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THE FREQGUENCY OF CRITICAL INCIDENTS AT PERIOPERATIVE PERIOD IN SMOKING PATIENTS

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ABSTRACT

A prospective, randomized, open research was performed, including 114 patients who had laparoscopic cholecystectomy: 1 group - non-smokers (57 people), 2 group - smokers (57 people).

Among smokers, both during the operation and within the near postoperative period (up to 120 minutes), the number of critical incidents increases, connected with the following systems: respiratory system, blood circulation system, and, especially, nervous system: motor excitation, fever, muscular tremors, the feeling of air lack.

Research Results allow to recommend to the anesthetist to pay attention to the smoking experience, the quantity of smoked cigarettes per day and to be wary concerning the occurrence of possible critical incidents.

Keywords: smoking, critical incidents, perioperative period

1.Introduction

There are 5.4 million smoking-related deaths worldwide every year [1]. Smoking increases the risk of adverse postoperative outcomes, especially heart and lung complications [2, 3]. Among smokers, pulmonary problems are prevalent, accounting that smoking impairs the mucus transport, provokes the hyperplasia of goblet cells, the hypersecretion of mucus [4], impairs the function of lung macrophages [5], increases a bronchial reactivity by stimulation of airway inflammation [6]. It is well established that smoking contributes to the development of cardiovascular diseases, but the relationship between smoking and perioperative cardiovascular complications remains controversial [7]. Most studies do not clearly identify the preoperative status of smoking as an independent factor of cardiac events after a non-cardiac surgery [2, 8, 9]. One of the ways to detect the influence of smoking on the occurrence of cardiovascular and pulmonary complications in the intraoperative period is to register critical incidents [10, 11]. A critical incident is defined as an event during the course of an anaesthetic treatment, which, in the absence of intervention, may lead to undesirable consequences [11].

The purpose of the study: to determine the frequency of critical incidents from the cardiovascular and pulmonary systems in smoking and non-smoking patients in the perioperative period.

2. Materials and methods

A controlled prospective randomized clinical trial was performed. The randomization plan was generated by the law of random numbers on the site www.randomization.com (seed 7481). We examined 114 patients with chronic calculus cholecystitis who will undergo laparoscopic cholecystectomy under total intravenous anesthesia based on Diprivan.

Inclusion criterion:

- informed consent of the patient to participate in the study;
- indications for laparoscopic cholecystectomy;
- physical status of the ASAI and ASAII class;
- age 38-52 years.

Exclusion criteria:

- refusal of the patient to participate in the study (lack of informed consent);
- physical status of class ASAIII;
- switching to an open operation;
- a history of polyvalent Allergy, diabetes mellitus, decompensated disorders of the cardiopulmonary system.

Patients are divided into two groups: 1-non – smokers (57 patients); 2-smokers per day for at least 20 cigarettes for at least 10 years (57 patients). Demographic data, information about the body mass index and physical status of patients are presented in table 1. The duration of anesthesia in both groups ranged from 54-72 minutes.

Table 1.

Demographic data of patients, body mass index and physical status according to the ASA

Groups	Quantity	Gender	Age	Body Mass Index	ASA I	ASA II
1	46	М	45,3±5,2	25,8±4,7	39	7
	11	Ж	47,4±5,1	26,8±4,8	8	3
2	45	М	44,4±5,6	24,6±4,5	35	10
	12	Ж	46,7±6,1	26,1±5,0	8	4
Total	114				90	24

Note: the data is presented as M±m. in all cases, P>0.05.

Standard TIA Protocol (for both groups):

* *Premedication*: Dimedrol 1% - 1.0 ml intramuscularly;

* *Preoxygenation*: 1-2 minutes;

* *Induction*: propofol 2 mg / kg, fentanyl 2.0-4.0 mcg/kg, croirone 0.6 mg/kg;

* *Maintaining anesthesia*: fentanyl +propofol 2-5 mg / kg per hour;

* *Myoplegia*: cruaron0. 15 mg / kg when the first response to TOF stimulation appears;

• *The volume of infusion*: the crystalloid 5-7 ml/kg . tsch.

Method of research

* ECG, heart rate, non-invasive blood PRESSURE measurement, capnometry;

* BIS-monitoring the depth of oppression of consciousness;

• TOF – Watch – accelerographic quantitative monitoring of neuromuscular function.

We calculated the frequency of critical incidents and the critical incident frequency index [12].

Critical incidents (CI) were registered in the middle of anesthesia and in the immediate postoperative period (30-40 min).

The results are presented as the average (M), the average deviation from the arithmetic mean (m). Statistical processing of the obtained results was performed using the STATISTICA 7.0 software package. P<0.05 was considered statistically significant. The method of four-field table of conjugate frequencies [13] is used for statistical analysis of FCI.

3.Results and discussion

A quantitative analysis of critical incidents and the frequency of critical incidents in patients during and after anesthesia is shown in table 2.

Table 2.

Distribution of critical incidents in groups during and after anesthesia

Registration stages	1 group CI (FCI)	2 group CI (FCI)	Criteria
During anesthesia	5 (FCI=0,09)	17 (FCI=0,30)	P<0,05
After anesthesia	9 (FCI=0,16)	39 (FCI=0,71)	P<0,001
Total	14 (FCI=0,25)	56 (FCI=0,98)	P<0,001

During anesthesia, the PPI in group 2 patients is 3.4 times higher than in group 1 patients, whereas after the end of anesthesia, the PPI in group 2 patients is 4.3 times higher than in group 1 patients.

The qualitative composition of critical incidents in patients of both groups during and after the anaesthetic treatment is presented in tables 3 and 4.

Table 3.

Qualitative composition of critical incidents (CI) during anesthesia

Incident	1 group (57 patients)	2 group (57 patients)	Statistical Significance
CI associated with the respiratory system			
Laryngospasm	-	1	
Total	0	1 (FCI=0,01)	
CI associated with the cardiovascular system			
Tachycardia Heart Rate>120 per min	1	3	
Bradycardia Heart Rate<50 per min	1	3	
Hypertension BPsyst >30% from the value after introductory anesthesia	2	3	
Hypotension BPsyst < 30% from the value after introductory anesthesia	1	2	
Depression or segment ST elevation	-	2	
Arrhythmia	1	2	
Total	5 (FCI=0,09)	13 (FCI=0,23)	P<0,05
CI associated with the nervous system			
Motor excitation	-	2	
Chills and muscle shiver syndrome	-	1	
Total	0	3 (FCI=0,06)	
TOTAL	5 (FCI=0,09)	17 (FCI=0,30)	P<0,05

Among the CI associated with the respiratory system, smoking patients (group 2) in one case during introductory anesthesia recorded laryngospasm, despite the fact that the depth of anesthesia on the BIS monitor was 35%, and the TOF monitor recorded TOF-0 responses. Laryngospasm was eliminated by additional bolus administration of 50 mg of Diprivan and 30 mg of croirone.

The number of CI associated with the circulatory system was statistically significantly more frequently recorded in group 2 patients.

In patients of both groups, the depth of a consciousness loss according to the BIS monitor indicators was 50-45%, which we consider to be the most optimal value [14]. To achieve these values of BIS monitoring, the Diprivan dose values were the same in both groups of patients. In non-Smoking patients, fentanyl consumption for adequate analgesia was 4.00+0.20 mcg/kg h, in smokers-5.10+0.11 mcg/kg h (P<0.05). The adequacy of anesthesia was assessed by heart rate increase more than 20% and to reduce the magnitude of replicatory more than 20% from the values recorded at induction anaesthesia. Consumption of croirone in the group of non-Smoking patients was 0.48+0.03 mg / kg h, in the group of smokers-0.61+0.03 mg/kg h (P<0.05).

In group 2 patients, motor arousal syndrome and muscle tremor syndrome were registered immediately before extubation. The TOF index was 0.8-0.9.

Table 4.

Qualitative composition of critical incidents (CI) after the end of anesthesia

Incident	1 group (57 patients)	2 group (57 patients)	Statistical significance
CI associated with the respiratory system			
Laryngospasm	-	2	
Stridor	1	2	
Moderate hypoxemia $SpO_2 <90 >80\%$	2	3	
Critical hypoxemia $SpO_2 <80\%$	-	1	
Critical hypercapnia $E_tCO_2 > 55$ мм рт.ст.	1	3	
Respiratory arrest for more than 45 sec	-	1	
Total	4 (FCI=0,09)	12 (FCI=0,21)	P<0,05
CI associated with the cardiovascular system			
Tachycardia	1	4	
Bradycardia	-	2	
Hypertension	1	5	
Hypotension	-	-	
Depression or ST elevation	-	3	
Arrhythmia	1	4	
Total	3 (FCI=0,04)	18 (FCI=0,30)	P<0,001
CI associated with the nervous system			
Motor excitation	-	3	
Chills and muscle shivering syndrome	1	3	
Feeling of air lack	1	3	
Total	2 (FCI=0,04)	9 (FCI=0,16)	P<0,01
TOTAL	9 (FCI=0,16)	39 (FCI=0,71)	P<0,001

The total value of PKI in both groups of patients in the postoperative period is approximately the same as the data of other authors who performed TVA in patients undergoing laparoscopic cholecystectomy [15].

In the immediate postoperative period, Smoking patients were 3.0 times more likely to have respiratory CI, 6 times more likely to have circulatory CI, and 4.5 times more likely to have nervous system CI. In total, the incidence of CI and, respectively, PKI in Smoking patients was 4.3 times higher than in non-smokers.

Extubation of all patients was performed with BIS-monitor indicators in the range of 88-92%. The TOF index of 0.9 was considered to reflect adequate recovery of neuromuscular function.

Results on the time from the end of administration of the hypnotic and muscle relaxant to extubation are presented in table 5.

Table 5.
Time from the end of Diprivan infusion and the last administration of a muscle relaxant to extubation

Groups of patients	The time in min from Diprivan switching off till the extubation	The time in min from the last administration of a muscle relaxant till the extubation
1	6,30±1,30	26,80±3,90
2	6,50±1,40	41,60±3,10
P	>0,05	<0,05

Diprivan does not affect the time of extubation and most likely does not play a significant role in the occurrence of critical incidents observed in patients in the postoperative period. Therefore, the components of TIA that could provoke the occurrence of critical incidents may be opioid analgesics and muscle relaxants. It is known that smokers have significant sequestration of sufentanyl and fentanyl by the lungs [16]. For full-fledged analgesia, smokers need to administer increased doses of opioids [17], and for full-fledged muscle relaxation, they need to increase the dose of rocuronium by about 25% compared to non-smoking patients [18]. Similar results are presented in this study: in Smoking patients, fentanyl doses increased by 28%, which may be a consequence of decreased sensitivity of mu-opiate receptors to products contained in tobacco smoke [16]. The dose of rocuronium used was increased by 27%. In Smoking patients, the duration of action of vecuronium and rocuronium also increases [19, 20], which is also noted in this study. This may be explained by changes in their metabolism in the liver [21]. Thus, the accumulation of high doses of opioids and muscle relaxants may be factors in the occurrence of critical incidents of the pulmonary system. Deterioration of mucus transport with simultaneous mucus hypersecretion (mucociliary clearance) [4] along with residual muscle relaxation [22] provokes more frequent episodes of hypoxemia and hypercapnia in smokers, that was registered in this study. An increased bronchial reactivity in smokers along with a residual muscle relaxation may provoke an increase in the frequency of laryngospasm. Smoking is also an independent factor in increasing incidents from the cardiovascular and nervous systems both during and after surgical interventions in non-cardiac surgery [22].

4.Conclusion

The increase in the frequency of critical incidents from the pulmonary, cardiovascular and nervous systems in smokers during and after surgery may be a consequence of the summing up effect of components that make up cigarette smoke, the need for increased amounts of opioids and muscle relaxants, their accumulation and changes in liver metabolism.

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ДИАГНОСТИКА И ЛЕЧЕНИЕ АНТИБИОТИК-АССОЦИИРОВАННОГО ПСЕВДОМЕМБРАНОЗНОГО КОЛИТА.

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АНОТАЦИЯ

Clostridium diffucle infection (CDI) является основной причиной внутрибольничной диареи, и ее распространенность значительно возросла за последнее десятилетие. Заболевание чаще всего вызвано воздействием антибиотиков, которые изменяют естественную флору кишечника. Быстрая эволюция устойчивости к антибиотикам у C. Difficile и последующее воздействие на профилактику и лечение представляют собой серьезную проблему для здоровья пациентов. Заболеваемость и тяжесть инфекции CDI увеличились в группах пациентов с высоким риском, имеющим в анамнезе воспалительные заболевания кишечника (IBD). В большинстве случаев не требуется прибегать к оперативному хирургическому лечению, так как инфекция реагирует на консервативное лечение антибиотиками. Тем не менее тяжелое течение CDI с осложненным колитом имеет высокую летальность среди пациентов и требуют экстренного оперативного вмешательства. Хирурги должны быть в состоянии выявлять и минимизировать риск возникновения CDI у своих хирургических пациентов, а также определять, какие пациенты выигрывают от хирургического лечения.

ABSTRACT

Clostridium diffucle (CDI) is the main cause of nosocomial diarrhea, and its prevalence has increased significantly over the past decade. The disease is most often caused by exposure to antibiotics that alter the intestinal flora. The rapid evolution of antibiotic resistance in C. Difficile and its consequent impact on prevention and treatment are a serious health problem for patients. The incidence and severity of CDI infection has increased in high-risk groups with a history of inflammatory bowel disease (IBD). In most cases, surgical surgical treatment is not required, since the infection responds to conservative antibiotic treatment. However, severe CDI with complicated colitis has a high mortality rate among patients and requires emergency surgery. Surgeons should be able to identify and minimize the risk of CDI in their surgical patients, as well as determine which patients benefit from surgical treatment.

Ключевые слова: CDI, псевдомембранозный колит, внутрибольничная диарея.
Key words: CDI, pseudomembranous colitis, nosocomial diarrhea.

Цель исследования:

1. Провести систематический анализ литературы по данной патологии.

2. Определить наиболее эффективные методы диагностики, направленные на выявление CDI.

3. Определить наиболее оптимальный подход к хирургическому лечению тяжелой и осложненной формы CDI.

4. Определить рекомендации для снижения риска возникновения псевдомембранозного колита у госпитализированных пациентов.