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RELATIONSHIP BETWEEN SMOKING HISTORY AND POSTOPERATIVE COMPLICATIONS IN GASTRECTOMY PATIENTS

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Abstract:

In this study, 220 patients were recruited from multiple hospitals in Iraq. A cross-sectional study was conducted, and data were collected from the patients after obtaining written informed consent for the purpose of conducting the research. The objective of this study was to ascertain the nature of the relationship between smoking and surgical complications following gastrectomy. The study was designed as a comparison between two groups, each comprising 110 patients. The initial information collected included age, weight, type of anesthesia, body mass index, type of surgical resection, and complications after surgery. This was done to evaluate the impact of smoking on patients and to assess the effect of health disparities on quality of life.

Results which, we found the Age Mean ±SD of patients 33.1±7.7, and control 31.1±4.9, number of cigarettes 14±5.6, BMI 32.2±3.3 of patients, control 30.9±1.9, Operative time Mean ±SD (114 (42.8)), Surgery type. Frequency (Laparoscopic Roux-En-Y gastric bypass for 40 and Laparoscopic sleeve gastrectomy for 70

patients), control (Laparoscopic Roux-En-Y gastric bypass for 50 and Laparoscopic sleeve gastrectomy 60), Preoperative albumin (g/L) 37.14 ± 3.67 of patients, 40.29 ± 3.88 control Smoking patients in bariatric surgery have worse 30-day outcomes, so pre-operative counseling on smoking cessation is crucial for better outcomes, reduced hospital costs, and increased chances of quitting.

Keywords: *Gastrectomy, Smoking, Operative, Complications, BMI, Laparoscopic, Relationship, Study, Outcomes, Preoperative albumin, Hospital.*

Introduction

Introduction

Cigarette smokers are at an elevated risk of developing complications following surgery when compared to non-smokers. These complications may include a decline in gastrectomy and lung function, the development of infections, and impaired wound healing. [1] Nevertheless, recent evidence indicates that smokers who cease smoking a minimum of four weeks prior to surgery are at a reduced risk of postoperative complications and exhibit enhanced health outcomes at the six-month mark. Patients who abstain from tobacco use are also less likely to experience anesthesia-related complications than regular smokers [2]. A recent joint study by the World Health Organization, the University of Newcastle in Australia, and the World Federation of Societies of Anaesthesiologists demonstrates that abstaining from tobacco use for one week after every four weeks improves health outcomes by 19% [3,4]. This is attributed to enhanced blood flow throughout the body to essential organs [5].

Complications from surgical procedures, such as gastrectomy, impose a considerable burden on patients and health systems. In developed countries, mortality rates associated with these complications range from 4% to 16% among hospitalised patients, with 1% of cases resulting in death and serious disability (6–9). In developed countries, a greater number of individuals are affected, with prevalence rates ranging from 0.24% to 10% (9–11). [6,7,8] The requisite surgical procedures are considerably more costly. Carbon monoxide, a substance that produces smoke, impairs the ability of red blood cells to transport oxygen. A multitude of factors can facilitate rapid recuperation following bariatric surgery, yet may persist as a source of concern for years post-operatively [9].

The presence of nicotine and carbon monoxide in cigarettes has been demonstrated to reduce oxygen levels and significantly elevate the risk of developing heart complications following surgical procedures [10]. Furthermore, the act of smoking has been proven to cause damage to the lungs, which can result in reduced airflow and an elevated risk of developing lung complications following surgery. Furthermore, smoking impairs the patient's immune system, potentially prolonging the healing process and increasing the risk of infection at the surgical site [11].

Patients and method

A cross-sectional study in Iraq of 220 patients who underwent gastrectomy and were divided into two groups, 110 patients and 110 controls in a study period from January 1, 2023 to March 31, 2024, including controlled clinical trials, cohort studies, case-control studies, cross-sectional studies, systematic reviews and meta-analyses where studies related to pulmonary physiology under anesthesia in patients with or without pulmonary diseases undergoing non-cardiac and thoracic surgery, pulmonary function tests and additional and non-additional exercises in postoperative assessment and outcomes, and the use of clinical prediction rules in patient assessment.

The average cigarette pack smoked per day and the number of years of smoking were recorded. All smokers were instructed to quit smoking immediately upon admission to the hospital. Active and passive smoking were strictly prohibited for all patients during their hospital stay.

The principal outcomes assessed were 30-day readmission and death or severe injury (DSM). DSM encompasses mortality, deep site surgical infection, surgical site infection in the organ space, wound dehiscence, pneumonia, reintubation, pulmonary embolism, acute kidney injury, myocardial infarction, cardiac arrest, sepsis, septic shock, return to the operating room, deep venous thrombosis and the necessity for mechanical ventilation support for 48 hours.

According to SPSS IBM 22 and MS 2013 Utilizing descriptive statistics, we evaluated the bivariate associations in smoking status and demographic characteristics. Change in smoking status was assessed through the Chi-square test in terms of postoperative readmissions and complications. Furthermore, for examining the relationship between various variables of interest and smoking status, multivariable logistic regression was performed.

Results

Table 1- General characteristics of patients, N=110

Variable	Details
Age	
Mean ±Sd	33.1±7.7
Sex, f (p%)	
Male	77
Female	33
Comorbidities f (p%)	
High blood pressure	22 (20)
Diabetes	28 (25.45)
Kidney disease	10 (9.09)
Joints	15 (13.64)
None	50 (45.45)
BMI	
Mean ±SD	32.2±3.3
ASA	
1	20 (18.18)
2	40 (36.3)
3	30 (27.2)
4	20 (18.18)
Education	
Primary	10 (9.09)
Secondary	40 (36.3)
College	50 (45.45)
High	10 (9.09)

Table 2- General characteristics of control, N=110

Variable	Details
Age	
Mean ±SD	31.1±4.9
Sex, f (p%)	
Male	60
Female	30

Comorbidities f (p%)	
High blood pressure	33 (36.3)
Diabetes	30 (33.3)
None	10 (11.11)
Joints	14 (15.5)
BMI	
Mean ±SD	30.9±1.9
ASA	
1	20 (22.2)
2	25 (27.7)
3	40 (44.4)
4	5 (5.56)
Education	
Primary	8 (8.89)
Secondary	32 (35.3)
College	40 (44.4)
High	10 (11.1)
Smoke	14±5.6

Table 3- Evaluation of surgical outcomes in patients and control groups undergoing gastrectomy

Variable	Control	Patients	P-value
Type of anesthesia	general	General	
General	110	110	0.0
Wound classification			
I/II	89 (80.9)	85 (77.2)	0.98
III/IV	21		0.7698
Operative time			
Mean ±SD	114 (42.8)	120.7 (51)	0.067
Surgery type. frequency			
Laparoscopic Roux-En-Y gastric bypass, f	40	50	0.02
Laparoscopic sleeve gastrectomy	70	60	0.082
Preoperative albumin (g/L)	37.14 ± 3.67	40.29 ± 3.88	0.727
Preoperative hemoglobin (g/L)	128.88 ± 22.86	113.12± 24.01	0.991
Intraoperative blood loss (mL)	300.5± 88.4	188.90 ± 118.44	0.01

Table 4- Description of surgical complications in the two study groups

Variable	Patients	Control	P-value
Transferring to ICU post-operation	8 (7.27)	4 (3.6)	0.05
Postoperative	9±4	6±2	0.01

hospital stays (days)			
infection	8 (7.27)	3 (2.7)	0.001
Bleeding	4 (3.6)	2 (1.8)	0.05
Readmission	2 (1.8)	2 (1.8)	0.0
Death	1 (0.9)	1 (0.9)	0.0
Superficial SSI	2 (1.8)	1 (0.9)	0.83
Organ space SSI	1 (0.9)	0	0.055

Table 5- Description of logistic regression results that present risk for smoking patients at surgery

v	(95% CI)*	P-value
Comorbidities	1.5 (0.83-1.9)	0.088
Smoking	2.8 (2.2-5.5)	0.001
sex	1.3 (0.8-1.5)	0.822
Age	1.53 (1.1-1.9)	0.77
Preoperative albumin (g/L)	1.94 (1.64-3.3)	0.7213
Preoperative hemoglobin (g/L)	1.56 (1.23-2.2)	0.921
BMI	2.23 (1.77-3.1)	0.001

Table 6- Describe the relationship between surgery and complications in both patient and control groups.

	Complication	P-value
Control	0.085	0.5
Patient	-0.944	0.001

Table 7- Assessment outcomes of study according to quality of life (HRQOL)

Variable	Patients	Control	P-value
Cognitive Functioning	55%	70%	0.001
Emotional Functioning	44%	73%	0.001
Fatigue	63%	67%	0.872
Financial Difficulties	45%	80%	<0.001
Pain	49%	69%	<0.001
Physical Functioning	62%	71%	0.093

Discussion

It is widely acknowledged that quitting smoking before undergoing surgery is a highly beneficial decision, as evidenced by reports from both the World Health Organization and the World Federation of Societies of Anesthesiologists. These reports indicate that patients who cease smoking at least four weeks before their scheduled operation are less susceptible to developing postoperative infectious diseases [12] and are also less likely to require readmission to the hospital due to surgical complications. Smoking has a deleterious effect on the cardiovascular system, impeding the normal functioning of the heart and lungs. Smoking can result in respiratory complications during and after

surgery, with an elevated risk of developing pneumonia. [13,14] It is possible that smokers may require the use of a ventilator following surgery. Prior research has demonstrated that smokers are more than twice as likely to experience surgical complications as non-smokers. [15] Given the substantial number of individuals who smoke, this places a considerable additional burden on hospitals and the global health system. The practice of smoking has been identified as a significant risk factor for patients undergoing gastric surgery, with a heightened likelihood of developing complications during or after the procedure [16]. A study published in the Journal of the American Medical Association has demonstrated that smokers are at a 77% increased risk of experiencing a myocardial infarction following surgery when compared to non-smokers. The detrimental effects of smoking extend beyond the respiratory system, as it also impairs cardiac health. Smoking has been linked to an increased prevalence of cardiovascular diseases, such as hypertension, arrhythmias, and congestive heart failure [17]. Additionally, it has been associated with an elevated risk of mortality from cardiovascular causes [18].

Chronic exposure to tobacco has been demonstrated to result in alterations to cardiovascular function, lung function, and tissue healing in patients who have undergone gastrectomy. Such alterations can render the recuperation process following surgery more arduous, thereby elucidating the elevated prevalence of postoperative complications observed in smokers [19]. Furthermore, there is evidence that even a single cigarette can reduce blood flow, which in turn contributes to unfavorable postoperative outcomes.

The chemicals present in tobacco have been demonstrated to increase the body's need for oxygen yet simultaneously limit its ability to utilise this resource effectively [20]. Nicotine stimulates the central nervous system, thereby increasing blood pressure, heart rate, peripheral vascular resistance, and oxygen consumption. Furthermore, it is hypothesised that tobacco use causes vasoconstriction and inhibits platelet aggregation, which ultimately reduces oxygen transport. Carbon monoxide binds to haemoglobin, reducing the availability of oxygen for cellular processes and disrupting the activity of cardiac enzymes, thereby decreasing oxygen transport and utilisation. The collective effect of these factors is the development of tissue hypoxia and increased blood viscosity, which in turn elevates the risk of cardiovascular events. The function of the lungs is as follows: The inhalation of tobacco smoke has been demonstrated to impair lung function, primarily due to the reduction of mucociliary clearance and the subsequent compromise of small airway function [20]. Cigarette smoking has been demonstrated to damage the ciliated pulmonary epithelium and tracheobronchial tree, resulting in increased mucus production, bronchial obstruction, and decreased ciliary activity. This has been linked to an increased risk of infection and respiratory complications (14). Mucus hypersecretion increases the volume of sputum, which can lead to alterations in oxygen transport systems, the development of bronchitis, and an increased risk of pulmonary complications.

Conclusion

Pulmonary complications in patients who smoke following surgery have a high incidence and significant impact on morbidity and mortality rates in patients undergoing non-thoracic surgery. Therefore, it is of great importance to identify patients at risk and to consider the role of pulmonary function tests and tools that allow for preoperative measures to reduce complications. A search of selected databases with dates from 2009 to 2018 revealed that patient characteristics and type of surgery were the most significant predictors of complications, with a limited role for pulmonary function tests and the implementation of risk scales designed to identify patients at risk.

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