



A STUDY ON EFFECTS OF TOBACCO SMOKING ON WOUND HEALING IN ABDOMINAL SURGERIES

General Surgery

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ABSTRACT

Introduction: Wound healing is a complex process involving four stages: hemostasis, inflammation, proliferation, and remodeling. Smoking is known to affect health adversely, yet its impact on wound healing is not well-recognized. This study assesses the effect of tobacco use on wound healing in patients undergoing abdominal surgeries. **Methods:** This hospital-based analytical study was conducted at the Narayana medical college and hospital, nellore, including 240 patients (120 smokers and 120 non-smokers) undergoing abdominal surgeries. Patients' demographic data, surgical details, and wound healing outcomes were recorded. The study was approved by the Institutional Ethics Committee. **Results:** The average wound healing time was significantly longer in smokers (27.25 days) compared to non-smokers (21.61 days) ($p < 0.01$). The complication rate was higher among smokers (30.8%) compared to non-smokers (15.8%) ($p < 0.01$). Smokers also had a higher requirement for additional surgical interventions (10% vs. 2.5%, $p = 0.029$). **Discussion:** The findings align with previous research by Manassa EH et al. and Sørensen LT et al., demonstrating that smoking delays wound healing and increases complications. Inoue Y et al. also showed that smoking cessation for over four weeks before surgery reduces complications and hospital stay duration. **Conclusion:** Smokers experience delayed wound healing and more postoperative complications. Preoperative smoking cessation is strongly recommended to improve surgical outcomes.

KEYWORDS

INTRODUCTION:

Wound healing is a complex biological process in the human body that occurs in four distinct and highly coordinated phases: hemostasis, inflammation, proliferation, and remodeling.

Various factors can disrupt one or more of these phases, leading to improper or delayed wound healing. While the role of tobacco smoking in causing lung cancer, coronary heart disease, and vascular disease is well known, its impact on delayed wound healing is less commonly recognized in clinical practice.

Effects of Smoking on Wound Healing:

The negative impact of smoking on wound healing was first identified in 1977 by Mosely and Finseth, who noted impaired healing in a smoker with arteriosclerosis.

Nicotine affects wound healing by reducing the proliferation of red blood cells, fibroblasts, and macrophages, increasing platelet adhesiveness, and causing cutaneous vasoconstriction. Collectively, these effects of toxic substances in tobacco can significantly hinder the conditions necessary for effective wound repair and healthy scar formation.

Aim/Objectives

Aim

To assess the impact of tobacco use on the rate of wound healing in patients undergoing abdominal surgeries.

Objectives

- To compare the wound healing rates between tobacco users and non-users.
- To compare the incidence of surgical site infections between tobacco users and non-users.

MATERIALS & METHODS:

Study Design

A hospital-based analytical study.

Study Location

Department of Surgery, Narayana Medical College and Hospital, Nellore.

Study Approval

Approved by the Institutional Scientific Committee and the Institutional Ethics Committee.

Study Population

Patients undergoing abdominal surgeries at our hospital who provide informed consent.

Inclusion Criteria:

- Patients older than 18 years
- Both genders
- All surgical wounds from abdominal surgeries (immediate postoperative wounds)
- History of tobacco smoking/chewing for more than 6 months
- Average to good nutritional status

Controls

- No history of tobacco smoking/chewing

Exclusion Criteria

- Patients younger than 18 years
- Immuno-compromised patients
- Patients not giving informed consent or unable to maintain follow-up

Sample Size

The sample size is calculated as follows: $N = (Z_{\alpha/2} + Z_{\beta})^2 \times P \times Q \times d^2$ Where: $N = \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times P \times Q}{d^2}$

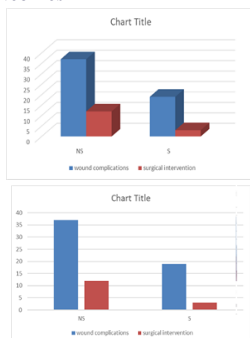
- $Z_{\alpha/2}$ = Z value at 5% error (1.96)
- Z_{β} = Z value at 20% (0.84)
- $P = \frac{p_1 + p_2}{2}$
- $Q = 1 - P$
- d = Prevalence of wound healing problems in smokers (47.9%)
- p_1 = Prevalence of wound healing problems in non-smokers (14.8%)
- d = Effect size (taken as 10%)
- N = Sample size of 120 cases and controls.

Methodology

- The study commenced after obtaining approval from the Institutional Ethics Committee.
- The study included 120 cases (tobacco users) and 120 controls (non-users).
- A detailed history, clinical examination, and relevant investigations were performed for all patients. For cases, the history of tobacco use, including duration, form, and amount (in pack-years), was recorded in a pre-designed case record form.
- Wound area was determined using the manual tracing method.
- All patients received standardized wound management according to the institute's protocol.

- Complete wound healing was defined as the complete epithelialization of the tissue defect.
- Wound healing time was defined as the number of days required to achieve complete wound healing.
- Data were analyzed using SPSS version 26.0.

Primary Study Outcomes



- Time for appearance of granulation tissue
- Time for complete wound healing
- Wound complications

RESULTS

- Both groups were comparable in terms of demographic profile, ASA grade, and duration of surgery ($p > 0.05$).
- The mean duration of wound healing was significantly longer in smokers compared to non-smokers (27.25 vs. 21.61 days; $p < 0.01$).
- The wound complication rate was 30.8% among smokers and 15.8% among non-smokers ($p < 0.01$).
- Requirement of other surgical interventions was 10% in smokers and 2.5% in non-smokers ($p = 0.029$).

Demographic and Surgical Characteristics Comparison

Variable	Group	Smokers	Non-Smokers	p-value
Age (years)	Mean $\pm$ SD	67.9 $\pm$ 11.9	66.82 $\pm$ 12.1	0.84
Gender	Female (%)	47 (39.2%)	43 (35.8%)	0.71
	Male (%)	153 (127.5%)	157 (130.8%)	
ASA Grade	I (%)	148 (123.3%)	156 (130.0%)	0.41
	II (%)	52 (43.3%)	44 (36.7%)	
Duration of Surgery	Mean $\pm$ SD	112.9 $\pm$ 21.4 minutes	126.82 $\pm$ 27.8 minutes	0.47

Comparison of Smokers and Non-Smokers on Wound Healing Parameters

Variable	Group	Smokers	Non-Smokers	p-value
Time for wound healing	Mean $\pm$ SD	27.25 $\pm$ 7.68 days	21.61 $\pm$ 6.82 days	<0.01
Wound Complications	Number (%)	37 (30.8%)	19 (15.8%)	<0.01
Requirement of other surgical interventions	Number (%)	12 (10.0%)	3 (2.5%)	0.029

DISCUSSION:

Manassa EH et al. investigated the impact of smoking on wound healing. They found a significant difference in the rate of wound complications and wound dehiscence between smokers and nonsmokers ($p < 0.01$). Specifically, 47.9% of smokers experienced wound healing issues before hospital discharge, compared to only 14.8% of nonsmokers.

Sørensen LT et al. focused on the relationship between smoking and postoperative healing complications. Their study revealed that the pooled adjusted odds ratio (95% CI) for wound complications was 2.27 (1.82-2.84). Additionally, they observed that smoking cessation interventions could significantly reduce surgical site infections, with an odds ratio of 0.43 (95% CI, 0.21-0.85).

Inoue Y et al. [8] investigated the link between smoking and perioperative complications in laparoscopic abdominal surgery. Their findings indicated that the postoperative hospital stay was significantly extended for smokers compared to nonsmokers ($p < 0.01$). Additionally, the total incidence of postoperative complications was higher among smokers across all groups. The study also found that implementing a smoking cessation period of over four weeks before

gastrointestinal surgery could decrease both the length of hospital stays and the rate of suture failures.

CONCLUSION:

The current study found that smokers experienced delayed healing and a higher incidence of postoperative wound complications compared to nonsmokers. Therefore, it is recommended that patients quit smoking prior to surgery to enhance the healing of surgical wounds.

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