

COMPARASION OF ISOFLURANE AND HALOTHANE ON RECOVERY CHARACTERISTICS IN DAY CARE SURGERYKewal Krishan Gupta¹, Haramritpal Kaur², Iqbal Singh³**HOW TO CITE THIS ARTICLE:**

Kewal Krishan Gupta, Haramritpal Kaur, Iqbal Singh. "Comparasion of Isoflurane and Halothane on Recovery Characteristics in Day Care Surgery". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 71, December 18; Page: 15078-15082, DOI: 10.14260/jemds/2014/4028

ABSTRACT: Day Care Surgery conducted under general anaesthesia, largely depends on anaesthetic agents which have shorter duration of action and hence are able to provide rapid recovery. In the present study we intend to compare the recovery profile of the two easily available agents in India i.e. isoflurane and halothane and compare their usefulness in day care surgery. **MATERIALS AND METHODS:** 50 patients were randomly divided into two groups of 25 each in age group of 18 to 60 years, of either sex, of American Society of Anaesthesiologists (ASA) grade I or II undergoing different surgeries of short duration up to half an hour, after proper preoperative screening. In both the groups induction was done with propofol 2 mg/kg. In group I patients, 1.0 Minimum Alveolar Concentration (MAC) halothane and in group II 1.0 MAC isoflurane was used for maintenance of general anaesthesia along with mixture of oxygen and nitrous oxide in the ratio of 40: 60. Narcotics and anti sialogogues that cross blood brain barrier were avoided, which may interfere with the recovery patterns. Postoperative recovery was divided into two phases and both the groups were compared by means of various clinical tests. **RESULT:** We found that early recovery following Isoflurane was more rapid compared to Halothane. The psychomotor tests to assess the intermediate recovery also showed the significant difference between the two groups with P value <0.001. More number of patients was able to sit up at half an hour and stand at two hours in the isoflurane group compared to halothane group. **CONCLUSION:** Isoflurane is a useful and better anesthetic over halothane and offers a clear advantage when used for maintenance of anaesthesia for operations performed on a day-care basis. **KEYWORDS:** Isoflurane, halothane, day care surgery.

INTRODUCTION: The earliest reference for day care surgery is mentioned as early as beginning of the 19th century by James Nicoll, a Glasgow surgeon, who performed about 9000 outpatient operations on children in 1903,¹ and later in 1912 when Ralph Water from Iowa, USA described "The Down Town Anaesthesia Clinic" where he gave anaesthesia for outpatient surgery.² However it has gained much of importance in the recent times as it offers certain advantages like 1) reduced cost of medical care 2) less time away from work 3) less opportunity for unnecessary medical investigations 4) reduced number of patient awaiting surgery.³ The major emphasis in day care surgery is placed on anaesthetic technique which has quicker induction, minimum interference with patient's hemostasis, shorter awakening time, shorter time to response to verbal command, quicker return of psychomotor functions to normal and minimal postoperative side effects so that patients may be discharged within hours of such procedures. Most of published studies relate to comparison of halothane or isoflurane to sevoflurane, desflurane and enflurane in paediatric surgeries.^{4,5,6}

In the present study, we investigated the comparative recovery profiles of isoflurane and halothane including emergence time, psychomotor recovery, ability to sit and stand unsupported following general anaesthesia in out-patient surgical patients.

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MATERIAL AND METHODS: After approval from the Institutional Ethical Committee patients in the age group of 18–60 years, of either sex, belonging to ASA grade I or grade II and scheduled for different surgical procedures of short duration lasting up to half an hour under ambulatory anaesthesia were selected after preoperative screening. A written informed consent was taken from each patient.

Patients were randomly divided into two groups of twenty five each using computer generated random numbers. Patients of both the groups were given nil per orally order as restriction of solids for 6 hours and restriction of clear fluids for up to 2 hours. Patients of both the groups were also made aware of different psychomotor tests to be used in study. Psychomotor recovery was assessed using perceptive accuracy test, card sorting test and finger tapping test. All the patients were given 0.5 mg alprazolam orally night before surgery.

After shifting the patient to operation theatre, standard monitors were applied including five-lead electrocardiogram, non-invasive blood pressure (NIBP) and pulse oximetry recorded and intravenous line was set up with lactated ringer's solution and ondansetron 4 mg i.v and 0.05mg/kg midazolam intravenously (IV) slowly were given. After preoxygenation with 100% oxygen, patients were induced with 1% propofol 2 mg/kg body weight IV slowly. Airway was maintained by using laryngeal mask airway (LMA) of adequate size. Injection Ketorolac 30mg IV was given for pain relief. Maintenance of anaesthesia was done with 1.0 MAC halothane in group I and 1.0 MAC isoflurane in group II, along with mixture of nitrous oxide and oxygen in ratio of 60:40. No muscle relaxant was used in either of the groups.

Intraoperative heart rate, blood pressure, and oxygen saturation were monitored. At the conclusion of surgery, recovery from anaesthesia was recorded in two phases:

RECOVERY PHASE I: was the time from which the surgery was completed and anaesthesia turned off until the patient was awake and oriented. This recovery phase was judged by asking the patient to open eyes on command and gives his/her name. This was done at intervals of every one minute after discontinuing the inhalational anaesthetic.

RECOVERY PHASE II: was the time between admission to and discharge from post-anaesthetic recovery room. The intermediate recovery phase was judged by psychomotor tests and ability of the patient to sit and stand without support. Following psychomotor tests were tested every 15 minutes on patients.

- a. Perceptive Accuracy Test: In this patients were asked to tell two or three digits number displayed on calculator. The number of correct answers in a period of two minutes was recorded.
- b. Finger Tapping Test: Here the patient was asked to tap on keyboard of the calculator. The number of times the patient taps on the keyboard in 30 seconds was taken as finger tap score.
- c. Card Sorting Test: A set (i.e. 52) of playing cards was taken. Patient was asked to separate red and black cards into two bundles. The time taken to separate the total cards accurately was recorded.

During postoperative period patients were also monitored for complications like pain, cyanosis and nausea/ vomiting along with pulse rate, blood pressure and oxygen saturation. The patients were

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given fitness for discharge from post anaesthesia care unit by senior anaesthesiologist by using Modified Aldrete Score.

All the results were recorded and analyzed statistically using unpaired students 't' test and chi square test, p values <0.05 were taken as significant.

RESULTS: Both the groups were statistically comparable in terms of age, gender, duration of surgery and type of surgery.

During recovery phase I (early recovery) average response time for opening eyes on command was 8.04 ± 1.06 minutes in group I and 5.00 ± 0.81 minutes in group II (Table I). Mean time taken to telling his/her name in group I was 8.88 ± 1.09 minutes and in group II was 5.72 ± 0.80 minutes (Table I). There was statistically significant difference of mean time taken to open eyes on command and time taken to tell his/her name between both the groups ($P < 0.001$).

In recovery phase II, patients in both the groups could not perform psychomotor tests at 15 minutes but could perform at 30 minutes. There was significant difference between the two groups in the performance of psychomotor tests at 30 minutes with the patients in group II performed better than group I in all psychomotor tests done at 30 minutes after termination of anaesthetic (Table II).

In recovery phase II, none of the patient was able to sit without support at first 30 minutes in both the groups. In isoflurane group 84% of patients were able to sit at 60 minutes and 76% of patients were able to stand at 120 minutes unsupported while in halothane group only 68% of patients were able to sit at 60 minutes and 60% of patients were able to stand at 120 minutes unsupported (Table III). At 120 minutes the number of patients who were ready to discharge was more in isoflurane group than in halothane group. At 180 minutes all the cases in both the groups were able to sit and stand unsupported. Postoperative recovery was uneventful in all the patients. No incidence of nausea/vomiting, cyanosis and cardiac arrhythmias was noted in both the groups. None of patients complained of pain postoperatively.

DISCUSSION: Day care surgery is still in infancy in India. Day Care Surgery conducted under general anaesthesia largely depends on anaesthetic agents which have shorter duration of action and hence are able to provide rapid recovery to the patients. Therefore, a safe and short postoperative recovery period and especially the full recovery of complex psychological function after general anaesthesia have become increasingly important. Till date, there have been number of studies aimed at finding the suitable inhalational agent for the purpose of ambulatory surgery. Halothane and isoflurane are more popular due to their easy availability. By standardizing the technique, the different effects of pre-medicants and inducing agents on the recovery profile was minimized in study.

There was statistically significant difference in average response time to open eyes on command and to tell name between two groups. We found that early recovery following isoflurane was more rapid as compared to halothane. This finding of our study is also supported by study done by Wren al⁷ which found that recovery from isoflurane was markedly faster.

The results of psychomotor tests to assess the recovery phase II (intermediate recovery) also showed the significant difference between the two groups. We found that psychomotor recovery was quicker in isoflurane group than in halothane group. More number of patients was able to do these tests accurately in isoflurane group. A study conducted by Bhandarker et al⁸ (2006) also found that psychomotor recovery was quicker with is of lurane than with halothane.

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There was a difference between the two groups in ability to sit and stand unsupported. In isoflurane group more patients were able to sit without support at 60 minutes and were able to stand without support at 120 minutes in comparison to halothane group. At 120 minutes the number of patients that were ready to discharge from recovery room was more in isoflurane group than in halothane group. These findings were in accordance with study done by Bhandarker et al. (2006)

During postoperative period there were no complications like cardiac arrhythmias, cyanosis and nausea/vomiting in both the groups. Postoperative recovery was uneventful in both the groups. These findings of our study correlate with observations of study done by Bhatia et al.⁹

CONCLUSION: To conclude, isoflurane is a better anaesthetic over halothane and has more favorable recovery profile and offer a clear advantage when used for maintenance of anaesthesia for operations of short duration performed on day care basis.

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Test	Halothane Group I		Isoflurane Group II		P value
	Mean	±S.D	Mean	±S.D	
time to Opening eyes on command (mins.)	8.04	1.06	5.00	0.81	<0.001
Time to Telling his/her name (mins.)	8.88	1.09	5.72	0.80	<0.001

TABLE 1: SHOW RECOVERY PHASE I

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Test		Halothane Group I	Isoflurane Group II	P- Value	Difference
Perceptive Accuracy Test		87.7%	98.2%	<0.001	Significant
FFT Score no.		39.9	45.8	<0.001	Significant
Card Sorting Test	Time (sec.)	46.0	34.6	<0.001	Significant
	%age	88.9%	97.1%	<0.001	Significant

TABLE 2: SHOW PHASE II RECOVERY USING PSYCHOMOTOR TESTS AT 30 MINUTES

	Halothane Group I		Isoflurane Group II		P- Value
	No.	%age	No.	%age	
Ability to sit up without support					
	At 30mins.				
	none		none	84%	<0.05
	17	68%	21		
At 60mins.					
Ability to stand without support					
	At 120 minutes				
	15	60%	19	76%	<0.05

TABLE 3: SHOWING PHASE II RECOVERY USING ABILITY TO SIT AND STAND UNSUPPORTED

AUTHORS:

1. Kewal Krishan Gupta
2. Haramritpal Kaur
3. Iqbal Singh

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Anaesthesia, GGSMC & Hospital, Faridkot.
2. Assistant Professor, Department of Anaesthesia, GGSMC & Hospital, Faridkot.
3. Ex Professor & HOD, Department of Anaesthesia, G M C, Amritsar.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Haramritpal Kaur,
Assistant Professor,
Department of Anaesthesia,
GGSMC & Hospital, Faridkot.
Email: amritk_dr@yahoo.co.in

Date of Submission: 05/12/2014.
Date of Peer Review: 06/12/2014.
Date of Acceptance: 12/12/2014.
Date of Publishing: 16/12/2014.