

The Interaction Between The Habit Of Smoking With The Concomitant Chronic Illnesses In Inducing Intra-Postoperatively Cardiac Arrhythmias

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Abstract

Studies have shown that smoking affects the response to anesthesia, and it is important to have a full understanding of the effects of smoking during surgery and anesthesia, and the effects of quitting smoking before surgery.

This study examines the connection between the prevalence of arrhythmia in patients receiving general anesthesia, smoking, and chronic illnesses. A cohort of 100 patients from three hospitals was analyzed to identify trends and correlations. The findings reveal that 80% of the patients were smokers, with a notable 37.5% suffering from chronic diseases. Smoking was strongly associated with an increased risk of arrhythmia, as 57.5% of smokers developed arrhythmia compared to only 15% of non-smokers.

Additionally, the presence of chronic diseases significantly compounded the risk, with 83.3% of smokers with chronic conditions developing arrhythmia. Long-term smoking (20+ years) further heightened the likelihood of arrhythmia, particularly in individuals aged 30-39. However, smoking cessation for more than a week prior to surgery dramatically reduced the incidence of arrhythmia (5.7%). Tachycardia was identified as the most prevalent type of arrhythmia, affecting 70% of cases.

These results underscore the importance of smoking cessation programs and early intervention strategies to mitigate perioperative cardiac risks. Addressing smoking as a modifiable risk factor in preoperative care may improve surgical outcomes and reduce long-term cardiovascular complications.

Keywords: - Tobacco Smoking, Arrhythmia (Abnormal Heart Rate), Smoking Cessation, Anesthesia Management

Aim Of Study

The study's objective is to evaluate cardiac problems (arrhythmia) especially irregular heartbeat during surgery in smoking and non-smoking patients under general anesthesia.

This research also aims to determine the incidence rate of these complications in smoking patients who have a history of chronic diseases that affect the heart (hypertension and diabetes)

And to know the importance of cessation smoking prior to surgery in order to lower the risk of problems from arrhythmias while under general anesthesia.

Nahid Salehi et al studied smoking and its effects regarding cardiovascular system and concluded the relation of coronary artery disease and the location of damaged arteries in the heart.2021

The cited 2022 review by Ohlrogge, Frost, and Schnabel details how tobacco smoking and alcohol consumption independently and adversely alter the atrial myocardium, leading to atrial cardiomyopathy, atrial fibrillation (AF), and stroke

Introduction

Smoking is a risk factor for many diseases, including the cardiovascular events. It is associated with dysfunction of atria leading to atrial cardiomyopathy and atrial fibrillation [1]. Smoking per se is independently cause a wide spectrum of cardiac arrhythmias as it is a risk associated factor of chronic obstructive lung diseases and coronary artery disease [2-4]. Most general anesthetic drugs are usually safe and free from unwanted serious effects on the heart [5]. Ketamine is a promising anaesthetic to patients with cardiac problems because it has a minimal depressant effect on the central cardio-respiratory centers [6]. Intraoperative bradyarrhythmias has been observed in patient

anesthetized with propofol [7]. Risk factors for cardiac arrhythmias intra-and postoperatively are variables and depended on the surgical procedure, and the target of surgery. The risk factors for post-operative atrial fibrillation following the cardiac surgery are male, age, obesity, hypertension, and prior cardiac surgery [8]. Diabetic patients who are metformin users are at a lower risk for developing atrial fibrillation postoperatively compared with other oral antidiabetics, indicating that diabetes mellitus is a risk factor for cardiac arrhythmias and metformin therapy is a preventive medics [9]. This study test the hypothesis that the effect of smoking on the vulnerability of cardiac arrhythmias could occur even after discontinuation from smoking prior the surgical procedure smokers, and it is potentially unrelated to the concomitant illnesses. This multicenter cross-sectional study aims to show the interaction between smoking and concomitant chronic diseases in inducing intra-and postoperatively cardiac arrhythmias.

Methods

Design and setting

This observational cross-sectional study was performed in AL Shaheed ALSader general hospital ,Ghazi AL Hareeri for surgical specialties and AL Yarmook teaching hospital from November 2024 to January 2025.). The study was conducted according to the Helsinki declaration that any therapeutic intervention is will be of benefit to the patients, and the patient can withdraw from the study at any time. An informed consent and approval for agreement were obtained from each of the 100 patients at the time of entry to the study to obtain the demographic characteristics and the events of cardiac arrhythmias during operative surgery or post-operative periods.

Participants

A 100 patients underwent different surgical procedures carried out under general anaesthesia were recruited from hospitals in Baghdad, namely Al-Shaheed Al-Sader General Hospital, Ghazi Al-Hariri Hospital For Surgical Specialties and Al Yarmouk Teaching Hospital. The eligibility of the study is both sexes, aging from 18 to 70 years. The criteria of inclusion were patients underwent general anesthesia during surgical operation, smokers, evidence of concomitant diseases, e.g., diabetes mellitus, hypertension, and anesthetic agents, including Patients who were not fit for surgical operation of whatever cause, terminal illnesses, blood dyscrasias, and pregnancy were excluded from the study. The sample size was calculated using Gpower 3.1 software adjusted at alpha-error of 0.05, 1- β error (power) of 0.8, and the effect of the sample size on the results using Cohen's test (d-value) at 0.5, and it has been found to be 85 patients.

Variables outcome

The primary outcome is electrocardiography (ECG) findings of cardiac arrhythmias and their relations to the current smoking and evidence of concomitant diseases. The secondary outcome is related to the duration of smoking, elapsed period of smoking cessation, and the age of the participants. A 100 patients were included into the study and the data were stratified according to the primary outcome as shown in Figure 1.

Statistical analysis

The results are expressed as numbers and percentages. The categorized data were analyzed using a chi-square tests. A Pearson's (rho) correlation test was conducted to show the risk factor (independent) of cardiac arrhythmias (dependent factor). Excel program of Windows 10 was used for statistical analysis, and a p-value of < 0.05 is considered significant.

Results

The results showed that 49% of the patients developed cardiac arrhythmias during anaesthesia, and 46 (93.9%) of them were smokers, while the smokers who did not have arrhythmias were 34 (66.7%). The difference between them is significant ($p < 0.001$). This indicates that smoking is a significant associated risk factor for cardiac arrhythmias. The association between the smoking and the existence of chronic concomitant disease is significantly ($p < 0.001$) higher in patients with cardiac arrhythmias (25 out of 46) compared with those who did not develop arrhythmia (5 out of 34). This indicates a potentiation of smoking and concomitant diseases in inducing cardiac arrhythmias during anesthesia.

Cessation of smoking prior to the surgical procedure and long-standing smoking

The patients had a history of variable period of smoking cessation ranged between 1 day up to 28 days distributed into intervals less than week, 1-2 weeks, and 2-4 weeks. A significant ($p < 0.001$) higher percentage of smokers with

cardiac arrhythmias discontinue the smoking within one week (33 out of 46) compared with smokers without cardiac arrhythmias (2 out of 34). This indicates that cessation of smoking will not prevent the development of cardiac arrhythmias during anaesthesia.

A 25 of participants with concomitant chronic diseases and developed cardiac arrhythmias had a history of smoking up to 39 years compared with the corresponding patients without concomitant diseases up to 29 years. According to the duration of smoking, there is a significant correlation between the percentage of patients with cardiac arrhythmias who had concomitant diseases with during of smoking ($r=0.934$, $df= 23$, $p<0.001$), and it is also significant in those without concomitant disease is ($r= 0.5$, $df=19$, $p=0.021$). This indicates that smoking is a superior risk factor for the occurrence of arrhythmias than the existence of chronic concomitant diseases.

The effect of the age factor on this association is shown in Table 1. Patients with advanced age were more likely to have chronic diseases and susceptible for cardiac arrhythmias while patients without concomitant disease were younger and the distributions of cardiac arrhythmias are approximately uniform across the age groups.

Cardiac arrhythmias and smoking

Tachyarrhythmias are a predominant finding which account 34 out 49; 32 (65.3) of them were smokers, while 4 patients showed bradyarrhythmias, 3 of them were smoker, and 11 smokers out of 49 participants showed variable abnormal electrocardiographic rhythm and conduction defects. This indicates that smoking in presence or absence of concomitant chronic is associated with abnormal rate and rhythm during anaesthesia.

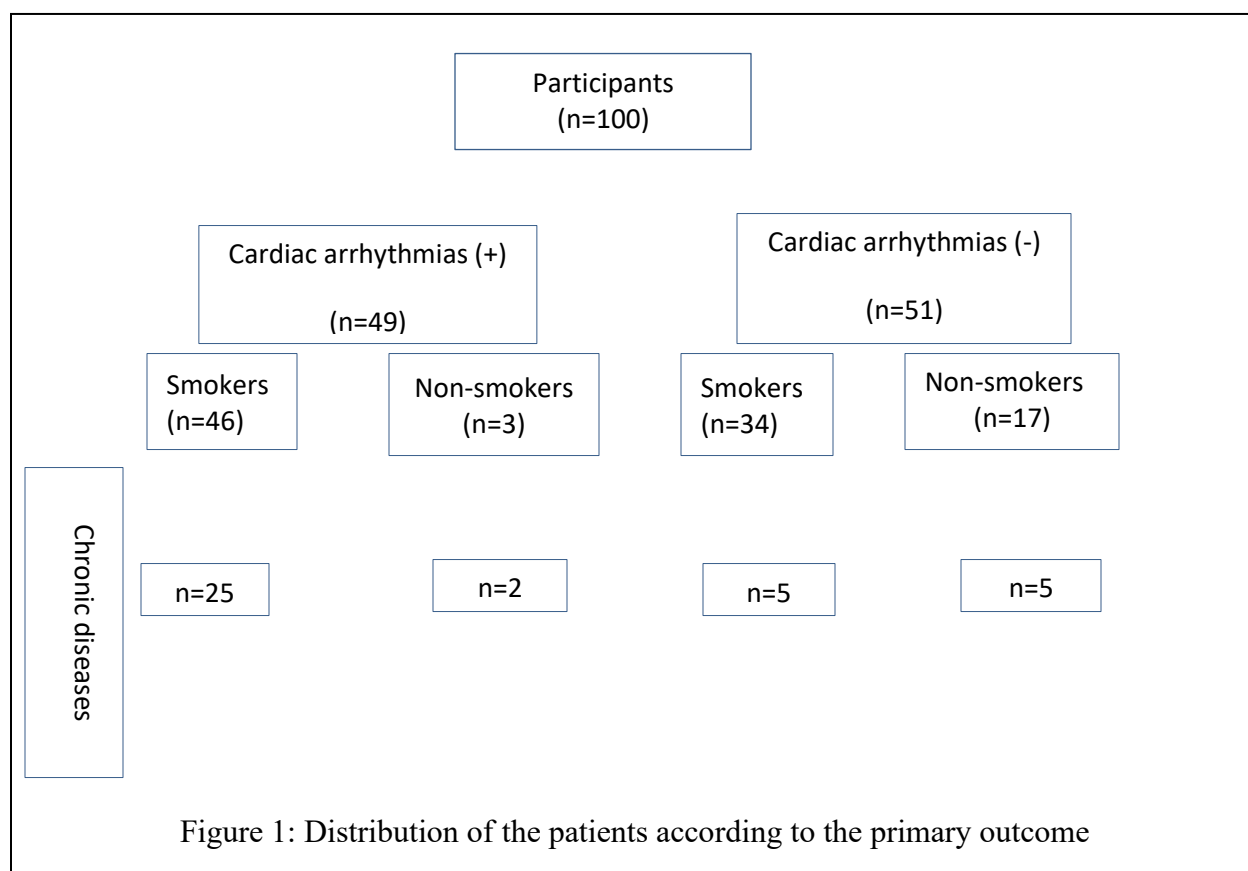


Figure 1: Distribution of the patients according to the primary outcome

Table 1: The distribution of patients with cardiac arrhythmias according to the age group and associated chronic diseases

Age groups (year)	Chronic diseases (+)	Chronic diseases (-)
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	(n=25)	(n=21)
18-29	0 (0)	7 (33.3)
30-39	1 (4)	7 (33.3)
40-49	1 (4)	5 (23.8)
50-59	8 (32)	2 (9.5)
60-69	15 (60)	0 (0)

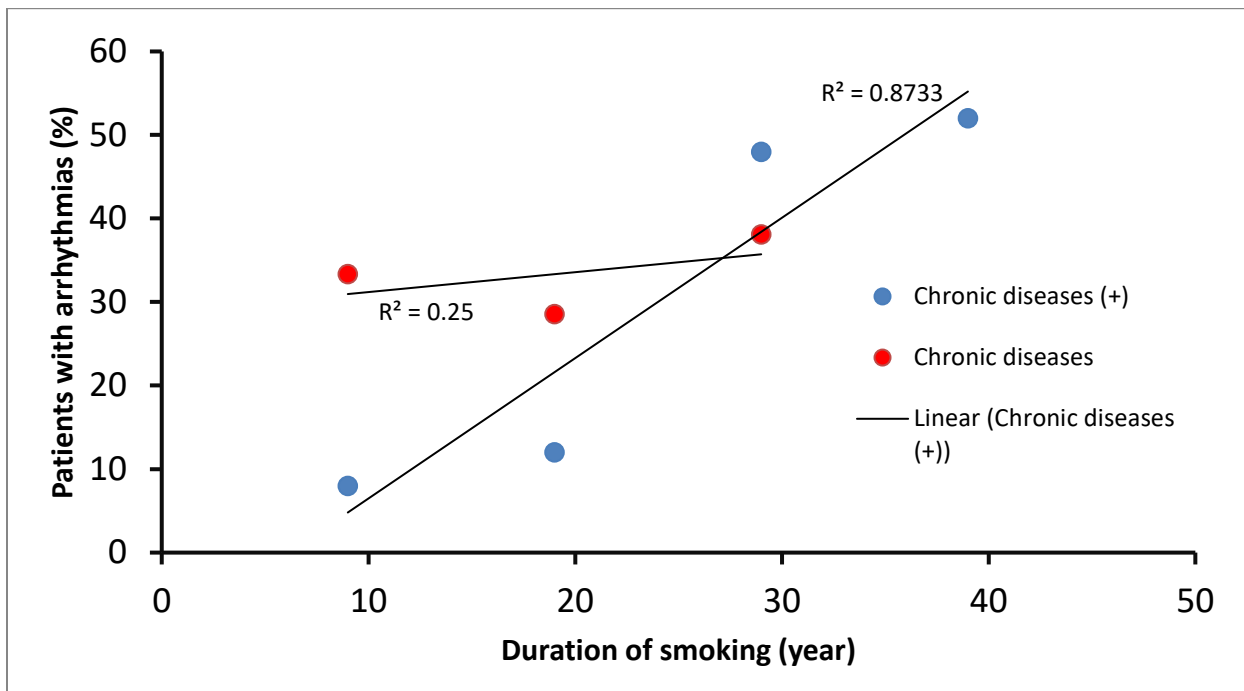


Figure 1: Correlation between the percentage of patients with cardiac arrhythmias and duration of smoking. The duration of smoking was grouped into 0-9, 10-19, 20-29, and 30-29 classes.

Conclusion

The analysis reveals a strong correlation between smoking and the prevalence of arrhythmia. Smokers, particularly those with chronic diseases, exhibit a higher incidence of arrhythmia compared to non-smokers. The duration of smoking cessation also appears to influence the occurrence of arrhythmia, with longer cessation periods associated with fewer arrhythmia cases. Additionally, the age factor shows that arrhythmia is more common in older age groups, especially among non-smokers.

- **Higher Risk for Smokers:** The data clearly indicates that smokers are more likely than non-smokers to experience an arrhythmia.
- **Chronic Diseases as a Compounding Factor:** Smokers with chronic diseases have an even higher incidence rate of arrhythmia. Chronic diseases further increase the risk among smokers.
- **Significant Difference:** The rate of arrhythmia among smokers (57.5%) is significantly higher than among non-smokers (15%). This suggests a strong association between smoking and the increased likelihood of developing arrhythmia.

In summary, smoking markedly increases the risk of arrhythmia, and the presence of chronic diseases further compounds this risk. Longer periods of smoking cessation reduce the likelihood of developing arrhythmias, which indicates the Importance of smoking cessation programs before surgery for at least two to four weeks. Age and duration of smoking play a decisive role in the severity and type of arrhythmia, with smoking duration of more than

10 or 20 years increasing the risk of developing arrhythmias during general anesthesia. These findings underscore the importance of smoking cessation and monitoring heart health, particularly for smokers and individuals with chronic diseases.

Recommendations

- Increase the sample size to include more hospitals in the study and for a longer period to confirm this study
- Study the effect of gender on the development of arrhythmia in smokers, because we used only men in this study and for the purpose of comparing men and women in the development of the risk of arrhythmia in smokers during anaesthesia
- Study the effect of age using a specific age group and comparing it with other groups
- Studying the impact of chronic diseases affecting the cardiovascular system (hypertension and diabetes) by identifying smoking patients without chronic diseases and comparing them with non-smokers.
- Encourage smoking cessation prior to surgery for a longer period of time to minimum possibility of complications including arrhythmia.
- Evaluation of the selection of appropriate anaesthetic drugs with the least side effects on the cardiovascular system in smokers
- Encourage spinal or regional anesthesia and avoid general anesthesia.

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