

Effects of halothane and isoflurane on QT interval in young patients underwent hemorrhoidectomy

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Abstract

Background Long QT syndrome (LQTS) is a heart rhythm disorder that can potentially cause fast, chaotic heart beats. These rapid heartbeats may trigger a sudden fainting spell or seizure. In some cases, your heart may beat erratically for so long that it can cause sudden death.

The aim of study is to evaluate the effects of halothane and isoflurane on QT interval in patients underwent hemorrhoidectomy.

patients and methods ECG were recorded in operative theater at al-shurgat general hospital just before surgical operations and directly after end of operation , 37 young , healthy patients were participated in this study 29 male and 8 female (n=17)received halothane (20) received isoflurane.

Results: The mean and standard deviation of participants age and duration of operation was considerably higher among those who received halothane in comparison to isoflurane and differences was statistically significant and the mean of age was 29.35 ± 5.958 years with halothane and 24.55 ± 4.893 years with isoflurane , (p-value 0.011) and regarding the mean of duration of operation was 19.47 ± 3.243 minutes with halothane and 16.75 ± 3.240 minutes with isoflurane use ,(p-value 0.023)

Conclusions the present study conclude that maintenance of anesthesia with halothane might prolong the QT-interval and did not result in arrhythmias while , with isoflurane was not associated with alterations in the QT-interval and induced no changes in cardiac rhythm.

Key words: halothane, isoflurane, QT-interval.

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Introduction :

Long QT syndrome (LQTS) is a heart rhythm disorder that can potentially cause fast, chaotic heart beats. These rapid heartbeats may trigger a sudden fainting spell or seizure. In some cases, your heart may beat erratically for so long that it can cause sudden death⁽¹⁾. The clinical features of LQTS result from a peculiar episodic ventricular tachyarrhythmia called 'torsade de pointes'. 'Twisting of the points' describes the typical sinusoidal twisting of the QRS axis around the isoelectric line of the ECG⁽²⁾. Usually torsade de pointes start with a premature ventricular depolarization, followed by a compensatory pause. The next sinus beat often has a markedly prolonged QT interval and abnormal T wave⁽³⁾. This is followed by a ventricular

tachycardia that is characterized by variation in the QRS morphology, and a constantly changing R-R interval. The 'short-long-short' cycle length sequence heralding torsade de pointes is a hallmark of LQTS⁽⁴⁾. Commonly, the episode torsade de pointes is self-terminating, producing a syncopal episode or pseudo-seizure, secondary to the abrupt decrease in cerebral blood flow^(5,6). The majority of episodes of sudden death in LQTS result from ventricular fibrillation triggered by torsade de pointes, although the mechanism of this deterioration is unknown^(7,8).

All of the clinical available inhalation agents could be considered in patients with LQTS except Halothane and Desflurane. Halothane is known to sensitize the heart to catecholamines and

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Desflurane causes a sympathetic activation and QT interval prolongation^(9,10). Among the others, Isoflurane has been reported as the agent of choice because of its apparent safety⁽¹¹⁾.

The aim of this study is to evaluate the effects of halothane and isoflurane on QT interval in patients underwent hemorrhoidectomy. While the objectives of the study are:

- 1- To determine the effects of halothane and isoflurane on QT- interval in patients underwent hemorrhoidectomy.
- 2- To detect variations in ECG and heart rate in patients underwent hemorrhoidectomy pre and post operatively.

Patients and methods:

ECG were recorded in operative theater at al-shurgat general hospital just before surgical operations and directly after end of operation before antidote administration and

extubation, to evaluate the effects of halothane and isoflurane volatile anesthesia on QT interval, 37 young, healthy patients were participated in this study 29 male and 8 female (n=17) received halothane (20) received isoflurane, also past history of any cardiac disease was taken and clinical examination was done for to exclude any signs of cardiovascular diseases. the drugs that used during operation were propofol, ketamine, halothane or isoflurane while in post-operative period patients received analgesic drugs 75mg diclofenac intramuscularly 30 minutes after operation. all data were presented as mean and standard deviation T – test and chi square test were used to indicate significant differences.

Results:

Table 1 show the mean and standard deviation of demographic data in association with type of anesthesia in patients underwent hemorrhoidectomy. The mean and

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standard deviation of participants age and duration of operation was considerably higher among those who received halothane in comparison to isoflurane and differences was statistically significant and the mean of age was 29.35 ± 5.958 years with halothane and 24.55 ± 4.893 years with isoflurane , (p-value 0.011) and regarding the mean of

duration of operation was 19.47 ± 3.243 minutes with halothane and 16.75 ± 3.240 minutes with isoflurane use ,(p-value 0.023) . There was no any statistically significant relationship between waist hip ratio and type of anesthesia in those received halothane (0.88 ± 0.07) isoflurane (0.88 ± 0.11).

Parameters	Type of anesthesia	Number	Mean	Stander deviation	P- value	T-test
Age	Halothane	17	29.35	5.958	0.011	Significant
	Isoflurane	20	24.55	4.893		
Duration of operation	Halothane	17	19.47	3.243	0.023	Significant
	Isoflurane	20	16.75	3.240		
Waist hip ratio	Halothane	17	0.88	0.07	0.88	Non-significant
	Isoflurane	20	0.88	0.11		

Table 2 shows the mean and standard deviation of QT interval before and after operation of patients underwent hemorrhoidectomy under general anesthesia. There was significant increase in QT interval when

estimated post-operatively in comparison with pre-operative measurement , in those received halothane in comparison to those received isoflurane (362.47 ± 25.549 to 377.18 ± 40.211) , (p-value 0.014).

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Table 2 the mean and stander deviation of QT interval before and after hemorrhidectomy under general anesthesia.

Parameters	Type of snesthesia	Number of patients	Mean	S.D	P-value	T -test
QT before	Halothane	17	362.47	25.549	0.065	Non-sign
	Isoflurane	20	347.45	22.348		
QT after	Halothane	17	377.18	40.211	0.014	sign
	Isoflurane	20	351.05	19.198		

Table 3 show increase in heart rate in both halothane and isoflurane that measured post-operatively but ; there was no statistically significant association between type of anesthesia and heart rate measurements before and after hemorrhoidectomy for both halothane and isoflurane

group, halothane (78.06±10.668 to 85.00±20.899 beats per minutes)isoflurane (85.85±12.696 to 89.30±16.604 beats per minutes).

Table 3 the mean and stander deviation of heart rate before and after hemorrhoidectomy.

Parameters	Type of anesthesia	Number	Mean	Stander deviation	P - value	T -test
Heart rate before	Halothane	17	78.06	10.668	0.053	Non-sign.
	isoflurane	20	85.85	12.696		
Heart rate after	Halothane	17	85.00	20.899	0.490	Non-sign.
	isoflurane	20	89.30	16.604		

Table 4 show there was no statistically significant relationship between QTc measurements pre and post-operatively and type of anesthesia in

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both halothane and isoflurane group, QTc in patients received halothane (413.24 ± 27.667 to 434.41 ± 26.187) isoflurane (407.40 ± 25.824 to 422.40 ± 21.854).

Table 4 the mean and stander deviation of QTc measurements before and after hemorrhoidectomy.

Parameters	Type of anesthesia	Number of patients	Mean	S.D	P-value	T -test
QTc before	Halothane	17	413.24	27.667	0.512	Non-sign
	Isoflurane	20	407.40	25.824		
QTc after	Halothane	17	434.41	26.187	0.137	Non-sign
	Isoflurane	20	422.40	21.845		

Discussion:

In the present study a 37 healthy, young patients were taken and put into two groups the first group include 17 patients sustain the operation under general anesthesia and inducted with propofol 2mg/kg and ketamine 0.5mg/kg given by direct intravenous administration while maintenance of anesthesia was achieved by halothane 1.5% and the second group include 20 patients sustain operation under GA and inducted with same drugs and doses in group one but;

maintenance of anesthesia was achieved by isoflurane 1.5% , in both groups maintenance anesthetics were introduced in mixing with 40% oxygen via oxygen mask. For both groups ECG was recorded pre and post-operatively.

The mean and stander deviation of participants' age and duration of operation was considerably higher among those who received halothane in comparison to isoflurane and differences were statistically significant. T test was performed

to compare between means of both groups.

These results were disagreed with Hossein et al (6),(2013) Mashhad one hundred patients were enrolled in this study and divided randomly in to two groups of 50 patients for studying patients demographic factors effect and type of anesthesia that used in hemorrhoidectomy , but ; there was no significant relationship between type of anesthesia and BMI In the present work,QT interval measurement have been shown significant differences between pre and post-operative values in hemorrhoidectomy operations. The clinical significant of the prolonged QT interval due to it is association with potentially serious ventricular arrhythmias, although there are usually amenable to treatment with either drugs or cardiac pacing(3,12,13,14). It is possible that abnormal QT prolongation is a commonly

missed marker of preventable mortality due to arrhythmias. The treatment of prolonged QT interval includes B-adrenergic blockers alone or in combination with left cervico-thoracic sympathetic ganglionectomy . implantation of an automatic internal defibrillator may occasionally be required(5,15,16,17,18).

This is could be due to effects of anesthetic techniques or the drugs used may themselves influence the duration of QT interval. Riely et al (19) ,studied that the effects of volatile anesthetics agents and reported that halothane and isoflurane prolonged QT interval .

The present study concludes the followings;

- 1- Although maintenance of anesthesia with halothane might prolong the QT-interval and did not result in arrhythmias.
- 2- Maintenance of anesthesia with isoflurane was not

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associated with alterations in the QT-interval and induced no changes in cardiac rhythm.

- 3- Halothane and isoflurane cause only minor fluctuation in the heart rate.

Also, the present study recommends the followings;

- 1- To do more studies on the effects of sevoflurane modern anesthetic agent on cardiovascular system in children and young adults.
- 2- Use heart monitors that show the ECG before and during surgery and not only monitor pulse and blood pressure.

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