Section: Anesthesia

Original Research Article

A COMPARATIVE STUDY OF GLOSSOPHARYNGEAL NERVE BLOCK WITH LIGNOCAINE (2%) AND TOPICAL LIGNOCAINE IN MANAGEMENT OF POST TONSILLECTOMY PAIN IN CHILDREN AGED 6-14 YEARS

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Received : 30/12/2022
Received in revised form : 21/02/2023
Accepted : 06/03/2023

Keywords:
Glossopharyngeal; Nerve block; Lignocaine; Topical lignocaine; Tonsillectomy.

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DOI: 10.47009/jamp.2023.5.2.135

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (2); 642-646

Abstract

Background: Glossopharyngeal nerve block causes the abolition of the gag reflex and is a useful method for palliating post-tonsillectomy pain. The study aimed to compare the analgesic efficacy of glossopharyngeal nerve block with topical 2 % lignocaine for post-tonsillectomy pain relief among children aged 6-14 years undergoing bilateral tonsillectomy. **Materials and Methods:** This is a prospective randomized control study among Children undergoing tonsillectomy under General anesthesia between May 2020 and February 2021. A total of 56 patients were selected for the study and divided into two groups: lignocaine injection (LI) and lignocaine topical (LT), each with 28 patients. The present study evaluated demographic, haemodynamic parameters, duration and rescue analgesia and total dose of analgesic consumption in patients of both groups. **Result:** The study population within the injection lignocaine for glossopharyngeal block and LT groups was not statistically significantly different in age, gender, weight, duration of surgery and baseline and Hemodynamic post-operative parameters such as Heart Rate, SBP and DBP, except the mean Heart Rate at 2 hours, 3 hours, 4 hours, and 5 hours among injection lignocaine group was significantly lower. Post-operatively, among LI for the glossopharyngeal block group, the mean m-CHEOPS pain score was significantly lower, and the time for rescue analgesia was significantly higher than in the LT group. **Conclusion:** The present study concludes that lignocaine injection for the glossopharyngeal block can be recommended among children undergoing tonsillectomy surgeries. Injection of lignocaine will reduce the pain and discomfort in the post-operative stay, reducing the duration of the hospital stay and the cost involved.

INTRODUCTION

Tonsillectomy is one of the most frequently performed ambulatory surgical procedures and causes severe pain post-operatively.[1-2] An adequate post-operative analgesia is essential after tonsillectomy as pain impairs swallowing with a risk of dehydration, infection and secondary bleeding and may interfere with a speedy recovery and smooth healing.[3]

The pain associated with tonsillectomy has maximum intensity immediately after an operation and in the first 24 hrs. It remains the major cause of morbidity following the surgery. Systemic analgesics and opioids provide pain relief but also produce undesirable side effects. The alternative is to use local anaesthetic agents and general anesthesia as they provide perioperative analgesia without opioid-related side effects.[4-5]

Lignocaine is a potent local anaesthetic that provides rapid and sustained analgesia and antiarrhythmic property.[6] After the advent of the ultra-sonogram, peripheral nerve block for analgesia is widely used with more precision with less systemic side effects and minimal dose of local anaesthetics. This will greatly impact patient satisfaction and duration of hospital stay, and cost. Opioid analgesics are extremely effective in reducing pain, but their usage is restricted because of their side effects, such as itching, nausea and vomiting.[7]

The topical application of Local Anesthesia is safe and simple to perform, especially just after the completion of the surgery. Any procedure after the

ISSN (O): 2687-5365; ISSN (P): 2753-6556

recovery of consciousness is difficult because of the gag reflex. Compliance and response due the post-operative pain among children are quite different from the management in adults.[8] It can delay the time of hospital discharge, delayed return to school, and considerably affect the child's nutrition.[9]

Glossopharyngeal nerve block causes the abolition of the gag reflex. It is a useful method for palliating post-tonsillectomy pain and is associated with a rapid onset of analgesia with prolonged duration.[6]

Management of post-tonsillectomy pain in children is challenging. Some studies revealed the effectiveness of Glossopharyngeal nerve block, and a few found it ineffective.[10] The usefulness of the Glossopharyngeal nerve block among children is least studied, especially in the Indian context. This study aims to compare the analgesic efficacy (Pain score during swallowing and resting, duration of post-operative analgesia) of glossopharyngeal nerve block with topical 2 % lignocaine for post-tonsillectomy pain relief among Children aged.[6-14] years undergoing tonsillectomy.

MATERIALS AND METHODS

This prospective randomized control study from May 2020 and February 2021 in the Department of Anaesthesiology, Govt. Kilpauk Medical College Hospital, and Govt. Royapettah Hospital, Chennai. Patients of either sex, aged from 6 years to 14 years with ASA class of 1 and 2, undergoing elective bilateral tonsillectomy were selected for the study. The sample size was calculated as per N. Basker et al. study, and it was 56.11. All 56 patients were divided into two groups: lignocaine injection (LI) and lignocaine topical (LT), each with 28 patients. The written consent and Institutional ethical committee approval were taken before the start of the study.

Inclusion criteria: Patients of either sex undergoing elective bilateral tonsillectomy aged between 6 to 14 years. Patients with ASA class 1 and 2 and given valid informed consent were included.

Exclusion criteria: Patients not satisfying inclusion criteria. Patients with allergies or sensitivity to local anaesthetics, bleeding disorders, respiratory infections, difficult airways, and a history of sleep apnea. Patients who did not fulfil inclusion criteria and did not sign the consent form were excluded.

Boyle's Apparatus, laryngoscopes with different blades, airway devices, endotracheal tubes, sterile 25G spinal needle, sterile gauze, Inj. Lignocaine 2% vial. On arrival in the operating room, premedication is given with atropine (10mcg/kg) and midazolam (0.03 mg/ kg) and fentanyl (2mcg/kg). Three-lead ECG, automated non-invasive blood pressure monitoring, and pulse oximetry monitored patients.

Induction: All patients are induced with propofol (3mg/Kg) IV. Tracheal intubation is facilitated with Inj. Suxamethonium (1.5mg/kg) and patients were intubated with appropriate size cuffed endotracheal tube nasally.

Maintenance: Anesthesia was maintained with nitrous oxide, oxygen (70/30), and controlled ventilation throughout surgery with Inj. Atracurium besylate (500mcg/kg) titrated doses.

Under aseptic precautions, the tip of the spinal needle is bent to 3mm with artery forceps. 2% Lignocaine was loaded in the syringe to a volume of 2ml. After bilateral tonsillectomy and complete hemostasis, a Glossopharyngeal nerve block was performed with a 25G spinal needle and the tip bent to 3mm at the base of both the anterior pillars of the tonsillar fossa by the anaesthetist. Group I received 2% lignocaine 2ml/ fossa. Group II received gauze soaked in 2% Lignocaine in the tonsillar bed. The precaution was to prevent accidental intravascular puncture by a negative aspiration for blood before injecting the drug into the base of the tonsillar pillars.

Recovery: After complete recovery, patients were reversed with an injection of neostigmine (50mcg/kg) and Inj atropine sulphate (10mcg/kg) and after thorough oral suctioning patient before extubation.

Post-operative period: After recovery, patients were kept in the post-op ward to compare the quality of analgesia, duration of analgesia, mCHEOPS scale, Total analgesic consumption in 24 hrs, blood pressure, and heart rate between the two groups.

Data were entered in an MS excel sheet and analysed using SPSS software version 16. Categorical variables like gender, study groups, etc., are represented in frequencies and percentages. An Independent t-test was used to compare numerical variables like pain scores and duration of analgesia among the study groups. For the test of significance, the chi-square test is used. Fisher's exact test is used when more than 20% of the cell values have an expected cell value of less than 5. P-values less than 0. 05 were considered statistically significant.

RESULTS

Patients of either sex, aged from 6 years to 14 years with ASA class of 1 and 2, undergoing elective bilateral tonsillectomy were selected for the study. All 56 patients were divided into two groups: lignocaine injection (LI) and lignocaine topical (LT), each with 28 patients. Male predominance was reported in the LT group, while female predominance was observed in the LI group. The mean age, weight, pre-operative heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP) and duration of surgery was reported to be comparable in both groups with statistically insignificant effect [Table 1].

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 1: Observation of demographic and haemodynamic variables of patients of both groups

		Injection Lignocaine (LI)	Topical lignocaine (LT)	p-value by 't-test
Gender	Female	16 (57.14%)	12 (42.85%)	0.286
	Male	12 (42.85%)	16 (57.14%)	
Mean Age years ± SD		8.39±2.10	8.89±2.35	0.406
Weight (Kg)		37.11±6.72	38.54±7.06	0.441
Preop Heart Rate		108.32±6.70	107.57±8.03	0.706
Preop Systolic Blood Pressure		101.00±7.88	103.57±9.07	0.262
Preop Diastolic Blood Pressure		65.36±5.76	65.21±5.95	0.928
Duration of surgery (min)		44.11±1.95	43.21±2.44	0.136

After the treatment, the mean heart rate, SBP, and DBP of both groups of patients were recorded from 1 hour to 8 hours. It was observed that there was a linear increase in the mean heart rate and SBP of both group patients. The mean heart rate and SBP of lignocaine topical group (LT) patients were higher than those of lignocaine injection (LI) patients at all points. However, the observation of mean DBP was almost the same in both group patients at every point [Table 2].

Table 2: Observation of mean heart rate, SBP, DBP and m-CHEOPS score in patients of both groups

Time	Groups	Heart Rate	SBP	DBP	m-CHEOPS score
1 hour	LI	85.54±2.17	101.36±7.58	65.71±5.73	2.32±0.48
	LT	86.50±2.65	103.93±8.70	65.57±5.26	3.00±0.54
	p-value by 't-test	0.142	0.244	0.923	0.001
2 hours	LI	88.11±2.33	102.82±7.27	66.07±4.97	2.96±0.64
	LT	90.25±2.98	105.43±8.81	65.29±5.84	3.79±0.50
	p-value by 't-test	0.004	0.232	0.590	0.001
3 hours	LI	90.79±2.44	104.50±7.28	66.07±4.97	3.57±0.57
	LT	95.71±3.95	106.93±8.63	65.71±5.04	4.64±0.49
	p-value by 't-test	0.001	0.260	0.791	0.001
4 hours	LI	94.46±2.74	106.21±7.13	66.07±4.97	4.25±0.70
	LT	105.79±8.02	109.79±7.57	65.71±5.04	5.96±0.19
	p-value by 't-test	0.001	0.075	0.791	0.001
5 hours	LI	100.43±7.13	108.07±6.72	66.07±4.97	4.71±0.46
	LT	109.14±7.78	111.71±7.03	66.07±4.97	6.71±0.53
	p-value by 't-test	0.001	0.053	1.0	0.001
6 hours	LI	108.71±6.4	110.43±5.72	66.43±4.88	6.18±0.55
	LT	111.36±7.11	113.64±6.44	66.07±4.97	7.46±0.64
	p-value by 't-test	0.15	0.053	0.787	0.001
7 hours	LI	111.11±5.82	112.43±4.97	66.79±4.76	7.18±0.72
	LT	113.25±6.94	114.93±6.54	66.43±4.88	8.18±0.72
	p-value by 't-test	0.216	0.113	0.783	0.001
8 hours	LI	113.14±5.51	113.93±4.97	67.50±5.18	7.79±0.88
	LT	114.71±6.51	116.21±6.87	67.14±5.35	8.46±0.58
	p-value by 't-test	0.334	0.160	0.81	0.001

The m-CHEOPS score for both groups of patients was also recorded from 1 hour to 8 hours. It was found that there was a serial increase in the m-CHEOPS score with time in both groups. In contrast, the m-CHEOPS score was significantly higher ($p<0.05$) in LT group patients as compared to LI group patients at every point [Table 2].

The mean rescue analgesia time among the LI group was 6.14, which was significantly higher ($p<0.05$) than the mean rescue Analgesia time among the LT group, which was 4.3. However, total Analgesic consumption (Syp. Paracetamol mg) in 24 hours was reported to be comparable in both groups [Table 3].

Table 3: Observation of rescue analgesia and total analgesic consumption in patients of both groups

Parameters	Group	Mean	Std. dev.	P-value by 't-test
Rescue Analgesia time (min)	LI	6.14	0.27	0.001
	LT	4.30	0.34	
Total Analgesic consumption (Syp. Paracetamol mg) in 24 hours	LI	556.61	100.78	0.424
	LT	578.75	105.05	

DISCUSSION

In this study, among the subjects, 28 (50%) were allocated to Glossopharyngeal Nerve Block through the Injection 2% Lignocaine group, and 28 (50%) were allocated to the Topical 2% Lignocaine group. The mean age among the LI group was 8.39 years which is lower than the mean age among the LT group, which was 8.89 years. Various studies have proved that the increased age among the study participants reduces post-operative pain among adults.12 Some studies have reported the same among children.13 In this study, 42.85% of the LI group had males and 57.14% had females compared

ISSN (O): 2687-5365; ISSN (P): 2753-6556

to the LT group, of whom 57.14% had males, and 42.85% had females, and the difference was not statistically significant ($p > 0.05$). Gramke et al. also reported similar findings in their investigations.[14]

Weight is an important parameter because the toxicity effects of lignocaine are weight dependent. In this study, the mean weight among the injection lignocaine group was 37.11 kg, which is lower than the mean weight among topical lignocaine group, 38.54 kg. The difference was not statistically significant. Scott et al. also reported similar observations in their study.[15]

In this study, the mean Preop heart rate among the LI group was 108.32, which is higher than the mean Preop heart rate among the LT group, which was 107.57. The mean Heart Rate at 2 hours, 3 hours, 4 hours, and 5 hours among the injection lignocaine group was significantly lower ($p<0.05$) than the mean heart rate among the topical lignocaine group. These findings in the present study follow Ramírez et al. study observations.[16]

Lignocaine is likely to cause cardiac toxicity but is not known to affect blood pressure values significantly. In this study, the mean Preop SBP among the LI group was 101, which is lower than the mean Preop SBP among the LT group, which was 103.57, and the difference was not statistically significant. Post-operatively, the mean SBP among the injection lignocaine group was lower but not significant than the mean SBP among the LT group. The mean Preop DBP among the LI group was 65.36, which is higher than the mean Preop DBP among the LT group, which was 65.21, and the difference was not statistically significant. Post-operatively, the mean DBP among the LI group was higher but not significant than the mean DBP among the LT group. These findings in our study follow earlier reported studies.[17]

In this study, the mean duration of surgery among the LI group was 44.11, which is higher than the mean duration of surgery among the LT group, which was 43.21, and the difference was not statistically significant. Some studies also have reported that post-operative pain increases as the duration of the surgery increases.[18]

Various studies have studied the validity of the m-CHEOPS pain score and observed good sensitivity and specificity.[19] In this study, post-operatively, the mean m-CHEOPS pain score among the injection lignocaine group was significantly lower than the topical lignocaine group. The following studies have used Visual analogue pain scores, which are good for adults and older children. The m-CHEOPS pain score and FLACC score are commonly used for pain assessment scales in children. The studies observed a similar result with the reduced pain scores among the glossopharyngeal nerve block group. Bell et al. concluded glossopharyngeal nerve block bupivacaine 0.5% is effective for uvulopalatoplasty with reduced Visual analogue pain scores, especially during the initial post-operative period.[20]

Park et al. observed glossopharyngeal nerve block using 0.75% ropivacaine and 0.5% bupivacaine significantly reduced post-operative 100 mm visual analogue scale score for pain assessed immediately after surgery, during rest and swallowing among the ropivacaine and bupivacaine groups compared to the groups which received no interventions.[21] Debasish et al. observed that glossopharyngeal nerve block using bupivacaine significantly reduced post-operative 100 mm visual analogue scale score for pain and concluded that the glossopharyngeal nerve block could be effectively used for the control of pain.22 We used the m-CHEOPS pain score to measure pain, but other studies used the post-operative FLACC score for pain assessment. The Toddler-Preschooler Post-operative Pain Scale was also used for this purpose.[23]

In this study, the mean rescue analgesia time among the injection lignocaine group was 6.14, which is higher than the mean Rescue Analgesia time among the topical lignocaine group, which was 4.3, and the difference was statistically significant. Ahmed El-Sharkawy et al. observed a statistically significant difference in pain scores between the groups at 12, 18 and 24 hours, with the glossopharyngeal nerve block group with plain bupivacaine (0.5%) having lower pain scores and higher duration of analgesia.[24] Basker et al. observed a significantly lower analgesia duration. They did not observe any complications following infiltration in the groups.[11] On the other hand, contrary to our study results, El-Hakim et al. concluded that the glossopharyngeal nerve blocks and lesser palatine nerve blocks using 0.5% bupivacaine is not effective in the relief of pain among the patients undergoing tonsillectomy.[25]

CONCLUSION

Post-operatively, Among injection lignocaine for glossopharyngeal block group, the mean m-CHEOPS pain score was significantly lower, Time for Rescue Analgesia is significantly higher than the topical lignocaine group. With respect to the post-operative Hemodynamic parameters followed up every hour for 8 hours, The mean Heart Rate at 2 hours, 3 hours, 4 hours, and 5 hours among injection lignocaine group was significantly lower than mean Heart Rate among topical lignocaine group. Systolic Blood Pressure and Diastolic Blood Pressure were not significantly different. Hence, Injection lignocaine for glossopharyngeal block, can be routinely recommended among the children undergoing tonsillectomy surgeries, with a little caution in maintaining the hemodynamic parameters. This will reduce the pain and discomfort in the post-operative stay, which in turn reduce the duration of hospital stay and cost involved

ISSN (O): 2687-5365; ISSN (P): 2753-6556

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ISSN (O): 2687-5365; ISSN (P): 2753-6556