

Article

Impact of Preoperative Smoking Cessation on Outcomes of Abdominal Wall Reconstruction: A Comparison Between Former and Never Smokers

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Abstract: Background: Smoking is a well-recognized risk factor for impaired wound healing and \postoperative complications following major surgical procedures. Preoperative smoking cessation has been recommended to improve surgical outcomes. Objective: To evaluate the impact of preoperative smoking cessation on postoperative outcomes of abdominal wall reconstruction by comparing former smokers with patients who have never smoked. Methods: This was a hospital-based comparative cross-sectional study conducted at Khyber Teaching Hospital Peshawar from May 2024 to May 2025 to including 240 adult patients who underwent abdominal wall reconstruction for complex ventral hernia repair. Results: The mean age of patients was 52.4 ± 11.6 years. Former smokers accounted for 49.2% of the cohort while 50.8% were never smokers. Surgical site infection occurred in 18.6% of former smokers compared with 9.0% of never smokers. Wound dehiscence was also more frequent among former smokers (11.9% vs. 4.9%). The mean hospital stay was longer in former smokers (6.8 ± 2.9 days) than in never smokers (5.6 ± 2.4 days). Overall, 65.0% of patients recovered without major complications. Conclusion: Although preoperative smoking cessation may reduce risks associated with active smoking, former smokers still demonstrated higher postoperative complication rates compared with never smokers. Early smoking cessation and preoperative optimization are important strategies for improving outcomes in abdominal wall reconstruction.

Keywords: Abdominal wall reconstruction; Smoking cessation; Former smokers; Surgical site infection; Postoperative complications

INTRODUCTION

Abdominal wall reconstruction (AWR) is a complicated surgical undertaking that is normally conducted to repair the large ventral hernias and to reconstruct the normal functioning of the abdominal wall. Postoperative complications like surgical site infection, wound dehiscence, hernia recurrence, seroma, and hernia constitute serious problems in the abdominal wall reconstruction despite the advancements in surgical procedures and mesh technology [1]. Patient factors have been found to be an important causal influence on the outcomes of a postoperative period and the identification of modifiable risk factors is fundamental in enhancing success of surgical procedures and complications reduction [2]. Smoking is also known as one of the most significant modifiable risk factors in terms of postoperative recovery. Tobacco smoked has many unhealthy components such as nicotine, carbon monoxide and reactive oxygen species which affect tissue perfusion and oxygen supply [3]. These effects may result to a decrease in collagen production, immune dysfunction and slow wound healing, which are all causes of postoperative complications [4]. Past researches have revealed that smokers who undergo major surgical operations have a high probabilistic of wound infections, tissue deterioration as well as extended hospitalization more than no-smokers [5]. This adverse effect of smoking matters especially during the abdominal wall reconstruction since the ability to achieve good results depends greatly on the healing of tissues and the suitable incorporation of the mesh used [6]. The vascularization and tissue oxygenation impairment linked to smoking could affect the surgical repair and predispose the wound to breakdown or recurrence [7]. This is why preoperative risk modification measures, such as smoking cessation, are currently an essential part of perioperative patient optimization [8]. It has been demonstrated that preoperative smoking stop helps to increase tissue oxygenation, develop immunity, and achieve a better wound healing effect [9]. Several clinical guidelines advise the patient to quit smoking at least four to six weeks prior to elective surgery to prevent the chances of postoperative complications [10]. There is a possibility that even shorter periods of smoking cessation can have a statistical treatment since it improves microcirculation and decreases inflammation reactions [11]. The major clinical issue is whether post-operative outcomes of patients who quit smoking prior to surgery are the same as those of not smoking individuals. Ex-smokers might have lingering physiological consequences of long-term exposure to tobacco that may affect the outcome of surgery and complication rates [12]. Nevertheless, new research indicates that preoperative smoking cessation can be highly effective in the prevention of postoperative complications and enhancing the overall outcomes [13]. Comparing the results of former smokers versus never smokers who receive abdominal wall reconstruction would be useful in offering a perspective on the efficacy of the smoking cessation intervention to practice surgery [14].

Objective

To evaluate the impact of preoperative smoking cessation on postoperative outcomes of abdominal wall reconstruction by comparing former smokers with patients who have never smoked.

Methodology

This comparative cross-sectional study conducted at Khyber Teaching Hospital Peshawar from May 2024 to May 2025, including 240 adult patients who underwent abdominal wall reconstruction for complex ventral hernia repair.

Inclusion Criteria

- Adult patients aged ≥ 18 years undergoing elective abdominal wall reconstruction.
- Patients classified as former smokers who had stopped smoking at least four weeks before surgery and patients who had never smoked.
- Patients with complete perioperative clinical records and postoperative follow-up data.

Exclusion Criteria

- Current smokers who continued smoking at the time of surgery.
- Patients undergoing emergency abdominal wall surgery.
- Patients with incomplete clinical records or lost to postoperative follow-up.

Data Collection

After obtaining informed consent, demographic and clinical data were collected using a structured proforma. Information recorded included age, gender, body mass index, comorbidities, smoking history, and duration of smoking cessation among former smokers. Operative details such as type of abdominal wall defect, surgical technique, mesh use, and operative time were documented. Postoperative outcomes including surgical site infection, seroma formation, wound dehiscence, length of hospital stay, and hernia recurrence were recorded during follow-up.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 26. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were presented as frequency and percentage. Comparisons between former smokers and never smokers were performed using independent t-test for continuous variables and chi-square test for categorical variables. A p-value of <0.05 was considered statistically significant.

Results

A total of 240 patients undergoing abdominal wall reconstruction were included with a mean age of 52.4 ± 11.6 years. The largest proportion of patients was in the 41–60 year age group (122, 50.8%), followed by those older than 60 years (64, 26.7%) and 18–40 years (54, 22.5%). Males constituted 138 patients (57.5%) while females accounted for 102 patients (42.5%). The mean body mass index was 28.3 ± 4.7 kg/m². Diabetes mellitus was present in 68 patients (28.3%) and hypertension in 96 patients (40.0%). Regarding smoking history, 118 patients (49.2%) were former smokers who had ceased smoking prior to surgery, while 122 patients (50.8%) had never smoked.

Table 1. Demographic and Baseline Characteristics of Patients Undergoing Abdominal Wall Reconstruction (N = 240)

Variable	Category	n (%) / Mean $\pm$ SD
Age (years)	Mean age	52.4 ± 11.6
Age Group	18–40 years	54 (22.5%)
	41–60 years	122 (50.8%)
	>60 years	64 (26.7%)
Gender	Male	138 (57.5%)
	Female	102 (42.5%)
Body Mass Index (kg/m ²)	Mean BMI	28.3 ± 4.7
Diabetes Mellitus	Present	68 (28.3%)
	Absent	172 (71.7%)
Hypertension	Present	96 (40.0%)
	Absent	144 (60.0%)
Smoking Status	Former smokers	118 (49.2%)
	Never smokers	122 (50.8%)

Operative characteristics showed that the mean abdominal wall defect size was 8.9 ± 3.2 cm. The average operative duration was 142.6 ± 36.8 minutes, and the mean intraoperative blood loss was 185 ± 74 mL. Mesh repair was performed in the majority of patients (214, 89.2%). The component separation technique was used in 72 patients (30.0%). Most procedures were performed using an open surgical approach (176, 73.3%), while a laparoscopic approach was utilized in 64 patients (26.7%).

Table 2. Operative Characteristics of Abdominal Wall Reconstruction

Variable	Category	n (%) / Mean $\pm$ SD
Defect Size (cm)	Mean size	8.9 ± 3.2
Operative Time (minutes)	Mean duration	142.6 ± 36.8
Mesh Repair	Performed	214 (89.2%)
Component Separation Technique	Performed	72 (30.0%)
Open Surgical Approach	Used	176 (73.3%)
Laparoscopic Approach	Used	64 (26.7%)
Intraoperative Blood Loss (mL)	Mean loss	185 ± 74

Surgical site infection occurred in 22 former smokers (18.6%) compared with 11 never smokers (9.0%) ($p = 0.032$). Seroma formation was observed in 19 former smokers (16.1%) and 12 never smokers (9.8%), although this difference was not statistically significant ($p = 0.147$). Wound dehiscence was more frequent in former smokers (14, 11.9%) compared with never smokers (6, 4.9%) ($p = 0.049$). Hernia recurrence occurred in 10 former smokers (8.5%) and 5 never smokers (4.1%). The mean hospital stay was longer in former smokers (6.8 ± 2.9 days) compared with never smokers (5.6 ± 2.4 days) ($p = 0.006$).

Table 3. Postoperative Outcomes in Former Smokers vs Never Smokers

Outcome Variable	Former Smokers (n=118)	Never Smokers (n=122)	p-value
Surgical Site Infection	22 (18.6%)	11 (9.0%)	0.032
Seroma Formation	19 (16.1%)	12 (9.8%)	0.147
Wound Dehiscence	14 (11.9%)	6 (4.9%)	0.049
Hernia Recurrence	10 (8.5%)	5 (4.1%)	0.182
Mean Hospital Stay (days)	6.8 ± 2.9	5.6 ± 2.4	0.006

Overall postoperative complications included surgical site infection in 33 patients (13.8%), seroma formation in 31 patients (12.9%), and wound dehiscence in 20 patients (8.3%). Hernia recurrence was observed in 15 patients (6.3%), while reoperation was required in 9 patients (3.8%). The mean length of hospital stay was 6.2 ± 2.7 days.

Table 4. Overall Surgical Outcomes Following Abdominal Wall Reconstruction

Outcome	Category	n (%) / Mean ± SD
Surgical Site Infection	Present	33 (13.8%)
Seroma Formation	Present	31 (12.9%)
Wound Dehiscence	Present	20 (8.3%)
Hernia Recurrence	Present	15 (6.3%)
Reoperation Required	Yes	9 (3.8%)
Length of Hospital Stay (days)	Mean stay	6.2 ± 2.7
Successful Recovery Without Complications	Yes	156 (65.0%)

Discussion

This paper assessed the effects of preoperative smoking cessation in the outcomes of postoperative abdominal wall reconstruction. Patients had a mean age of 52.4 ± 11.6 years of age and most of the patients were between the ages of 41-60 (50.8%). The proportion of male patients was slightly higher (57.5percent) than that of female patients. The same demography trends have been observed in former studies in which the abdominal wall reconstruction has mainly been carried out in middle-aged adults with a slight male preponderance [14]. Operative values indicated that the average area of defects was 8.90 cm 3.15 cm and the median time of operation was 142.6 36.8 min. Most patients (89.2) were repaired with mesh and open surgery method was more commonly used (73.3) than laparoscopic repair. Similar results were recorded by previous studies, which suggest that the most widely used procedures in complex abdominal wall repair are mesh-based repair and open surgeons [15]. The fact that former smokers had a higher rate of postoperative complications was proven in comparison of former smokers and never smokers. The incidence of surgical site infection was found to be 18.6 and 9.0 percent among former smokers and non-smokers respectively, and wound dehiscence was found to be 11.9 and 4.9 percent among former smokers and non-smokers respectively. Moreover, the average length of stay was higher in ex-smokers (6.8 ± 2.9 days) as compared to never smokers (5.6 ± 2.4 days). The same has been found in past studies in which the smoking history was linked with greater incidences of wound complications and longer postoperative recovery after abdominal wall reconstruction [16-18].

Despite the fact that the occurrence of seroma and hernia recurrence were a little higher in former smokers, the difference was not considered to be statistically significant. Past studies have also indicated that smoking can inhibit tissue oxygenation and collagen production which can adversely affect wound healing and predispose the individual to postoperative complications [19]. General complication assessment revealed that 13.8% of patients had surgical site infection, 12.9% had seroma, and 8.3% had wound dehiscence with 6.3% having recurrence of hernia. Most of the patients (65.0%) healed without significant problems. There is a similar rate of complications in earlier studies comparing the outcome of abdominal wall reconstruction and wound-related complications were the most frequent postoperative issues in that study [20]. The results of the study indicate that it is possible that despite the fact that preoperative smoking cessation can decrease some risk factors in case of active smoking, former smokers still can develop fewer complications than non-smoking patients. The existing literature has also suggested that long-term smoking effects could last beyond cessation and thus the need to encourage the patients with the need to quit the habit and the need to have extensive preoperative optimization measures in patients undergoing abdominal wall reconstruction.

Conclusion

It is concluded that preoperative smoking cessation plays an important role in improving surgical outcomes following abdominal wall reconstruction. However, former smokers still demonstrated higher rates of postoperative complications such as surgical site infection, wound dehiscence, and longer hospital stay compared with patients who had never smoked.

Although the majority of patients achieved successful recovery, these findings suggest that prior smoking history may continue to influence postoperative healing. Early smoking cessation and careful preoperative optimization are therefore essential to minimize complications and improve overall outcomes in patients undergoing abdominal wall reconstruction

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