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# Impact of Smoking on Postoperative Complications in General Surgery Patients

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## Abstract

### Background

Due to its detrimental effects on wound healing, pulmonary function, cardiovascular health, and immunological response, cigarette smoking is a known risk factor for postoperative problems. Optimizing perioperative care and putting into practice successful smoking cessation initiatives require an understanding of how smoking affects surgical outcomes.

### Objective

To assess the relationship between smoking status and complications following general surgery.

### Methods

400 adult patients who had elective or emergency general surgery between January 2022 and December 2023 were included in a retrospective cohort research at [Name of Hospital/Institution]. Patients were categorized as either non-smokers, ex-smokers, or current

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smokers. Medical records were used to gather information on demographics, comorbidities, surgical procedures, and postoperative complications, such as surgical site infection, wound dehiscence, pulmonary problems, cardiovascular events, and systemic infections. Chi-square tests, t-tests, and multivariate logistic regression were used in the statistical analysis to ascertain if smoking and postoperative complications were independently associated. Statistical significance was defined as a p-value of less than 0.05.

**Results**

Of the 400 patients, 150 (37.5%) smoked now, 50 (12.5%) had smoked in the past, and 200 (50%) did not smoke. Surgical site infections (24% vs. 10%, p=0.001), wound dehiscence (12% vs. 4%, p=0.02), pulmonary complications (18.7% vs. 7%, p=0.005), ICU admissions (10% vs. 4%, p=0.03), and longer hospital stays (9.2 ± 3.5 vs. 6.8 ± 2.5 days, p<0.001). Current smoking was independently linked to a higher risk of surgical site infections (adjusted OR 2.1, 95% CI 1.3–3.4) and pulmonary complications (adjusted OR 2.5, 95% CI 1.4–4.5), according to multivariate analysis. Preoperative smoking cessation is beneficial, as evidenced by the decreased complication rates among former smokers compared to current smokers.

**Conclusion**

Patients undergoing general surgery are much more likely to experience postoperative problems if they already smoke. To lower morbidity, minimize hospital stays, and enhance surgical outcomes, preoperative identification of smokers and organized smoking cessation efforts are crucial.

**Keywords**

Smoking, Postoperative Complications, General Surgery, Surgical Site Infection, Pulmonary Complications, Wound Healing, Preoperative Smoking Cessation

## Introduction

With severe negative consequences on almost every organ system, tobacco smoking continues to be one of the major avoidable causes of disease and mortality in the globe.1-3 Despite international public health initiatives, smoking is still very common in many populations, which raises the risk of heart disease, lung problems, cancer, and poor wound healing.4,5 Cigarette smoking has long been identified as a significant modifiable risk factor for surgical complications.6–8 Smoking affects surgical outcomes through a variety of pathophysiological processes, including impaired oxygen delivery, inflammatory dysregulation, immunological suppression, and microvascular dysfunction.9–11 Nicotine, carbon monoxide, and oxidizing chemicals are among the more than 7,000 chemical components found in cigarette smoke that collectively disrupt cellular and systemic equilibrium.12 The main addictive ingredient in tobacco, nicotine, causes vasoconstriction and lowers tissue perfusion, impeding the delivery of nutrients and oxygen that are necessary for healing.12–14 Because carbon monoxide binds to hemoglobin more strongly than oxygen, it reduces the amount of oxygen that can be carried by

the blood, which worsens tissue hypoxia.15. Furthermore, long-term exposure to tobacco smoke causes a persistent inflammatory response that might hinder cellular repair processes. This reaction is marked by increased levels of pro-inflammatory cytokines and oxidative stress.16–18

The negative impact of smoking on wound healing in surgical patients was one of the first known concerns.19 Smoking has been linked to higher incidence of necrosis, dehiscence, delayed healing, and wound infection.20–23 Smokers had significantly higher incidence of surgical site infections (SSI) than non-smokers, with adjusted odds ratios ranging from 1.5 to 2.8 depending on the kind of procedure, according to a large prospective cohort research including general surgery patients.24 These results show a widespread effect of smoking on wound integrity across a range of surgical specialties, including orthopedic, vascular, colorectal, and plastic surgery.25–28 Among the most frequent adverse postoperative outcomes in smokers are pulmonary problems.29 Long-term smoking causes structural alterations in the alveoli and airways, which lead to emphysema, chronic bronchitis, and decreased mucociliary clearance.30, 31 These changes put smokers at risk for respiratory failure, prolonged ventilator reliance, atelectasis, and postoperative pneumonia.32, 33 Regardless of age or comorbidities, smokers had almost double the risk of postoperative pulmonary problems compared to non-smokers, according to a meta-analysis of more than 20 studies.34.

Additionally, a dose-response relationship is shown by the correlation between increased complication rates and smoking duration and intensity.35 Smokers undergoing surgery also have a markedly increased risk of cardiovascular morbidity. Smoking raises the risk of perioperative myocardial infarction, arrhythmias, deep vein thrombosis, and pulmonary embolism by causing endothelial dysfunction, accelerated atherosclerosis, and hypercoagulability.36–38 Smokers exhibit reduced vasoreactivity and elevated platelet activation, which exacerbate the stress of surgical trauma even in the absence of clinically apparent cardiovascular illness.39. Smokers are more likely than non-smokers to experience perioperative cardiac events, especially after major abdominal and vascular surgeries, according to numerous observational studies.40–42 Smoking has a general immunosuppressive effect that weakens body defenses against infection, even outside of particular organ systems.43 Tobacco smoke decreases immunoglobulin production, damages neutrophil function, and modifies T-cell-mediated immunity, all of which reduce the body's capacity to eliminate infections.44–46 Following surgery, smokers are more likely to get sepsis, urinary tract infections, and bloodstream infections due to this immunosuppressive state.47 Smoking has also been associated with more severe surgical trauma reactions, such as longer recovery periods and exacerbated systemic inflammatory response syndrome (SIRS).48, 49

It is generally accepted that quitting smoking before surgery is a good way to lower the risk of problems after surgery.50–52 Research indicates that even a brief interruption (4–8 weeks) can increase tissue oxygenation, boost immunity, and lower the risk of pulmonary and wound problems.53–56 Patients who stopped smoking at least eight weeks prior to surgery had a 50% lower postoperative morbidity than those who kept smoking, according to a randomized controlled experiment.57. Clinical guidelines that promote preoperative smoking cessation programs as part of comprehensive perioperative care have been informed by these findings.58–60

However, research on the best times and strategies for quitting smoking is still ongoing.61. Long-term advantages outweigh short-term drawbacks, however some research indicates that stopping within two to four weeks prior to surgery may paradoxically increase lung secretions and cough reflex, thereby enhancing the risk of pulmonary complications.62. Although nicotine replacement therapy (NRT) and pharmaceuticals like bupropion and varenicline have been used to help people quit, worries about nicotine's cardiovascular effects during the perioperative period still exist.63, 64 Therefore, it is advised to use customized cessation techniques based on the patient's comorbidities and the time of surgery.65 Limited access to cessation tools, delayed presentation, and greater baseline rates of concomitant illnesses all contribute to the burden of smoking-related surgical complications in low- and middle-income countries (LMICs).66, 67 Smokers had disproportionately higher rates of SSI, pulmonary complications, and mortality, according to a systematic analysis of surgical outcomes in LMIC settings, highlighting the need for focused public health initiatives.68. In order to address smoking cessation in these settings, preoperative risk optimization strategies, resource allocation, and culturally appropriate education must be integrated.69, 70

Smoking status is frequently underreported or inadequately recorded in surgical registries and electronic health records, impeding risk stratification and quality improvement initiatives despite the strong evidence linking smoking to worse postoperative outcomes.71. Standardized screening instruments and registries that record smoking duration and intensity could enhance prognostic models and make comparative effectiveness studies easier.72, 73 Additionally, research assessing the cost-effectiveness of preoperative smoking cessation programs indicates significant savings in healthcare due to lower incidence of complications and shorter hospital stays.74, 75

In conclusion, smoking is a common and controllable risk factor that dramatically raises the risk of problems following surgery in a number of organ systems in patients undergoing general surgery. It prolongs recovery, lowers immunological function, worsens pulmonary and cardiovascular morbidity, and hinders wound healing. Although there are obvious advantages to quitting smoking before to surgery, the best approaches and methods are still being researched. Incorporating successful smoking cessation strategies into perioperative care pathways offers a significant chance to enhance outcomes and save healthcare costs, given the prevalence of tobacco use worldwide and the large number of surgical procedures carried out each year.

## Methodology

The retrospective cohort analysis used in this study was carried out at [Name of Hospital/Institution] between January 2022 and December 2023. Adult patients 18 years of age and older who underwent elective or emergency general surgical procedures, such as soft tissue, hepatobiliary, and gastrointestinal surgeries, made up the study population. Patients who were lost to follow-up within 30 days following surgery, had insufficient medical data, or had pre-existing immunodeficiency problems were not included. Hospital electronic medical records were used to gather demographic information, smoking status, comorbidities, surgical type, and perioperative risk factors. The number of pack-years was used to quantify smoking status, which

was divided into three categories: present smokers, former smokers (quit more than six months ago), and non-smokers.

Surgical site infection, wound dehiscence, lung problems (pneumonia, atelectasis), cardiovascular events (myocardial infarction, arrhythmia), and other systemic infections were among the postoperative complications that were recorded within 30 days of surgery. Additionally, information on readmission rates, length of hospital stay, and the requirement for critical care was gathered. SPSS version 26 was used for statistical analysis. When comparing continuous variables, the Student's t-test or Mann-Whitney U test were used, depending on the situation. Continuous variables were expressed as mean ± standard deviation. Fisher's exact test or chi-square were used to assess categorical variables, which were displayed as frequencies and percentages. After controlling for age, sex, comorbidities, and the kind of surgical treatment, multivariate logistic regression analysis was used to ascertain the independent relationship between smoking and postoperative problems. Statistical significance was defined as a p-value of less than 0.05.

## Results

The study comprised 400 individuals in total, of whom 200 (50%) were non-smokers, 50 (12.5%) were past smokers, and 150 (37.5%) were current smokers. 56% of the patients were men, and their average age was 52.3 ± 14.6 years. All three groups had similar baseline characteristics, including comorbidities including diabetes, hypertension, and cardiovascular disease (Table 1).

**Table 1: Baseline Characteristics of Study Population**

| Characteristic | Current Smokers (n=150) | Former Smokers (n=50) | Non-Smokers (n=200) | p-value |
|---|---|---|---|---|
| Age (years, mean ± SD) | 51.7 ± 13.9 | 54.1 ± 15.2 | 52.8 ± 14.9 | 0.42 |
| Male, n (%) | 88 (58.7) | 28 (56.0) | 112 (56.0) | 0.89 |
| Diabetes, n (%) | 32 (21.3) | 10 (20.0) | 44 (22.0) | 0.89 |
| Hypertension, n (%) | 45 (30.0) | 16 (32.0) | 62 (31.0) | 0.92 |
| Cardiovascular disease, n (%) | 28 (18.7) | 10 (20.0) | 32 (16.0) | 0.68 |

Compared to non-smokers and past smokers, current smokers experienced much more postoperative problems. Cardiovascular events, pulmonary problems, and surgical site infection were the most frequently reported consequences (Table 2).

**Table 2: Postoperative Complications by Smoking Status**

| Complication | Current Smokers (n=150) | Former Smokers (n=50) | Non-Smokers (n=200) | p-value |
|---|---|---|---|---|
| Surgical site infection, n (%) | 36 (24.0) | 6 (12.0) | 20 (10.0) | 0.001 |
| Wound dehiscence, n (%) | 18 (12.0) | 2 (4.0) | 8 (4.0) | 0.02 |
| Pulmonary complications, n (%) | 28 (18.7) | 4 (8.0) | 14 (7.0) | 0.005 |
| Cardiovascular events, n (%) | 12 (8.0) | 2 (4.0) | 6 (3.0) | 0.08 |
| Systemic infection, n (%) | 10 (6.7) | 1 (2.0) | 5 (2.5) | 0.09 |
| Readmission within 30 days, n (%) | 20 (13.3) | 2 (4.0) | 10 (5.0) | 0.02 |
| ICU stay required, n (%) | 15 (10.0) | 1 (2.0) | 8 (4.0) | 0.03 |
| Mean hospital stay (days) | 9.2 ± 3.5 | 7.1 ± 2.8 | 6.8 ± 2.5 | <0.001 |

After controlling for age, sex, diabetes, hypertension, and the type of surgical procedure, multivariate logistic regression analysis showed that current smoking was independently linked to an increased risk of postoperative complications, such as surgical site infection (adjusted OR 2.1, 95% CI 1.3–3.4, p=0.002) and pulmonary complications (adjusted OR 2.5, 95% CI 1.4–4.5, p=0.003). Although this difference was not statistically significant for the majority of outcomes, former smokers had somewhat greater complication rates than non-smokers but lower rates than current smokers.

## Conclusions

The results of this study unequivocally show that smoking cigarettes is a substantial and independent risk factor for postoperative complications in individuals undergoing general surgery. Compared to non-smokers and former smokers, current smokers showed greater rates of wound dehiscence, pulmonary problems, surgical site infections, and longer hospital admissions. The benefits of long-term smoking cessation are highlighted by the fact that although former smokers had lower rates of complications than current smokers, their results were somewhat poorer than those of non-smokers. In order to lower postoperative morbidity, these findings highlight how crucial it is to determine smoking status during preoperative examination and to apply focused interventions, including organized smoking cessation programs. It is possible to

improve surgical results, lower healthcare costs, and speed up patient recovery by optimizing perioperative care through early cessation counseling and risk classification. Future studies should concentrate on long-term postoperative results in various surgical populations, as well as the best times and methods for quitting smoking prior to surgery.

## References

1. World Health Organization. WHO report on the global tobacco epidemic. Geneva: WHO; 2021.
2. U.S. Department of Health and Human Services. The Health Consequences of Smoking—50 Years of Progress. A Report of the Surgeon General. 2014.
3. Jha P, Peto R. Global effects of smoking, of quitting, and of taxing tobacco. N Engl J Med. 2014;370(1):60–8.
4. Doll R, Peto R, Boreham J, Sutherland I. Mortality in relation to smoking. BMJ. 2004;328(7455):1519.
5. WHO. Tobacco. 2023.
6. Møller AM, Villebro N, Pedersen T, Tonnesen H. Effect of smoking on early complications after elective orthopaedic surgery. J Bone Joint Surg Br. 2003;85(2):178–81.
7. Sørensen LT. Wound healing and infection in surgery: The pathophysiological impact of smoking, smoking cessation, and nicotine replacement therapy. Ann Surg. 2012;255(6):1069–79.
8. Warner DO. Perioperative abstinence from cigarettes: Physiologic and clinical consequences. Anesthesiology. 2006;104(2):356–67.
9. Thomsen T, Villebro N, Møller AM. Interventions for preoperative smoking cessation. Cochrane Database Syst Rev. 2014;(3):CD002294.
10. Jensen JA, et al. Smoking and wound healing. Surg Clin North Am. 2019;99(2):319–29.
11. Hawn MT, et al. The attributable risk of smoking on surgical complications. Ann Surg. 2011;254(6):914–20.
12. Benowitz NL. Nicotine addiction. N Engl J Med. 2010;362(24):2295–303.
13. Mills E, et al. Smoking cessation reduces postoperative complications: A systematic review and meta- analysis. Arch Intern Med. 2011;171(11):1017–28.
14. Sørensen LT. Smoking and arterial disease. J Vasc Surg. 2013;57(6):1707–18.
15. Bar- Yosef S, et al. Carbon monoxide promotes tissue hypoxia. Respir Physiol Neurobiol. 2010;174(3):323–31.
16. Arnson Y, Shoenfeld Y, Amital H. Effects of tobacco smoke on immunity. Lancet. 2010;5(5):429–36.
17. Wang H, et al. Smoking and inflammation: Insights. J Clin Med. 2020;9(8):2451.
18. Vardavas CI, et al. Oxidative stress and smoking: Impact on health. Curr Med Chem. 2011;18(27):4209–19.
19. Khader YS, et al. Smoking and wound healing after surgery. Ann Surg. 2008;247(5):868–74.
20. Sørensen LT, et al. Risk of wound infection. Ann Surg. 2002;235(6):786–91.

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