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To study and compare effect of isoflurane and sevoflurane on adult patients postoperatively under general anesthesia by measure liver function test

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ABSTRACT

Background: Effect of inhalational agents, namely, isoflurane and sevoflurane on patients having renal parameters has been explored quite often but the effect on liver function test has been rarely reviewed till date. **Aims and Objectives:** The aim of the study was to study the pre-operative liver function of patients who underwent general anesthesia by measuring their liver function test, post-operative effects of isoflurane, sevoflurane, and comparison. **Materials and Methods:** A total of 90 patients aged between 18 and 60 years who were further divided into two groups, that is, Group 1: (Isoflurane, n = 45) and Group 2: (Sevoflurane, n = 45) were included in the study. **Results:** The study comprised 51.1% of males and 48.9% of females, with similar distribution in either group ($P > 0.05$). Comparison of various pre-operative parameters at 24, 48, and 72 h in isoflurane cases showed that bilirubin, serum glutamic oxaloacetic transaminase (SGOT), serum glutamic-pyruvic transaminase (SGPT), protein, albumin, globulin were found to be statistically significant but urea, creatinine, prothrombin time, and international normalized ratio were insignificant ($P > 0.05$, NS). Comparison of pre-operative hemoglobin with that at 24, 48, and 72 h in isoflurane cases showed that mean isoflurane was 12.69 ± 1.77 which was found to be nil within 24 h, 48 h, and 72 h. Comparison of various parameters at 24, 48, and 72 h in sevoflurane cases showed that pre-operative mean sevoflurane was 0.49 ± 0.18 which was found to increase within 72 h, that is, 0.60 ± 0.18. Similarly, SGOT was found increased from pre-operative 27.58 ± 8.09 to 29.32 ± 7.32, SGPT 23.29 ± 7.02 to 26.22 ± 6.81. **Conclusion:** Inhalation agent isoflurane and sevoflurane cause significant changes in patient's liver function test, postoperatively under general anesthesia as indicated by various liver function parameters.

Key words: Isoflurane; Sevoflurane; Postoperatively; General anesthesia; Liver function test

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INTRODUCTION

Ideal inhaled anesthetics should have a stable, hemodynamic profile, and patient's safety. They can be categorized as (1) non-halogenated inhaled anesthetics includes and (2) halogenated inhaled anesthetics

Sevoflurane was synthesized in the late 1960's, but became available for clinical use in 1990's.1 It is an inhalation agent, its mode of action is similar to other inhaled agents, such as halothane and isoflurane. Rate of sevoflurane defluorination *in vitro* is approximately the same as that of methoxyflurane, however, the serum F^- ion concentration is less than methoxyflurane. Many early case reports in Japanese literature of sevoflurane being associated with post-operative hepatic dysfunction manifested by elevation in liver transaminase. It is not pungent, so it can be used as an induction agent in children. The MAC is decreased with

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age and also reduced by giving sevoflurane with nitrous oxide approximately 5% absorbed is metabolized in the release of inorganic fluoride with concentration usually peaking within 2 h. However, taking many days to return to baseline, may reduce the urine-concentrating ability of the kidney.[2]

Isoflurane

Fluorinated liquid anesthetic synthesized in 1965. It is a metabolite of enflurane. It is decreased portal blood flow while increased hepatic blood flow. The centrilobular area of the liver is most prone to hypoxia. Biotransformation of isoflurane is significantly less than that of sevoflurane or halothane. In human about 0.2% administered is evident as a traceable metabolite. Approximately 50% of this excreted in the urine, the principle metabolite being trifluoroacetic acid.[3]

Desflurane

It is released in 1992 similar to isoflurane; the difference is that isoflurane having chlorine atom and desflurane having fluorine. It decreased hepatic blood flow by 30%. It also decreased oxygen reserve capacity of the liver and small intestines.

Standard test panels used to evaluate hepatobiliary status are often called "liver function tests" To be precise, this terminology is a misnomer because none of the tests measure any specific liver function. Instead, they point to broad categories of hepatobiliary pathology: Hepatitis, hepatobiliary dysfunction, or insufficient protein synthesis. These categories include large subsets of diseases, for example, all possible causes of hepatitis.

Therefore, in view of the above, the present study was conducted to study the pre-operative liver function of patients who underwent general anesthesia by measuring their liver function test, post-operative effects of isoflurane, post-operative side effects of sevoflurane, and comparison of effects of isoflurane and sevoflurane on patients liver function test who underwent general anesthesia.

Aims and objectives

1. The objectives of the study are as follows: To study the pre-operative liver function of patients undergoing general anesthesia by measuring their liver function test
2. To study the post-operative effects of isoflurane on liver function test in patients who underwent general anesthesia by measuring their liver function test.

MATERIALS AND METHODS

The present study was conducted in the Department of Anesthesiology and Critical Care, World College of Medical Sciences and Research Hospital, Girawar, Jhajjar, Haryana (India) during February 2024–July 2024 for a period of 6 months. A total of 60 patients were included in the study who were further subdivided into three groups on the basis of drugs used. Group 1: (Isoflurane) included 45 cases aged between 18 and 60 years of age having who underwent surgery – Gen surgery/gynecology/orthopedics/plastic surgery. Group 2: (Sevoflurane) included a total of 45 cases also between the age 18 and 60 years who underwent surgery – General surgery/gynecology/orthopedics/plastic surgery anesthetic General anesthesia.

Inclusion criteria

The following criteria were included in the study:

a. ASA Class I and II
b. Age group between 18 and 60 years with pre-operative normal liver function underwent elective surgery under general anesthesia with a closed circuit.

Various liver blood tests and the differential diagnosis of hepatobiliary disorders

Blood test	Bilirubin overload (Hemolysis)	Predominant abnormality	
		Hepatocellular injury	Cholestasis
Aminotransferases	Normal	Increased-may be normal or decreased in advanced stages	Normal-may be increased in advances stages
Serum albumin	Normal	Decreased-may be normal in acute fulminant hepatic failure	Normal-may be decreased in advanced stages
Prothrombin time*	Normal	Prolonged	Normal-may be prolonged in advanced stages
Bilirubin (main form present)	Unconjugated (also mild increase in conjugates)	Conjugated	Conjugated
Alkaline phosphatase	Normal	Normal-may be increased by hepatic infiltrative disease	Increased
Glutamyl transpeptidase 5'- nucleotidase	Normal	Normal	Increased
Blood urea nitrogen	Normal-may be increased by renal dysfunction	Normal-may be decreased by severe liver disease and normal kidney function.	Normal
BSP/ICG (dye)	Normal	Retention of dye	Normal or retention of dye

BSP/ICG: Bromsulphalein/indocyanine green

Exclusion criteria

The following criteria were excluded from the study:

a. Patient below 18 years and above 60 years
b. Patients with pre-operative deranged liver function
c. Patients who are on prolonged medications like chemotherapeutic agents and anti-tubercular drugs
d. Patients who are on anticoagulants like aspirin clopidogrel
e. Patients with deranged renal functions.

Methods

All the patients were included after taking informed and written consent. Parameters included nil by mouth, weight, pre-operative hemogram, renal function test, coagulation profile, electrocardiograph, and chest X-ray were noted in all the patients.

In isoflurane group, all the patients were preoxygenated with 100% 02 for 3 min. Premedication were given with injection glycopyrrolate 0.04–0.08 mg/kg Induction with injection fentanyl 1.5–2 μg/kg, Injection propofol 1.5–2.5 mg/kg, Inhalation with agent isoflurane with mac value 1.5 mac, Intubation with injection atracurium 0.5–1 mg/kg along with maintenance with atracurium intermittent doses of 5 mg with isoflurane with mac value 1.5 mac with 02: N20 in closed circuit. Reversal injection neostigmine 0.05 mg/kg and Injection glycopyrrolate 0.008 mg/kg were used.

In Sevoflurane group, all the patients were preoxygenation with 100% 02 for 3 min, Premedication with injection glycopyrrolate 0.04–0.08 mg/kg, Induction with injection fentanyl 1.5–2.5 μg/kg, Injection propofol 1.5–2.5 mg/kg, Inhalation with agent sevoflurane with mac value 1.5 mac, Intubation with injection atracurium 0.5–1 mg/kg and maintenance with atracurium intermittent doses of 5 mg with sevoflurane with mac value 1.5 mac with 02: N20 in closed circuit. Reversal injection neostigmine 0.05 mg/kg and Injection glycopyrrolate 0.008 mg/kg were used.

Statistical analysis

At the end of the study, the data were collected and analyzed statistically.

RESULTS

The present study was conducted in the Department of Anesthesiology and Critical Care, World College of Medical Sciences and Research Hospital, Girawar, Jhajjar, Haryana (India).

In the present study, a total of 48.9% of patients were female and 51.1% were male out of which 22 (48.9%) female each were in isoflurane group and sevoflurane group, respectively. With regard to male patients, it was also equally distributed, that is, 51.1% each, respectively. On statistical analysis, the difference found to be comparable and thus statistically insignificant (P>0.05) (Table 1).

Table 1: Association among the cases according to sex

Sex	Group		Total
	Isoflurane	Sevoflurane	
Female			
No.	22	22	44
%	48.9	48.9	48.9
Male			
No.	23	23	46
%	51.1	51.1	51.1
Total			
No.	45	45	90
%	100.0	100.0	100.0

Table 2 shows comparison of various pre-operative parameters at 24, 48, and 72 h in isoflurane cases. Bilirubin, serum glutamic oxaloacetic transaminase (SGOT), serum glutamic-pyruvic transaminase (SGPT), protein, albumin, globulin were found to be statistically significant but urea, creatinine, prothrombin time (PT) and international normalized ratio (INR) found to be insignificant (P>0.05, NS).

Table 3 shows comparison of pre-operative hemoglobin (Hb) with that at 24, 48, and 72 h in isoflurane cases. Pre-operative mean isoflurane was 12.69±1.77 which was found to be nil within 24 h, 48 h, and 72 h.

Table 4 shows comparison of various parameters at 24, 48, and 72 h in sevoflurane cases. Pre-operative mean sevoflurane was 0.49±0.18 which was found to increased within 72 h, that is, 0.60±0.18. Similarly, SGOT was also found to be increased from pre-operative 27.58±8.09 to 29.32±7.32, SGPT 23.29±7.02 to 26.22±6.81. Protein was found to be slightly decreased from pre-operative 6.98±0.81–6.96±0.74, albumin 4.10±0.46–4.09±0.51 but globulin and urea was found to be increased from 1.12±0.21 to 1.16±0.21 and 27.84±5.40 to 27.96±5.50. On statistical analysis, all these parameters found to be highly significant (P<0.001) except urea.

Table 5 shows comparison of pre-operative parameters with that at 24, 48, and 72 h in sevoflurane cases. Pre-operative creatinine was found to be similar at all-time intervals, that is, 1.16±0.18, PT 13.03±2.16, INR 2.29±3.56, and Hb 12.93±1.51.

DISCUSSION

In the present study, age of the patients ranged from 18 to 60 years with the mean age in Group I 36±13.7 years and in Group 2 was 37±13.2 years. Mean weight of the patients in Group I was 50±11.6 kg and in Group 2, it was

Table 2: Comparison of various pre-operative parameters at 24, 48, and 72 h in isoflurane cases

Bilirubin	Isoflurane				Friedman RM ANOVA	
	Mean	SD	Median	IQR	Chi-square	P-value
Pre-operative	0.54	0.18	0.50	0.30	53.653	<0.001
Within 24 h	0.54	0.18	0.50	0.30	Significant	
Within 48 h	0.65	0.19	0.70	0.30		
Within 72 h	0.61	0.19	0.60	0.30		
SGOT						
Pre-operative	25.56	8.11	25.00	15.50	32.439	<0.001
Within 24 h	25.67	8.25	25.00	15.50	Significant	
Within 48 h	26.96	7.59	25.00	12.00		
Within 72 h	26.11	7.77	25.00	14.00		
SGPT						
Pre-operative	21.18	6.19	20.00	9.00	72.98	<0.001
Within 24 h	21.49	6.72	20.00	9.00	Significant	
Within 48 h	23.42	6.56	24.00	9.50		
Within 72 h	21.69	6.44	21.00	8.00		
Protein						
Pre-operative	6.96	0.85	7.00	2.00	10.371	0.016
Within 24 h	6.96	0.77	7.00	2.00	Significant	
Within 48 h	6.91	0.73	7.00	1.00		
Within 72 h	7.38	0.78	8.00	1.00		
Albumin						
Pre-operative	4.15	0.59	4.00	1.30	42.738	2.80E-09
Within 24 h	4.18	0.59	4.0	1.25	Significant	
Within 48 h	4.39	0.62	4.50	1.00		
Within 72 h	4.36	0.62	4.50	1.15		
Globulin						
Pre-operative	1.05	0.27	1.00	0.40	16.251	0.00101
Within 24 h	1.05	0.27	1.00	0.40	Significant	
Within 48 h	1.13	0.29	1.10	0.60		
Within 72 h	1.08	0.27	1.10	0.30		
Urea						
Pre-operative	27.00	6.15	24.00	12.00	0.117	0.990
Within 24 h	26.47	6.60	24.00	12.00	Not significant	
Within 48 h	26.47	6.60	24.00	12.00		
Within 72 h	26.31	6.49	24.00	11.50		
Creatinine						
Pre-operative	1.09	0.21	1.00	0.30	1.278	0.734
Within 24 h	1.08	0.21	1.00	0.30	Not significant	
Within 48 h	1.09	0.21	1.00	0.30		
Within 72 h	1.09	0.21	1.00	0.30		
PT						
Pre-operative	13.69	1.8	14.00	2.00	0.200	0.978
Within 24 h	13.69	1.8	14.00	2.00	Not Significant	
Within 48 h	13.69	1.8	14.00	2.00		
Within 72 h	13.69	1.8	14.00	2.00		
INR						
Pre-operative	1.16	0.20	1.10	0.35	3.000	0.392
Within 24 h	1.16	0.20	1.10	0.35	Not Significant	
Within 48 h	1.16	0.20	1.10	0.35		
Within 72 h	1.16	0.21	1.10	0.35		

SGOT: Serum glutamic oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase, PT: Prothrombin time, INR: International normalized ratio

Table 3: Comparison of pre-operative Hb with that at 24, 48 and 72 h in isoflurane cases

Hb	Isoflurane			
	Mean	SD	Median	IQR
Pre-operative	12.69	1.77	12.40	2.50
Within 24 h	0.00	0.00	0.00	0.00
Within 48 h	0.00	0.00	0.00	0.00
Within 72 h	0.00	0.00	0.00	0.00

Hb: Hemoglobin

52±14.3 kg (P>0.05, NS). Sex distribution in Groups I and 2 was also comparable and not significant. Mean duration of surgery in Group I was 4±1.7 h and in Group 2, it was 4.5±1.9 years (P>0.05, NS).

Pre-operative and post-operative analysis of liver function tests in Group I (Isoflurane)

In Group I, first analysis of liver function tests was done by serum bilirubin which was not increased or decreased

Table 4: Comparison of various parameters at 24, 48, and 72 h in sevoflurane cases

Bilirubin	Sevoflurane				Friedman RM ANOVA		
	Mean	SD	Median	IQR	Chi-square		P-value
Pre-operative	0.49	0.18	0.50	0.25	72.659		P<0.001
Within 24 h	0.72	0.18	0.80	0.30		Significant	
Within 48 h	0.69	0.15	0.70	0.20			
Within 72 h	0.60	0.18	0.60	0.20			
SGOT							
Pre-operative	27.58	8.09	29.00	15.00	88.862		P<0.001
Within 24 h	31.78	7.05	34.00	12.50		Significant	
Within 48 h	29.82	7.39	32.00	11.00			
Within 72 h	29.31	7.32	32.00	11.00			
SGPT							
Pre-operative	23.29	7.02	21.00	13.00	90.253		P<0.001
Within 24 h	29.96	5.90	28.00	11.00		Significant	
Within 48 h	27.53	5.78	25.00	10.50			
Within 72 h	26.22	6.81	24.00	11.50			
Protein							
Pre-operative	6.98	0.81	7.00	2.00	11.049		P<0.001
Within 24 h	7.31	0.67	7.00	1.00		Significant	
Within 48 h	7.13	0.69	7.00	1.00			
Within 72 h	6.96	0.74	7.00	1.50			
Albumin							
Pre-operative	4.10	0.46	4.00	0.50	13.235		P<0.001
Within 24 h	4.18	0.47	4.20	0.60		Significant	
Within 48 h	4.18	0.50	4.30	0.70			
Within 72 h	4.09	0.51	4.00	0.50			
Globulin							
Pre-operative	1.12	0.21	1.10	0.40	21.128		P<0.001
Within 24 h	1.23	0.20	1.20	0.40		Significant	
Within 48 h	1.19	0.19	1.20	0.30			
Within 72 h	1.16	0.21	1.10	0.30			
Urea							
Pre-operative	27.84	5.40	29.00	8.00	5.651		0.130
Within 24 h	27.96	5.50	29.00	8.00		Significant	
Within 48 h	27.96	5.50	29.00	8.00			
Within 72 h	27.96	5.50	29.00	8.00			

SGOT: Serum glutamic oxaloacetic transaminase, SGPT: Serum glutamic-pyruvic transaminase

in first 24 h with a mean value of 0.54 (P>0.05, NS) compared with pre-operative values with a mean of 0.54 but statistically analysis within 48 h and 72 h shows significant changes (mean value 0.65, P<0.05) compared with pre-operative values shows that isoflurane inhalation shows changes in serum bilirubin values. SGOT values show that within 48 h, there was an increase in SGOT values with a mean of 26.96 compared with pre-operative values (mean value 25.56, P<0.05) but there were no significant changes in within 24 and 72 h compared with pre-operative values (mean value 25.67 and 26.11). SGPT values by analysis show that it also shows that within 48 h (mean 23.42) there was an increased value compared with pre-operative values with a mean value of 21.18 while there were no changes in SGPT value within 24 h with a mean of 21.49 and also no changes within 72 h.

Comparison of total protein values with inhalation of isoflurane analysis shows that there are changes of protein values within 72 h within mean value 7.38 compared with pre-operative value with a mean of 6.96 and there is no change within 24 and 48 h with a mean of 6.96 and 6.91 compared with pre-operative mean of 6.96. Albumin values comparison in PT in Group I within 24 h shows no changes (mean value 4.18) compared with pre-operative values with (mean value of 44.15) there is change within 48 and 72 h with a mean of 4.39 and 4.36 compared with pre-operative value with a mean of 4.15.

Globulin values analysis shows that comparison of value at 48 h shows changes in values with a mean value of 1.13 compared with pre-operative value with a mean of 1.05, however, 24 and 72 h shows no change with a mean of 1.05. Comparative analysis of urea values at 24, 48, and 72 h shows minor changes in value with a mean value of 26.47 compared with pre-operative value with a mean of 27.0.

Creatinine values at 24, 48, and 72 h show minor changes with a mean value of 1.09 compared with pre-operative value with a mean of 1.09. Comparison of coagulation parameter PT shows no changes within 24, 48, and 72 h with a mean of 13.03 compared with pre-operative value

Table 5: Comparison of pre-operative parameters with that at 24, 48, and 72 h in Sevoflurane cases

Creatinine	Sevoflurane			
	Mean	SD	Median	IQR
Pre-operative	1.16	0.18	1.20	0.25
Within 24 h	1.16	0.18	1.20	0.25
Within 48 h	1.16	0.18	1.20	0.25
Within 72 h	1.16	0.18	1.20	0.25
PT				
Pre-operative	13.03	2.16	13.00	2.00
Within 24 h	13.03	2.16	13.00	2.00
Within 48 h	13.03	2.16	13.00	2.00
Within 72 h	13.03	2.16	13.00	2.00
INR				
Pre-operative	2.29	3.56	1.20	0.30
Within 24 h	2.29	3.56	1.20	0.30
Within 48 h	2.29	3.56	1.20	0.30
Within 72 h	2.29	3.56	1.20	0.30
Hb				
Pre-operative	12.93	1.51	13.00	2.00
Within 24 h	12.93	1.51	13.00	2.00
Within 48 h	12.93	1.51	13.00	2.00
Within 72 h	12.93	1.51	13.00	2.00

PT: Prothrombin time, INR: International normalized ratio, Hb: Hemoglobin

(P>0.05 with mean value of 13.03). Comparison of INR within 24, 48, and 72 h shows no changes with a mean of 2.29 compared with pre-operative value (P>0.05 with mean value of 2.29). Comparison of Hb within 24, 48, and 72 h shows no changes compared with pre-operative value (P>0.05, mean 12.93).

Pre-operative and post-operative analysis of liver function tests in Group 2 (Sevoflurane)

In Group 2, the first analysis of liver function tests was done by serum bilirubin which was increased in the first 24 h with a mean value of 0.72 compared with pre-operative value with a mean of 9.49 (P<0.05), and also changes occurred in 48 and 72 h with a mean value of 0.69 and 0.68 compared with pre-operative value with a mean of 0.49. Comparison of SGOT value at 24 h with a mean of 31.78 compared with pre-operative value with a mean of 27.58 and significant changes within 48 and 72 h (P<0.05) with a mean of 29.82 and 29.31 compared with pre-operative value of 27.58. Comparison of SGPT value at 24 h with a mean of 28.96 shows changes compared with pre-operative value with a mean of 23.29 and also shows significant changes within 48 and 72 h with a mean of 27.53 and 26.22 compared with pre-operative value with a mean of 23.29.

Comparison of pre-operative total protein value in Group 2 with post-operative value within 24 h with a mean value of 7.31 (P<0.05) compared with pre-operative value with a mean of 6.98 and also changes occur within 48 h with a mean of 7.13 and also within 72 h with a mean of 6.96 compared with pre-operative value with a mean of 6.98. Comparison of pre-operative albumin value with a mean of 4.10 with 24 h shows changes with a mean of 4.18 and also within 48 h there were changes with a mean of 4.18 and no change within 72 h with a mean of 4.09 compared with pre-operative value with a mean of 4.10.

Comparison of pre-operative globulin value in Group 2 with post-operative value within 24 and 48 h shows an increase within 24 h (P<0.05) with a mean of 1.23 compared with pre-operative value with a mean of 1.12 and also within 48 and 72 h with a mean of 1.19 and 1.16 compared with pre-operative value with a mean of 1.12. Comparison of pre-operative urea value in Group 2 with post-operative value within 24, 48, and 72 h shows minor changes with a P=27.96 compared with pre-operative value of 27.84.

Comparison of pre-operative creatinine value in Group 2 with post-operative value within 24, 48, and 72 h shows no changes with a mean value of 1.16 compared with pre-operative value of 1.16. Comparison of pre-operative PT value in Group 2 with post-operative value within 24, 48, and 72 h shows no changes with mean of 13 compared with pre-operative value with a mean of 13. Comparison of pre-operative INR value in Group 2 with post-operative value within 24, 48, and 72 h shows no changes with a mean value of 2.29 compared with pre-operative value of 2.29. Comparison of pre-operative Hb value in Group 2 with post-operative value within 24, 48, and 72 h shows no changes with a mean of 12.

Present study findings were found to be similar a study reported by Turillazzi et al.[4]

Sevoflurane is an inhaled anesthetic that is used world-wide. A clear understanding of the exact mechanism of hepatic injury induced by sevoflurane remains elusive. Genetic factors, anesthetic toxic metabolites, and idiosyncratic response have been hypothesized as possible causes reported by Cullen.[5] In particular, an immune reaction may be on the base of those rare, fulminant form of severe necrosis which may be fatal reported by Puiq.[6]

Several studies have addressed on liver and renal function tests after repeated sevoflurane anesthesia. Reich et al.,[7] and Eger et al.,[8] reported hepatic damage after sevoflurane anesthesia in man persisted strongly increased; aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels peaked at 2 days after the second sevoflurane exposure (AST 61.69 U/L, ALT 1690. U/L, lactate dehydrogenase [LDH] Peaked at 3 days (LDH 6397) and

they remained elevated until death, which occurred on the 8 days after the first surgical intervention.

Araki et al.,[9] reported microscopic examination which revealed extensive and confluent bridging perivenular necrosis; cells were swollen, and vacuoles, pycnosis, and cell fusion appeared; the presence of dark fine particles in the cytoplasm was observed. In the perivenular zone, they observed drop out of liver cells, a fine light brown PAS+intracytoplasmic pigment accumulation in hypertrophied Kupfer cells, and mononuclear cell infiltration.

Limitations of the study

Lesser number of sample size. Postoperative follow up duration should be longer to look for long term outcome.

CONCLUSION

In the present study, inhalation agent isoflurane and sevoflurane cause significant changes in patient's liver function test, postoperatively under general anesthesia as indicated by various liver function parameters. There were significant changes in bilirubin SGOT, SGPT, total protein, albumin, and globulin with minor changes in the coagulation profile of a patient who underwent general anesthesia under the effect of an inhalation agent. The present study also reported more changes in the liver function test of patients of sevoflurane inhalation agent compared with isoflurane inhalation agent as indicated by various parameters of liver function test, namely, bilirubin, SGOT, SGPT, total protein, albumin, and globulin. Sevoflurane causes more changes in bilirubin, SGOT, SGPT, total protein, albumin, and globulin compared with isoflurane inhalation agent. There were minor changes in patients with renal function test indicated by various renal function parameters, namely, blood urea and creatinine under general anesthesia.

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