($P<0.001$), with all individuals who smoke experiencing complications, while a significant majority of non-smokers (76.6%) do not encounter complications. This underscores the detrimental impact of smoking on post-surgical outcomes.

DISCUSSION

Pressure sores remain a significant healthcare challenge, particularly among individuals with limited mobility. Due to the incredible extent of tissue damage, the patient can experience small, skin-only wounds to large, multi-hit wounds, as well as a wide variety of etiologies, such as traumatic, oncological, and congenital wounds.^{4,6}

Table 3: Association of post-surgical complications status with some independent variables (n=58)

Variables	Complication status		P-value
	Without complication (%)	With complication (%)	
Age (years)			0.008*
21–34	8 (53.3)	7 (46.7)	
35–49	21 (84.0)	4 (16.0)	
50 and above	7 (38.9)	11 (61.1)	
Sex			0.572
Male	23 (59.0)	16 (41.0)	
Female	13 (68.4)	6 (31.6)	
Smoking status			0.000*
Non-smoker	36 (76.6)	11 (23.4)	
Smoker	0 (0.0)	11 (100.0)	

**Figure 1:** Percent-wise distribution of frequencies of complications presented

Surgical reconstruction using flaps is a well-established intervention for severe cases.⁷ In this retrospective study of 58 patients undergoing flap reconstruction for pressure sores at Bharatpur Hospital, we sought to elucidate the epidemiological profile, post-operative complications, and factors influencing surgical outcomes.

Our findings revealed that the majority of patients undergoing flap reconstruction fell within the middle-age group (35–49 years). This demographic distribution may reflect the increased risk of pressure sores associated with age-related factors, such as reduced tissue elasticity and prolonged immobility. Pressure sores were most commonly located in the ischial region (44.8%) followed by sacral pressure ulcer (34.5%) which is consistent with their susceptibility due to prolonged sitting. Tailored preventive measures for specific locations and causes are imperative to reduce the incidence of pressure sores. This finding is consistent with the study conducted by Wettstein *et al.*⁸

Another study by Huang *et al.*,⁹ developed a reconstruction algorithm for deep sacral and ischial pressure injuries using free-style local perforator flaps. They reported successful outcomes with minimal complications and no recurrences during follow-up.

The predominance of male patients in our study aligns with previous reports and underscores the need for gender-specific interventions and preventive strategies.⁵ Dehiscence emerges as the most common occurring in 17.2% of post-surgical patients which is similar to many other researches.⁴

The overall complication rate we documented in our study, which stands at 36.2%, seems to be comparatively lower when contrasted with complication rates found in other studies investigating flap coverage for pressure ulcers. Two extensive retrospective investigations conducted by Keys *et al.*¹⁰ and Bamba *et al.*,⁴ reported comprehensive complication rates of 73% and 58.7%, respectively. Another systemic review by Vathulya *et al.*,¹¹ compared the outcomes of different local flaps options. The review concluded that musculocutaneous flaps tend to have lower recurrence rates, while combined flaps (e.g., biplanar) have lower complication rates. The choice of flap should also consider factors such as donor site morbidity, defect size, and patient comorbidities. Head injuries emerged as the leading cause of pressure sores in our study, followed by traumatic paraplegia. These findings emphasize the diverse etiologies contributing to pressure sore development.

Complications following flap reconstruction were observed in a significant proportion of patients. Dehiscence, deep SSI, serious fluid accumulation, and septic shock were among the most prevalent complications. These findings underscore the importance of vigilant post-operative monitoring and early intervention to mitigate severe complications. Graft failure and flap necrosis, though less frequent, should not be underestimated, as they may necessitate revision surgeries.

Smoking status emerged as a significant factor influencing complications, with smokers experiencing a higher rate of adverse outcomes. The association of smoking with complications of pressure sore reconstruction has been shown in many other studies as well.⁴ Smoking cessation programs and pre-operative counseling are crucial to minimize the risks associated with tobacco use. Moreover, our study highlighted age as a pertinent factor, with the middle-aged group (35–49 years) exhibiting a lower incidence of complications. This suggests that age-related considerations, such as tissue healing capacity, should be integrated into surgical risk assessments.

Notably, we found no statistically significant gender-based differences in complication rates. This finding suggests that surgical outcomes in pressure sore reconstruction may not be influenced by gender but rather by other patient-specific factors and comorbidities.

Limitations of study

This study is limited by its cross-sectional design. This means that we can only measure the association between the variables of interest at a single point in time. We cannot infer causality from the results of this study. Another limitation of this study is that it is being conducted at a single hospital. This means that the results may not be generalizable to other populations. Despite these limitations, this study will provide valuable information on the outcomes of flap surgery for pressure sores in a Nepalese population.

CONCLUSION

This study emphasizes the need for a multidisciplinary approach in the management of pressure sores, integrating surgical expertise with patient-specific considerations. Our findings provide valuable insights into the demographic and clinical characteristics of patients undergoing flap reconstruction. Smoking cessation strategies and tailored interventions for older patients are recommended to enhance post-operative outcomes. Prospective studies are warranted to further validate these observations and refine patient care strategies in this context.

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SKP- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis, manuscript preparation and submission of article; **SD**- Concept, design, clinical protocol, manuscript preparation, and editing; **SKY**- Design of study, statistical analysis and interpretation, literature survey, preparation of figure, coordination and review manuscript.

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