

Comparison of the Hemodynamic & Respiratory Parameters between Smokers & Non Smokers in Lower Abdominal Surgery Under General Anesthesia

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ABSTRACT:

BACKGROUND:

Smoking is a very widespread habit , it had been proved to affect adversely on many systems of the body especially the cardiovascular (CVS) & the respiratory system, and such effects would be exaggerated perioperatively because of the effect of general anesthesia (GA) especially when there is no any period of abstinence from smoking (as when occurred during emergency procedures).

OBJECTIVE:

To assess the hemodynamic & respiratory effects of smoking perioperatively in patients undergoing emergency lower abdominal operations.

PATIENT AND METHODS:

A prospective case control study carried on 80 patients in Baghdad teaching hospital/Medical city / Baghdad / Iraq, from September 2011 to March 2012, the 80 patients have been allocated into 2 groups, (each of 40 patients): group 1 who were non smoker patients, & group 2 the smoker patients.

The 2 groups were undergone emergency lower abdominal surgery under GA, all the patients received similar pre. & intraoperative managements. Pulse rate (PR), systolic blood pressure (BP_{sys}), diastolic blood pressure (BP_{dias}), oxygene saturation (SPO₂), and airway pressure (Paw) were monitored with the standard non invasive technique, at the baseline period (preoperative); immediate postintubation; 10, 20, 30, & 40 minutes intraoperatively; immediate postextubation; & 10 minutes in the recovery period.

RESULTS:

Regarding the pulse rate, there were no statistically significant variations between the 2 groups apart from the immediate postextubation period (105 ± 6.95 in smokers vs 100.3 ± 8.3 in non smokers

Regarding the systolic blood pressure, there was statistically significant increase in the systolic BP especially at the immediate postintubation period in smoker patients

Regarding the diastolic BP, apart from the immediate postextubation period ,there was significant increase in the diastolic BP between the 2 groups especially at the immediate postintubation

Regarding the SPO₂%, there were no statistically significant reduction in the SPO₂ readings between the 2 groups apart from the intraoperative period

Regarding the P airway , there were no significant increase in the P airway perioperatively between the 2 groups

CONCLUSION:

There were statistically significant CVS derangements in the smoker group versus the non smokers especially around intubation period.

KEYWORDS: smoking, hemodynamic, respiratory

INTRODUCTION:

In the 20th century, smoking killed 100 million people worldwide; currently, 5.4 million deaths each year are related to smoking. Smoking is associated with chronic diseases, economic

losses to society, and a substantial burden on the healthcare system. ^(1,2,3)

Each year, up to ten million cigarette smokers in the United States require surgery and anesthesia. ⁽⁴⁾

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Smoking is a risk factor for intra operative pulmonary complications and a wide range of

post-operative pulmonary, cardiovascular and wound related complications. It is associated with poorer outcomes in gastrointestinal, orthopaedic, day care, plastic and cardiovascular surgery. Smoking poses a significant risk factor for post-operative pulmonary complications. Smokers are more prone to post-operative atelectasis which delays the recovery and predisposes the patients to pneumonia. Also there is an increased incidence of intensive care admissions.⁽⁵⁾

Preoperative smoking abstinence of longer than 3 weeks reduces the incidence of impaired wound healing among patients who have undergone reconstructive head and neck surgery.⁽⁶⁾

In elective surgery patients are advised to quit smoking at least four to six weeks prior to surgery.⁽⁵⁾

Abstinence for twelve hours is sufficient to get rid of carbon monoxide.^(5,7,8)

Ciliary function improves and nicotine levels return to normal within 12-24 hours. Abstinence for 2 weeks helps return sputum volume to normal levels. Laryngeal and bronchial activity is better in 5-10 days. Improvement in small airway narrowing is seen in 4 weeks but it takes 3 months to see changes in tracheobronchial clearance.⁽⁵⁾

After 6-8 weeks of stopping smoking, ciliary and immunological activities are restored.⁽⁹⁾

Stopping smoking is also associated with anxiety and withdrawal symptoms.⁽⁵⁾

In emergent surgery there is no time for abstinence of smoking so this study done for emergent surgery to estimate the effect of smoking on the haemodynamic and respiratory systems perioperatively

PATIENT AND MATERIALS:

This is a prospective case control study in which 80 patients were enrolled in Baghdad teaching hospital/Medical city complex / Baghdad / Iraq, in the duration from September 2011 to March 2012, the 80 patients have been allocated into 2 groups, (each group consists of 40 patients): group 1 the control group "who were non smoker patients", & group 2 "the smoker patients".

All patients are selected as American Society of Anesthesia classification (ASA) I&II, for lower

abdominal surgeries, for both genders, from the age group of 20 to 60 years.

Smoker patients with a duration of smoking less than 2 years or smoking less than 10 cigarette per day are excluded from the study

□Also patients with ASA more than 2, uncontrolled HT, HF, □dysrhythmia, ischemic heart disease (IHD), valvular heart disease (VHD), chronic obstructive pulmonary disease (COPD), severe asthma, chest infections, restrictive pulmonary diseases, and patients on cigar or argali were excluded from the study

Demographic data of patient's age, gender, and weight, and for the smoker patients, the duration of smoking, and number of cigarette /day were recorded in data collecting sheets

The 2 groups were undergone emergency lower abdominal surgery under GA, all the patients admitted urgently without any period of smoking abstinence "for the smoker group". Preinduction medication (dexamethasone 8mg, metoclopramide 10 mg, midazolam 0.01mg/kg, ketamine 20 mg, fentanyl 0.01mg/kg) were given for all patients, preoxygenation for 3 minutes, then GA had been induced with propofol 2mg/kg, then suxamethonium given 1mg/kg, and ETT introduced, then the anesthesia was maintained with halothane 1%, pancuronium, & IV fluids, the parameters to be monitored (PR, BPsys, BPDias, SPO2, and Paw) with the standard non invasive technique, and had been recorded at the baseline period (preoperative); immediate postintubation; 10, 20, 30, & 40 minutes intraoperatively; immediate postextubation; & 10 minutes in the recovery period.

Any type of dysrhythmia, bronchospasm, or episode of cough were recorded

At the end of operation, reversal drug was given, halothane set off & extubation done.

Results were recorded in data collecting sheet .The difference was considered to be statistically significant if the P value was less than 0.05

RESULTS:

The mean age of smoker group was (39.6 ± 9.1) year and the range was (21 – 60) versus (37.55 ± 5.9) year with a range of (20 – 52) in Non smoker. There was **no** significant difference in mean age of both groups P.value >0.05, table (1)

Table1: Mean age and range of patients in each group.

Age (year)	Smoker	NonSmoker	P.value
Mean ± Sd*	39.6 ± 9.1	37.55 ± 5.9	0.22
Range	21 - 60	20 - 52	

SD* = standard deviation

Males were represented 77.5% of patients in Smoker groups versus 67.5% out of non smoker while females were represented the remaining percentages , No significant difference had been found in gender distribution in between groups, the overall comparison P.value > 0.05, table(2).

Table 2: Gender distribution of patients of both groups.

Gender	Smoker		NonSmoker		P.value
	Frequency	Percent	Frequency	Percent	
Male	31	77.5%	27	67.5%	0.323
Female	9	22.5%	13	32.5%	
Total	40	100%	40	100%	

The readings of Mean Pulse rate at different time of measurement in between groups revealed higher readings in smoker patients than non smoker patients and the P values were statistically significant in 4 times .Table(3).

Table 3: Comparisons of Mean Pulse rate at different time of measurement in between groups.

Time of measuring	Mean ± Std.Deviation (Sd)		P.value
	Smoker	Non smoker	
Baseline	104.4 ± 9.25	100.5 ± 8.3	0.06
After Intubation	109.7 ± 9.5	108.9 ± 8.2	0.678
10 Minute	107.2 ± 7.8	105.7 ± 8.9	0.432
20 Minute	105.8 ± 8.1	102.4 ± 8.4	0.03
30 Minute	104.8 ± 7.9	102.2 ± 10.2	0.202
40 Minute	104.9 ± 8.02	101.1 ± 8.8	0.044
After Extubation	105 ± 6.95	100.3 ± 8.3	0.007
10 Minute After Recovery	100.5 ± 6.6	96.95 ± 7.5	0.029

The readings of mean systolic blood pressure in smoker patients were higher than in non smoker patients and the P value were statistically significant at different times of measurements .Figure(1)



Figure 1: Comparisons of mean Systolic Bp in both groups.

The readings of mean diastolic blood pressure in smoker patients were higher than in non smoker patients and the P value were statistically significant at all times of measurements except after extubation. Figure(2)



Figure 2: Comparisons of mean Diastolic Bp in both groups.

The readings of mean SPO2 in smoker patients were lower than in non smoker patients and the P value were statistically significant at 4 times of measurements. Table (4)

Table 4: Comparisons of Mean (SPO2 %) at different time of measurement in between groups.

Time of measuring	Mean ± Std.Deviation (Sd)		P.value
	Smoker	Non smoker	
Baseline	96.83 ± 1.5	97.10 ± 1	0.351
After Intubation	98.66 ± 0.64	98.70 ± 0.5	0.732
10 Minute	99.06 ± 0.6	99.52 ± 0.5	0.0001
20 Minute	98.80 ± 0.8	99.75 ± 0.44	0.0001
30 Minute	99.09 ± 0.7	99.45 ± 0.5	0.009
40 Minute	99.03 ± 0.8	99.45 ± 0.5	0.005
After Extubation	98.11 ± 0.93	97.90 ± 0.7	0.240
10 Minute After Recovery	96.37 ± 1.4	96.62 ± 0.8	0.309

The readings of mean airway pressure in smoker and non smoker patients were statistically non significant at all times of measurements. Figure(3)

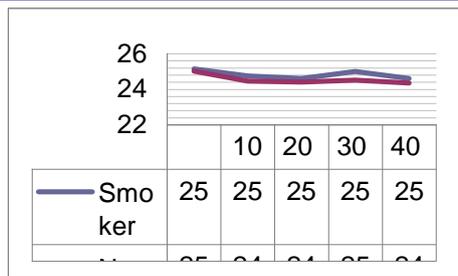


Figure 3: Comparisons of mean P airway in both groups

DISCUSSION:

According to the results that we have been got from this research, we can summarize the results as follows:

Heart rate: there was a statistically significant increase in HR intraoperatively & postoperatively, [postextubation > 10 Minute After Recovery > 20 Minute IO > 40 Minute IO], in the smoker group compared with the non smoker group, but the increase was extreme exactly postextubation and this can be explained by the role & effect of the exaggerated sympathetic overflow associated with smoking, the postintubation period was devoid of such effect probably mainly due to deep anesthesia good analgesia have been used before intubation that minimise the sympathetic response to intubation, also the bradycardial effect of fentanyl has been used in this study opposed the increase in heart rate in response to intubation

Systolic BP: there was a statistically significant increase in the systolic BP throughout the whole period perioperatively especially immediately postintubation, [postintubation > IO & PO >preoperative > postextubation], in the smoker group compared with the non smoker group, but the increase was extreme exactly postintubation and this can be explained by the role & effect of the exaggerated sympathetic overflow associated with smoking, and it was obvious that the most powerful sympathetic stimulus perioperatively is the intubation.

Diastolic BP: there was a statistically significant increase in the diastolic BP throughout the whole period perioperatively (except the postextubation period), the increase in the diastolic BP was extreme at the postintubation period, [postintubation >20 Minute IO >30 Minute IO >10 Minute IO > 40 Minute IO >preoperative > PO], in the smoker group compared with the non smoker group, but the increase was extreme exactly postintubation and this can be explained

again by the role & effect of the exaggerated sympathetic overflow associated with smoking, And it was obvious that the most powerful sympathetic stimulus perioperatively is the intubation.

SPO2%: there was a statistically significant mild decrease in the SPO2% throughout the whole intraoperative period, especially the beginning of the period, [10 Minute IO & 20 Minute IO > 40 Minute IO > 30 Minute IO], in the smoker group compared with the non smoker group, and this can be explained probably by being the patients were unprepared preoperatively with even a short period of smoking abstinence, reflecting a defect in the diffusion process intrapulmonary from a lung epithelial lining lesion, or intrapulmonary shunting.

Airway pressure: there was no significant increase in airway pressure perioperatively between smoker & non smoker groups. And this can be explained (although partly) by the efficient pharmacological effects of the preinduction drugs (probably the dexamethasone) in controlling the swelling & inflammatory effects of the bronchial mucosa. Also the bronchial tone could be efficiently suppressed by the effect of ketamine, and halothane.

□□ The results in this study agree with the results obtained by Daelim Jee and Ui-Kyun Park (10) , in 2006, they studied the Haemodynamic response of young smokers to induction and intubation in 50 male patients, aged 20-29 yrs, there was no significant difference of heart rate between smokers and non smokers during the observational period, anesthesia was induced with thiopentone 3mg/kg, fentanyl 1.5µg/kg, vecuronium 0.1mg/kg, and maintained with enflurane 1% in N2O & O2.17

□□ The results in this study also agrees with the results obtained by Malhorta SK, et al 2005,

regarding the systolic and diastolic BP, but it disagrees with the results regarding the HR. Malhorta SK studied induction – intubation response in smokers vs. non-smokers in 40 male patients 20 smokers and 20 non-smokers. He found that during induction-intubation period, heart rate; systolic, diastolic and mean arterial pressure and rate-pressure product showed more pronounced fluctuations in smokers than in non-smokers.

□□ The results in this study agree with the results obtained by Paventi S. et al(11), 2001, studied control of haemodynamic response to tracheal intubation in cigarette smokers compared with non-smokers in 126 patients, ASA I-II, aged 20-49 yr, submitted laparoscopic cholecystectomy (66 male, 60 female). Sixty-three patients were non-smokers and 63 patients smoked 10 or more cigarettes per day and reported that immediately after intubation, the neuroendocrine response (epinephrine and norepinephrine plasma levels) & so the systolic & diastolic BP of smokers was significantly higher than non-smokers.

□□ The results in this study disagree with the results obtained by O. Cuvas et al (12), Specialist, Department of Anaesthesiology and Intensive Care Medicine, Ankara Training and Research Hospital, Ankara, Turkey, 2008, in his study regarding the effect of intubation on the hemodynamic response in smokers compared with non smokers in an elective surgeries with a 12 hours abstinence of smoking when he found a significant increase in heart rate & rate pressure product (RPP) after intubation in the smoker group ,the normal heart rate post intubation in this study mainly due to deep anesthesia good analgesia have been used before intubation that minimise the sympathetic response to intubation, also the bradycardial effect of fentanyl has been used in this study opposed the increase in heart rate in response to intubation

CONCLUSION:

It was very obvious the exaggerated sympathetic activity in the significant haemodynamic changes in the smoker patients

Regarding the SPO₂%, there was significant decrease in the SPO₂% during the intraoperative period in the smokers compared with the non smokers.

Regarding the airway pressure, there was insignificant increase in smoker patients compared with the non smoker group.

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