Original Research Paper

Volume-7 | Issue-9 | September-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Anesthesiology

A COMPARATIVE STUDY OF TOPICAL ANALGESIA WITH 4% LIGNOCAINE AND 0.5 % BUPIVACAINE FOR POST OPERATIVE PAIN RELIEF FOLLOWING TONSILLECTOMY

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ABSTRACT

BACKGROUND: The use of topically applied local anaesthetics is an important component of atraumatic administration of regional anaesthesia. This study was designed to compare the efficacy of topical application of 4% Lignocaine and 0.5 % Bupivacaine in reducing post-operative pain after tonsillectomy.

MATERIALS AND METHODS: 105 ASA I / II patients in the age group of 8–35 years admitted to undergo elective Adeno tonsillectomy in a tertiary care hospital were included. The patients were randomly allocated into 3 groups of 35 each. Group N -control Group where normal saline was used, Group L- 4% Lignocaine was used and in Group B 0.5% Bupivacaine was used. The postoperative pain scores were observed in all three groups for a period of 8 hours. Visual Analogue Scale was used for pain assessment. Postoperative pain score was lower in Group L and Group B when compared with Group N.

RESULTS: The overall VAS scores were low in Group L (2.5714 ± 0.6289) than in Group B (4.1000 ± 0.4296) and Group N (4.7357 ± 0.7147) which is statistically significant (P < 0.0005).

CONCLUSION: Topical application of 4% Lignocaine and 0.5% Bupivacaine in the tonsillar bed is an effective method of reducing postoperative pain in patients undergoing elective Adeno tonsillectomy.

KEYWORDS : Topical analgesia, Adeno tonsillectomy, Visual analogue scale,4% Lignocaine

INTRODUCTION

Pain after tonsillectomy is due to trigeminal nerve stimulation. Inadequate pain relief after tonsillectomy leads to poor oral intake, which leads to lassitude, delayed recovery of strength and well being. Various methods of postoperative pain relief include infiltration of local anesthetics, Non-Steroidal anti-inflammatory drugs, opioids, Glossopharyngeal nerve block, local anesthetic sprays.

Infiltration of local anesthetics can cause infection, abscess, inadvertent intravascular injection leading to central nervous system and cardiovascular toxicity, hemorrhage, airway obstruction, vocal cord paralysis.

NSAIDS cause bleeding tendency because of inhibition of platelet adhesion. It also causes gastritis, nausea and vomiting. Glossoph aryngeal nerve block can cause airway obstruction.

Opioids can produce undesirable side effects like respiratory depression, Pruritis, nausea and vomiting.

Topical anesthetics are rapidly absorbed from mucosal surfaces and hence immediate pain relief is obtained. It is safe and simple to perform without the side effects of other methods.

The use of topically applied local anesthetics is an important component of the atraumatic administration of regional anesthesia.

The concentration of an anesthetic used topically is greater than that same agent administered for local infiltration, central neuraxial blockade and peripheral nerve block. Topical anesthesia is effective on surface tissue (2-3 mm). Peak anesthetic effect following topical application occurs within 2-5 minutes and anesthesia last for 30 to 45 minutes.

In this study we have compared the efficacy of topical analgesia for post tonsillectomy pain with 4% Lignocaine and 0.5 % Bupivacaine

AIM OF THE STUDY

To compare the efficacy of topical application of 4% Lignocaine and 0.5 % Bupivacaine in reducing post-operative pain after tonsillectomy.

MATERIALS AND METHODS

The study population consisted of 105 ASA I/II patients in the age group of 8 – 35 years admitted to undergo elective Adeno tonsillec tomy in a tertiary care hospital.

The patients were randomly allocated into 3 groups of 35 each.
Group N - Control group where Normal Saline was used
Group L - 4% Lignocaine was used
Group B - 0.5% Bupivacaine was used.

Cases of peritonsillitis, peritonsillar abscess or neoplastic lesions were excluded. The study was approved by the Institutional Ethical Committee and written consent was obtained from the patients. The patients were subjected for anesthetic fitness. ASA grade I &II patients were selected.

Hemoglobin, total count, differential count, blood grouping, typing, bleeding time, clotting time and urine for albumin and sugar were done as preoperative investigations for all patients. Preoperative starvation was for a period of 6 hours. Baseline Blood pressure, Pulse rate, Respiratory rate, Oxygen saturation were recorded.

All patients were premedicated with Tablet Diazepam 0.2 mg/kg on the night prior to surgery. On the day of surgery, patients were pre-medicated with Inj. Glycopyrrolate 0.01 mg/kg, 30 minutes prior to surgery. After shifting to the Operating room, intravenous cannula was inserted in the upper limb and Ringer Lactate started. Monitors (NIBP, pulse oximetry, ECG) were connected. Patients were preoxygenated with 100% O2 for 3 minutes. Injection Thiopentone sodium 2.5% 5mg/kg was used for induction. Intubation was facilitated with Injection Succinyl hydrochloride 2mg/kg.

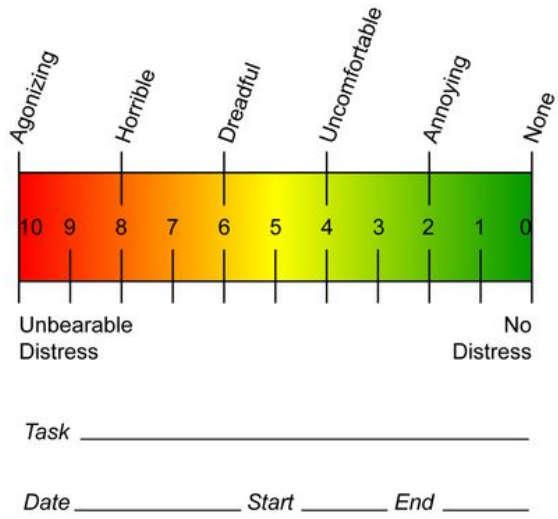
Naso tracheal intubation was done with an appropriate size ETT and secured. Anesthesia was maintained with O2: N2O 50:50, halothane and Inj. Vecuronium 0.1mg/kg. Intermittent positive pressure ventilation was employed with closed circuit or Jackson Rees circuit. Intraoperative fluid therapy was maintained according to Holiday and Segar 4-2-1 formula. After obtaining surgical hemostasis, a gauze measuring 3cm2 soaked in 2ml of Normal Saline or 4% Lignocaine or 0.5% Bupivacaine according to the group was kept in both tonsillar fossae for a period of 3 minutes.

Patients were reversed with Inj. Neostigmine 0.05 mg/kg and Inj. Glycopyrrolate 0.02 mg/kg and extubated after return of reflexes. After ensuring spontaneous respiration with adequate tidal volume, patients were shifted to the recovery room.

Postoperative pain assessment was done by Visual Analogue Scale. Visual Analogue Scale is used to assess pain in children aged 5 or more. It is quick, simple to perform.

The Visual Analogue Scale is most commonly a straight 100 mm line, without demarcation, that has the words "no pain" at the left most end and "worst pain imaginable" at the right most end. Patients are instructed to place a mark on the line indicating the amount of pain that

they feel at the time of the evaluation. The distance of this mark from the left end is then measured, and this number is used as a numeric representation of the severity of the pain.



If the pain scoring was more than 5, we have planned to give Inj. fentanyl 2mcg per kg as rescue analgesic. At each visit pain, dysphagia and difficulty in speaking were assessed

OBSERVATIONS AND ANALYSIS

Statistical analysis was done using SPSS version 12 software. Sociodemographic details, patient profiles and variables used in this study were calculated by descriptive analysis. Each group was compared by using Analysis of Variance (ANOVA) test. Categorical data were compared after constructing contingency tables and applying the Chi-square test. A value of P<0.05 was considered statistically significant.

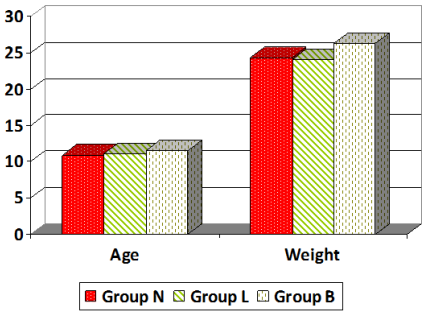
Hundred and five ASA I / II patients aged between 8-35 years were taken up for our study and analyzed. They were randomly allocated into three groups of 35 each namely Group N, Group L and Group B. The groups were comparable with respect to demographic characteristics like age, sex, body weight and duration of surgery. In the postoperative period they were monitored by an observer blinded to the study.

Table1: Demographic variables (Mean ± SD)

Variables	Group N	Group L	Group B	P value*
Age	10.91± 2.44	11.09±2.61	11.51±2.34	> 0.05
Weight	24.37±7.10	24.11±5.94	26.31±7.25	> 0.05
Duration of surgery(minutes)	40.43±7.94	40.66±6.64	39.69±6.81	> 0.05

* P > 0.05 - **Statistically insignificant.**

GRAPH 1: MEAN VALUES OF AGE AND WEIGHT



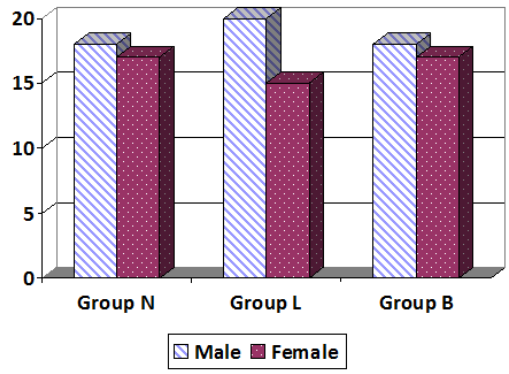
This shows that the age distribution among the three groups is almost the same. The weight range is also almost the same in all the three groups. Hence, there is no bias in age and weight in all the three groups. The mean duration of surgery in all the three groups is almost the same.All the surgeries were done by surgeons of equal experience in the field and they followed the same technique.

Table 2: Group Sex Cross tabulation

The Sex Distribution in all three groups is as follows

Group	Sex		Total
	Female	Male	
Group N	18 51.4%	17 48.6%	35 100.0%
Group L	20 57.1%	15 42.9%	35 100%
Group B	18 51.4%	17 48.6%	35 100.0%

GRAPH 2: SEX DISTRIBUTION



The sex distribution in the groups is also not of much difference. This is evidenced by the bar diagram. There is no bias in sex distribution.

Table 3: Comparison of visual analogue scale in between the groups

Group	VAS1	VAS2	VAS4	VAS8	Average VAS	
Group N	Mean	5.94	4.86	4.11	4.03	4.7357
	N	35	35	35	35	35
	Std. Deviation	0.70	1.12	1.11	1.07	0.7147
Group L	Mean	3.00	1.66	1.29	4.34	2.5714
	N	35	35	35	35	35
	Std. Deviation	1.19	0.64	0.52	0.68	0.6289
Group B	Mean	5.46	4.51	3.60	2.83	4.1000
	N	35	35	35	35	35
	Std. Deviation	0.70	0.70	0.50	0.71	0.4296

Table 4: ANOVA Table

Group	Sum of squares	df	Mean Square	F	Sig	
VAS1 *	Between Groups (Combined)	174.229	2	87.114	90.144	0.000
	Within Groups	98.571	102			
	Total	272.800	104	0.996		
VAS2 *	Between Groups (Combined)	216.076	2	108.038	151.135	0.000
	Within Groups	72.914	104			
	Total	288.990	104	0.715		
VAS4 *	Between Groups (Combined)	158.914	2	79.457	137.167	0.000
	Within Groups	59.086	104			
	Total	218.000	104	0.579		
VAS8 *	Between Groups (Combined)	44.705	2	22.352	31.741	0.000
	Within Groups	71.829	104			
	Total	116.533	104	0.704		
VAS *	Between Groups (Combined)	86.623	2	43.311	119.111	0.000
	Within Groups	37.089	104			
	Total	123.712	104	0.364		

Patients in Group L had significantly lower VAS scores than in Group B and Group N at the time interval of 1, 2 and 4 hours. But the patients

in Group L had higher pain scores at the end of 8th hour (4.34±0.68) when compared with patients in Group B (2.83±0.71) and Group N. This shows that Group L shows superior and immediate postoperative pain relief when compared with Group B and Group N.

Patients in Group B had lower VAS scores at 4 and 8 hours and compared with patients in Group N. The patients in Group B had the lowest pain scores at the end of 8th hour than in Group L. The overall VAS scores were low in Group L (2.5714±0.6289) than in Group B (4.1000±0.4296) and Group N (4.7357±0.7147) which is statistically significant (P<0.0005).

DISCUSSION

Our study was a randomized single blind controlled trial. It was conducted to compare the efficacy of topical application of 4% Lignocaine and 0.5% Bupivacaine in reducing postoperative pain after tonsillectomy. There were 35 patients in each group. In Group N 2ml of Normal Saline, in Group L 4% Lignocaine and in Group B 0.5% Bupivacaine was kept in both the tonsillar fossae for 3 minutes. The pain scores were evaluated at the end of 1$^{st.}$ 2nd, 4th and 8th hours by Visual Analogue Scale.

Mean VAS scores for pain belonging to Group L and Group B were significantly lower (P < 0.05) as compared to those of Group N. VAS score was found to be lower in Group L at the end of 1st, 2nd and 4th hours postoperatively than the Group B and Group N. But at the end of 8th hour the VAS score was found to be lower in Group B than in Group L and Group N.

The pain relief was of longer duration well beyond the normal duration of pharmacological action of Lignocaine and Bupivacaine. This is explained by the phenomenon of 'neuroplasticity' which proposes that the pre-emptive blockade of release of nociceptive neuromediators may contribute to the elimination of hyperexcitable state responsible for maintenance of postoperative pain.

This study correlates well with the study results of Bruno Bissonnette et al. They reported that 10% aerosol Lignocaine applied directly on the tonsillar beds showed a superior and immediate post tonsillectomy pain relief.

The study by Kadar AA et al., and another study by T. Hung et al., suggested that topical Bupivacaine is effective in reducing postoper ative pain in pediatric day-care tonsillectomy

Another study by A. K. Wong et al., showed that post tonsillectomy infiltration of 0.5% Bupivacaine with 1:200000 Epinephrine reduces immediate postoperative pain in children compared with a similar concentration of Bupivacaine administered by spray or placebo.

In our study, topical application of 4% Lignocaine provided immediate postoperative pain relief when compared to 0.5% Bupivacaine. But 0.5% Bupivacaine provided a prolonged pain relief when compared to 4% Lignocaine and no significant pain relief in the immediate postoperative period as shown in the VAS 1.

CONCLUSION

We conclude that the topical application of 4% Lignocaine and 0.5% Bupivacaine in the tonsillar bed is an effective method of reducing postoperative pain in patients undergoing elective Adenoto nsillectomy. Of these 4% Lignocaine was found to be superior and produced good analgesia for upto 4 hours postoperatively.

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