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ORIGINAL RESEARCH

Comparison of Propofol (TIVA) Versus Isoflurane Based Anaesthesia on Recovery Time and Post-Operative Adverse Effects in Adult Mastoid Surgery

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ABSTRACT

Background: Mastoid Surgery requires bloodless surgical field for better operating conditions, deep level of anaesthesia and rapid emergence. A total intravenous anaesthesia (TIVA) with Propofol, has been a popular choice for both induction and maintenance of general anaesthesia (GA).The aim of this study was to compare the effects of Propofol versus Isoflurane based anaesthesia in adult mastoid surgery with respect to recovery time and post-operative side effects.

Method: A total 70 patients ofeither sex, age between 18 to 60 years, ASA status 1 and 2 were enrolled and divided into two groups (35 each). Propofol group: patients who received Propofol infusion at 4-6mg/kg intraoperatively for maintenance of anaesthesia. Isoflurane group: patients who received Isoflurane inhalation intra-operatively for maintenance of anaesthesia.

Results: The recovery time in Propofol group (2.46±0.508 min) was lesser than in Isoflurane group (2.65±0.780 min), (P=0.157). The mean nausea/vomiting score was relatively more among Isoflurane group (at 30 mins it was 1.22), as compared to Propofol group (at 30 mins it was 1.1), (p=0.074).In Isoflurane group, the VAS score at baseline was 2.93 and it was reduced to 2.14 at 24 hours while in Propofol group, the mean VAS score at baseline was 2.96, it was reduced to 2.18 at 24 hours. This reduction was statistically significant, ($p<0.05$) but there was no inter-group significant difference between the two groups.The need of analgesics in the post-operative period was more in both the groups in initial 30 minsand need of anti-emetics was relatively more in Isoflurane group at 30 mins.

Conclusion: Propofol (TIVA) could be preferred anaesthetic choice as compared to Isoflurane anaesthesia in patients undergoing mastoid surgery under GA. But, to get statistically significant finding, further study with large sample size may be required to support our conclusion.

Keywords: Mastoid Surgery; Anaesthesia; Propofol; Isoflurane; Recovery time;VAS score.

INTRODUCTION

The Mastoid surgery requires bloodless surgical field for better operating conditions, deep level of anaesthesia and rapid emergence with minimal complications like postoperative pain, nausea and vomiting [1-4].It has been reported that 50-80% of the patients who undergo middle ear surgery experience post-operative nausea and vomiting [5-7]. This incidence may justify the use of prophylactic antiemetics for the prevention of postoperative nausea and vomiting (PONV) after middle ear surgery. Numerous anti-emetics, such as 5-HT3 antagonists, dopamine receptor antagonists, and antihistamine drugs have been studied for the prevention of PONV after middle ear surgery [8,9].A total intravenous anaesthesia (TIVA) with Propofol, has been a popular choice for both induction and maintenance of general anaesthesia owing to rapid onset, short duration of action, rapid recovery and low incidence of PONV.Injection Propofol has been shown to be

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superior to inhalational anaesthesia in terms of rapid recovery from GA. The kinetics of Propofol allows both induction and continuous maintenance of anaesthesia with rapid recovery of consciousness at the end of the procedure. Studies have also shown that Propofol provides better surgical field visibility and less blood loss than inhalational anaesthesia for middle ear microsurgery [10-12].Bispectral index (BIS) monitoring plays an essential role in anaesthesia management in patients undergoing GA. BIS is an objective method of assessing the depth of anaesthesia intraoperatively. BIS decreases with increasing depth of anaesthesia, and an adequate level of anaesthesia is achieved with BIS ranging from 40-60. BIS monitoring allows reduction in total amount of anaesthetic drugs and decreases the recovery time [13,14].Hence, we decided to conduct present study to compare the effect of Propofol (TIVA) versus Isoflurane based anaesthesia on recovery time and post-operative adverse effects in adult mastoid surgery.

MATERIALS AND METHODS

A total 70 patients of either sex, age between 18 to 60 years, ASA status 1 and 2 were enrolled in the study.After IEC-HR Permission, patients were scheduled for the routine surgical procedures under general anaesthesia. Patients were thoroughly evaluated regarding fitness for general anaesthesia as per institutional protocol. All baseline information and relevant investigations required were checked. Standard monitoring was applied in the form of non-invasive blood pressure, electrocardiography, pulse oximetry and BIS monitoring. Intravenous access was established, and ringer's lactate solution was commenced.All the patients were premedicated with inj. glycopyrrolate 0.2mg and inj. ondansetron 4mg iv. Sedation was administered with inj. Midazolam 0.02mg/kg and inj. fentanyl 2mcg/kg body weight. Patients were pre-oxygenated with 100%oxygen under mask using semi closed circuit. Anaesthesia was induced in both the groups with inj. Propofol 2.5/3mg/kg body weight till loss of verbal contact. The tracheal intubation was established using neuromuscular blockade with inj. vecuronium 0.1mg/kg IV and IPPV with oxygen & N2O. After induction, all the patients were started with inj. dexmedetomidine loading dose 1mcg/kg for initial 10 mins and continued with rate of 0.5mcg/kg till 15mins prior to end of the surgery. Anaesthesia was maintained on 60% nitrous oxide in oxygen and all the patients were mechanically ventilated to maintain the end tidal concentration (Etco2) between 30-35mmhg.Patients were selected into two groups according to the use of anaesthetic agent administered for maintenance of the anaesthesia.Group Propofol: Those who received Propofol infusion at 4-6mg/kg intraoperatively for maintenance of anaesthesia.Group Isoflurane: Those who received Isoflurane inhalation agent intra-operatively for maintenance of anaesthesia.In group I-Isoflurane was given initially as 1% and subsequently reduced to 0.8%-0.6% (end tidal concentration) as per the BIS monitoring in the range of 40-60. MAC value of Isoflurane was noted in group I throughout the procedure.In group P- Propofol infusion rate was adjusted between 4-6 mg/kg, which will be required to maintain haemodynamics and BIS measurement score (40-60) throughout the procedure. The rate of Propofol infusion was noted in group P.Intra-operatively, heart rate, arterial blood pressure, ECG, EtCO2 and pulse oximetry (SpO2), Isoflurane MAC and BIS was noted at 5 mins interval for first 30 mins & then every 15 mins intervals till the end of surgery. For Postoperative analgesia all patients were given Inj. paracetamol 15 mg/kg. At the end of surgery, muscle relaxant action was reversed in patients with reversal drugs and patients extubated as per standard institutional protocol.During recovery period parameters observed were recovery time, nausea and vomiting score(1= no nausea and vomiting; 2= mild nausea and vomiting; 3= moderate nausea and vomiting; 4= severe nausea and vomiting). Number of episodes of nausea and vomiting in 24 hrs post operative period.VAS score was noted at regular intervals in the recovery room and in the ward at 30mins,1hr,2hr,4hr,8hr,12hr and 24 hrs.All the patients experiencing nausea or vomiting were administered first line rescue antiemetic as inj. metoclopromide10 mg IV, if no response then inj. Ondansetron 0.1 mg/kg IV was given in the recovery room. If patients requested additional analgesia in the recovery room, inj. Fentanyl 0.5-1 mcg/kg was given. The times of administration of anti-emetics and analgesia drugs was also recorded in the post-operative period.

STATISTICAL ANALYSIS

The collected data was entered using M.S. Excel software. Descriptive statistical analysis was done to find out prevalence. Comparison of recovery time of two methods – Propofol (TIVA) and Isoflurane was done using student's t-test. Comparison of PONV of two methods- Propofol (TIVA) and Isoflurane was done using non-parametric tests. Association between different categorical variables was assessed using Chi-square test. In case of three and more continuous variables, ANOVA test was applied. Quantitative variables between different groups were compared using Student's t-test for continuous data. If calculated p-values found less than 0.05, the difference was considered as significant.

OBSERVATIONS AND RESULTS

The present study enrolled 70 patients and divided into two groups of 35 in each group (group P and group I). Both the groups were comparable and found no significant difference with respect to age, gender, weight and BMI as shown in table 1.

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Table 1: Demographic profile of the patients

Demographic data		Isoflurane	Propofol	P value
Age	Mean	32.54	32.57	0.49
Weight	Mean	58.68	58.32	0.42
BMI	Mean	23.96	23.96	0.49
Gender	Male	20	20	1.0
	Female	15	15	

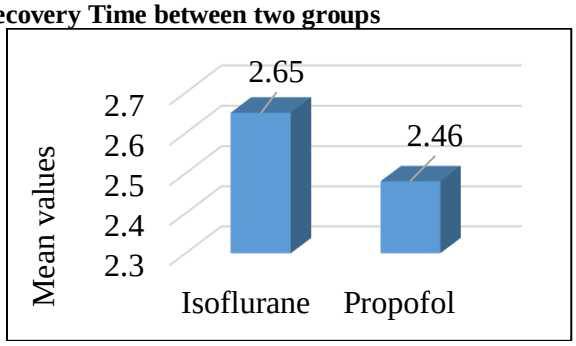
From the table 2, it was observed that in Isoflurane group, the BIS Score at baseline was 92, while it was reduced to 47.89 at 4 hours. The reduction in BIS score from baseline till 4 hours was compared using ANOVA test, and it was found to be statistically significant, ($p<0.00001$). While in Propofol group, the mean BIS score at baseline was 92.36, while same at 4 hours was reduced to 47.96. ($p<0.00001$).However, there was no inter-group significant difference between the observations. (The p-value was 0.469).

Table 2: Comparison of BIS index among study groups

Duration	Isoflurane	Propofol
0 min	92	92.36
30 mins	64.29	64.14
1 hour	62	61.82
1.5 hours	58.61	58.36
2 hours	54.75	54.82
2.5 hours	51.32	51.36
3 hours	50.14	50.11
3.5 hours	50.11	50.14
4 hours	47.89	47.96
P value	<0.00001	<0.0000
Significant between 2 groups	0.46	

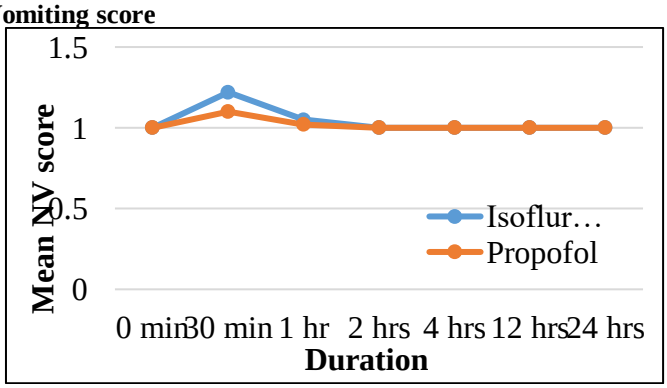
The recovery time in Propofol group (2.46±0.508 mins) was lesser than that in Isoflurane group (2.65±0.780 mins), which was not statistically significant with p value of 0.157 as depicted in figure 1.

Figure 1: Comparison of Recovery Time between two groups



From the figure 2, it was observed that NV score was relatively more among Isoflurane group (at 30 mins it was 1.22), as compared to Propofol group (at 30 mins it was 1.1) which was not statistically significantwith p value of 0.074.

Figure 2: Nausea and Vomiting score



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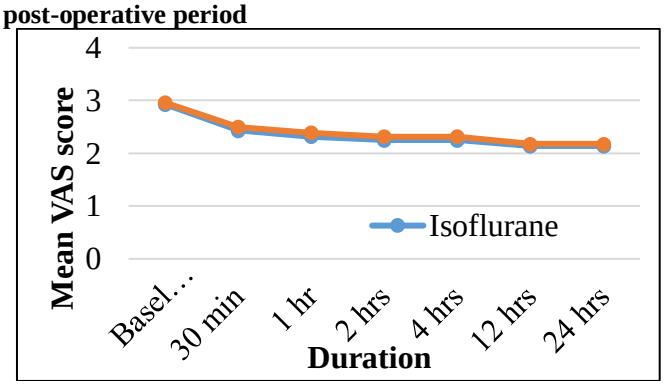
In Isoflurane group, the VAS score at baseline was 2.93, while same at 24 hours was reduced to 2.14. The reduction in VAS score from baseline till 24 hours was compared using ANOVA test, and it was found to be statistically significant, (p-value: <0.0001). While in Propofol group, the VAS score at baseline was 2.96, while same at 24 hours was reduced to 2.18, (p-value: <0.0001). However, there was no inter-group significant difference between the observations, (p=0.407), (Figure 3).

Figure 3: VAS score in post-operative period



From the table 3, it was observed that 7.14% subjects at baseline and 3.57% study subjects at 0min and 30 mins required analgesics in Isoflurane group; while in Propofol group, the need of analgesics was comparatively lesser (3.57% at baseline), later none of the groups required analgesics, (p=0.555).

Whereas 28.57% at 30 minutes and 22.85% at 1 hour required anti-emetics in Isoflurane group, while in Propofol group, the need of anti-emetics was comparatively lesser (11.42% at 30 minutes and 5.71% at 1 hour), however the observations were not found to be statistically significant, (p-value >0.05), (Table 3).

Table 3: Need of analgesics and anti-emetic inpost-operative period

Duration	Need of analgesics		Need of anti-emetics	
	Isoflurane	Propofol	Isoflurane	Propofol
Baseline	02 (7.14%)	01 (3.57%)	00 (0.0%)	00 (0.0%)
30 min	01 (3.57%)	00 (0.0%)	10 (28.57%)	04 (11.42%)
1 hr	00 (0.0%)	00 (0.0%)	08 (22.85%)	02 (5.71%)
2 hrs	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)
4 hrs	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)
12 hrs	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)
24 hrs	00 (0.0%)	00 (0.0%)	00 (0.0%)	00 (0.0%)
Significance	0.555		0.632	

DISCUSSION

Recovery is a passive process with the gradual return of consciousness after discontinuing administration of anaesthetic and adjuvant agents at the end of the surgical procedure. Propofol has proven to be useful agent for inpatient and outpatient Total intravenous anaesthesia, enables us to be used alone or with a powerful analgesic such as fentanyl, alfentanil, buprenorphine or ketamine [15-17].

Total intravenous anaesthesia is the latest step in the evolution of concept of balanced anaesthesia which obviates the need for an inhalational agent. Interest in total intravenous anaesthesia (TIVA) has risen due to advent of Propofol, the kinetics of which allows both induction and continuous intravenous maintenance of anaesthesia with rapid recovery of consciousness [18,19]. Propofol has been shown to be superior to inhalational anaesthesia in terms of rapid awakening [18,20].

In the present study, it was observed that the recovery time in Propofol group (2.46±0.508 min) was lesser that that in Isoflurane group (2.65±0.780 min) which was not statistically significant with p value of 0.157. The similar findings are reported in the study conducted by Mishra LD et al [18] and Ebert TJ et al [21].

Theassessment ofnausea/vomiting score was done post-operatively from 0 min till 24hrs in the ward. The mean nausea/vomiting score were relatively more with Isoflurane group compared to Propofol group, but it was not statistically significant. We observed that at '0' min Nausea/vomiting score was same in both the groups and at '30'mins Nausea/vomiting score was higher in Isoflurane group (1.28) than Propofol group (1.11), though it was not statistically significant and later at 2,4,8 and 12 and 24hrs nausea and vomiting score was same in both the groups. These findings are correlated with the study done by Mukherjee K et al [1], Lee DW et al [8] and Fujii Y et al [22].In Isoflurane group, the VAS score at baseline was 2.93, while same at 24 hours was reduced to 2.14. The reduction in VAS score from baseline till 24 hours was found to be statistically significant(p value was <0.0001). In Propofol group, the mean VAS

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score at baseline was 2.96, while same at 24 hours was reduced to 2.18(p value was <0.0001). However, there was no inter-group significant difference between the two groups (p=0.407). These findings are in accordance with the study conducted by Van den Berg AA et al [15].

In present study, we used BIS monitoring for both the groups. However, we didn't find any statistically significant difference between the two groups and the requirement of analgesic was same in both the study groups as similar to previous studies [10,23-25].

The need of anti-emetics was relatively more in Isoflurane group at 30 mins, otherwise none of patients at any time later in the post-operative period required anti-emetics in both the groups. Whereas the need of analgesics in the post-operative period was more in both the groups in initial 30 mins, though it was not statistically significant and later both the groups didn't require analgesics post-operatively.The similar findings are reported in the study conducted by Mukherjee K et al [1].

So, we observed in current study that Propofol (TIVA) has slightly faster recovery time than Isoflurane, but statistically significant difference was not observed. The same holds true for other post-operative observed parameters. Post-operative adverse effects like PONV and Pain score were relatively more in Isoflurane group than Propofol group in the early post-operative period and the need of anti-emetics and analgesics was more in Isoflurane group.

CONCLUSIONS

Thus, it can be concluded from present study that Propofol (TIVA) could be preferred anaesthetic choice as compared to Isoflurane anaesthesia in patients undergoing mastoid surgery under GA. But, to get statistically significant finding, further study with large sample size may be required to support our conclusion.

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