VOLUME-7, ISSUE-5, MAY-2018 • PRINT ISSN No 2277 - 8160

Original Research Paper

Clinical Research

# A COMPARATIVE EVALUATION OF ISOFLURANE ALONE AND SEVOFLURANE WITH ISOFLURANE ALTERNATELY FOR PRODUCING CONTROLLED HYPOTENSION DURING COMBINED APPROACH TYMPANOPLASTY (CAT) IN ADULTS

**Dr. Shambhavi**

**Dr. Roopesh Kumar**

**Dr. P Sahi**

**KEYWORDS :** Isoflurane, Sevoflurane, Controlled hypotension, Modified Aldrete Score

## INTRODUCTION:

CAT is microscopic surgery requiring bloodlessfield which has been revolutionized with the introduction of hypotensive anaesthesia. Hypotensive anaesthesia is a double edged sword and a very precise control is requiredBothisoflurane and sevoflurane areinhalationalanaesthetic agents and used to induce controlled hypotension. Isofluranehaving mild pungency,limits rate of induction.Sevoflurane, with low Blood:Gaspartition coefficient provides smooth, rapid induction and recovery but is costlier.As a solution to this we tried to conduct a study to determine if isoflurane when given individually and with sevoflurane alternately offered any advantages in terms of intraoperative hemodynamic profile , surgical field, bleeding , recovery profile and post operative side effects if any

## METHOD:

Afterethical committee approval, adult (20-50 years) ASA I/IIpatients, undergoing CAT with writteninformed consent were subjected for this randomized, prospective, double blind study.Patients with difficult airwaywere excluded.

The sample size was calculated to be 50 ($\alpha$=0.05 and $\beta$=0.2 )to achieve 80% power to detect a 30% difference in mean arterial pressure between the two groups. They were randomly divided further into Group A and B (n = 24; n = 22 respectively).

In 4 patients other drugs had to be used to produce desired hypotension hence were excluded from the statistical analysis.

In the operation theatre, all patients were attached standard monitoring like ECG, NIBP, pulse oximeter, EtCO2. Intravenous line with 18G ivcanula was secured.

Premedication was done with midazolam 0.03 mg/kg, ondansetron 4 mg , fentanyl 2µg/kg and simultaneously pre-oxygenation was done with flow rate of 8-10 litre of O2/min.Induction was done with propofol 2mg/kg followed by vecuronium 0.1 mg/kg.

In Group Aisoflurane was started at 1 MAC and in Group B sevoflurane was started at 1 MAC.After adequate relaxation, intubation was done using appropriate size endotracheal tube and maintained on O2 : Air in ratio of 34:66.

In Group B Sevoflurane 1 MAC was replaced by Isoflurane 1 MAC after 10 minutes and Sevoflurane 1 MAC was started again 5 minutes post graft placement till the closure of first stitch at skin incision In Group Aisoflurane 1 MAC alone was continued till first stitch at skin incision.

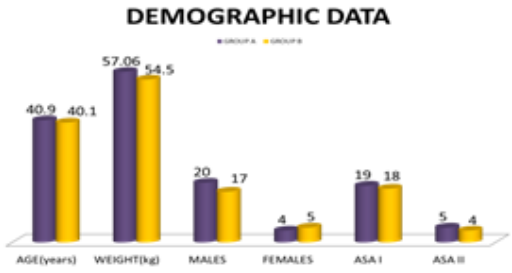
At end of surgery residual paralysis was reversed with neostigmine and glycopyrrolate.

Induction profile via number of episodes of coughing/breath holding and hemodynamic variables ( Systolic, Diastolic and Mean arterial blood pressure ; Oxygen saturation and Heart rate ) were observed. Surgical field and satisfaction were assessed by Likert scale and Modified Aldrete scoring was seen 10 minutes post - extubation.

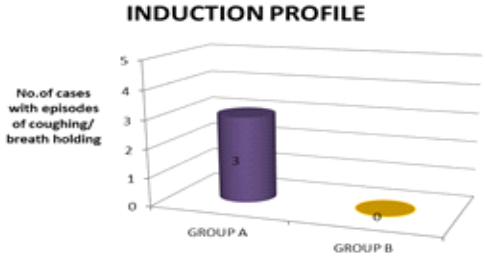
The observations obtained in both the groups were recorded and tabulated. After the study, analysis of the data done by Chi-square test and t-test for parametric data and Mann-Whitney for non parametric data. A probability value (P value) of <0.05 was considered as statistically significant and <0.001 as highly significant.

## RESULTS:

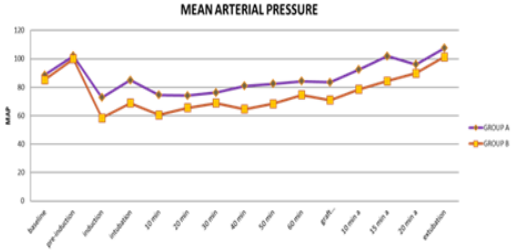
The groups were comparable ( p> 0.05 ) in terms of demographic data , ASA grading and type of surgery.



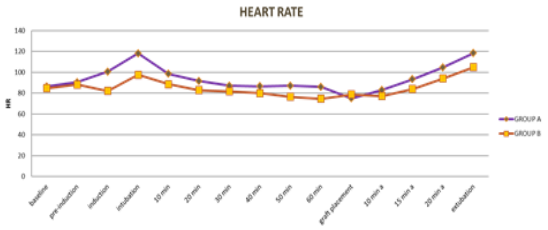

Although 3 cases in Group A had episodes of coughing during induction and none in Group B but it was found not significant (pvalue = 0.085). Sahu et al in their study concluded that sevoflurane was associated with less airway hypereactivity but in our study we found no such difference.




MAP revealed lower values in both the groups but the fall was highly significant at the time of intubation (p value <0.001) and significantat the time of induction and rest of intraoperative period till few minutes before extubation (p value <0.05) in group B.

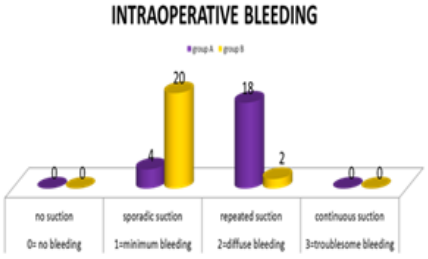


Heart rate increased significantly during induction and intubation in Group A while the response was adequately blunted in Group B but the difference in heart rate remained insignificant throughout rest of the intraoperative period.




In our study, effect on surgical field was assessed by intra-operative bleeding and surgeons satisfaction score.

Intra-operative bleeding was studied under 4 grades ( Grade 0= no bleeding requiring no suction ; Grade 1= minimal bleeding requiring sporadic suction ; Grade 2= diffuse bleeding requiring repeated suction ; Grade 3= troublesome bleeding requiring continuous suction) In Group A, 75% of patients had Grade II bleeding and required repeated suctioning.(p value < 0.001) whereas in Group B, 90.9% of patients required only sporadic suctioning revealing that blood loss was significantly lower in these patients.( p value <0.001)

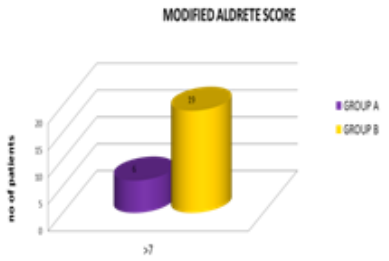



Surgeon's satisfaction was taken on likert scale as ( Grade 1= not at all satisfied ; Grade 2= slightly satisfied ; Grade 3= moderately satisfied ; Grade 4= very satisfied ; Grade 5= extremely satisfied ). In 81% of cases surgeons were extremely satisfied in group B whereas in group A they were only moderately satisfied in 50% of cases.

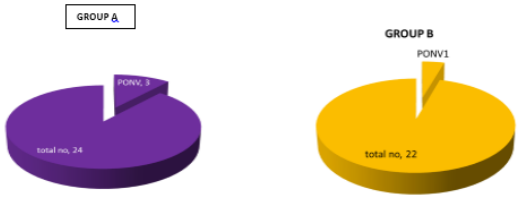

Modified Aldrete Score >7 was achieved by 79.2% patients in Group B while only 25% of the cases in Group A which was found highly significant( p value <0.001)

**Chart 1. The 'modified' Aldrete Scale**

| | | | |
|---|---|---|---|
| RESPIRATION | 2 | 1 | 0 |
| | Able to take deep breath and cough | Dyspnea/Shallow Breathing | Apnea |
| O2 SATURATION | 2 | 1 | 0 |
| | Maintains > 92% on room air | Needs O2 inhalation to maintain O2 saturation > 90% | Saturation < 90% even with supplemental O2 |
| CONSCIOUSNESS | 2 | 1 | 0 |
| | Fully awake | Arousable on calling | Not responding |
| CIRCULATION | 2 | 1 | 0 |
| | BP ± 20mmHg pre op | BP ± 20-50mmHg pre op | BP ± 50mmHg pre op |
| ACTIVITY | 2 | 1 | 0 |
| | Able to move 4 extremities voluntarily or on command | Able to move 2 extremities voluntarily or on command | Able to move 0 extremities voluntarily or on command |




No intra-operative complications were seen inany of the cases however 3 cases in Group A and 1 in Group B had incidence of post-operative nausea was found not significant statistically.




## DISCUSSION:

During middle ear surgery, controlled hypotension is required for a clearer operative field, as oozing blood obscures vision during ear microsurgery and can make correct graft placement difficult during tympanoplasty. Primary methods used are mild head elevation of 15° and infiltration of epinephrine. Pharmacological agents can be used alone or adjunctively to limit dosage requirements and hence the adverse effects of the other agents.

Both isoflurane and sevoflurane produce hypotension via peripheral vasodilation. But the target MAP [<70 mm hg or 30% reduction in baseline whichever is less] was achieved earlier with sevoflurane group which can be explained by its rapid solubility and was maintained with less variation intraoperatively.As sympathetic stimulation at the time of intubation was more with isoflurane which hampered the achievement of target MAP and inadequate blunting of intubation response resulting in significant tachycardia during intubation.1Dal D et al in their study found comparable hemodynamics with isoflurane and sevoflurane.

As no effective method is available to accurately calculate intraoperative blood loss, so it wasn't measured or compared statistically in this study. But there was subjective improvement in operating conditions in Group B with which surgeons were more satisfied.

Emergence was better in patients with sevoflurane which can be explained by its low B:G partition coefficient leading to its early wash off and recovery.2Sahu et al in their study found that sevoflurane as compared to isoflurane had advantages of quicker emergence, early discharge from PACU and less airway hypereactivity.

No significant perioperative complications were seen in our study. 5Frink et alalso in their clinical comparison of sevoflurane and isoflurane in healthy patients reported that the incidence of postoperative nausea did not differ between the sevoflurane and isoflurane groups.

**CONFLICTS OF INTEREST : None**

## CONCLUSION:

So it can be concluded, isoflurane alone can be used to achieve desired hypotension but sevoflurane with isoflurane in alternate manner provides better intraoperative hemodynamics, minimal bleeding with clearer surgical field and improved recovery profile.

## REFERENCES:


1. Dal D , Celiker V, Ozer E, Başgül E, Salman MA, Aypar U.et al Induced hypotension for tympanoplasty: a comparison of desflurane, isoflurane and sevoflurane.[IJA Nov 2012]
2. Dinesh Kumar Sahu, VincaKaul, and ReenaParampillComparison of isoflurane and sevoflurane in anaesthesia for day care surgeries using classical laryngeal mask airway.[IJA Sep 2011]
3. Elcock DH, Sweeney BP. Sevofluranevsisoflurane: A clinical comparison in day surgery. Anesthesia. 2002;57:52–6.[PubMed]
4. Philip BK, Kallar SK, Bogetz MS, Scheller MS, Wetchler BV. A multicentre comparison of maintainence and recovery withsevoflurane or isoflurane for adult ambulatory anesthesia. AnesthAnalg. 1996;83:314–9. [PubMed]
5. Frink EJ, Jr, Malan TP, Atlas M, Dominguez LM, DiNardo JA, Brown BR., Jr Clinical comparison of sevoflurane andisoflurane in healthy patients. AnesthAnalg. 1992;74:241–5. [PubMed]
6. Aldrete JA, Kroulik D. A postanesthetic recovery score. AnesthAnalg. 1970;49:924–34. [PubMed]