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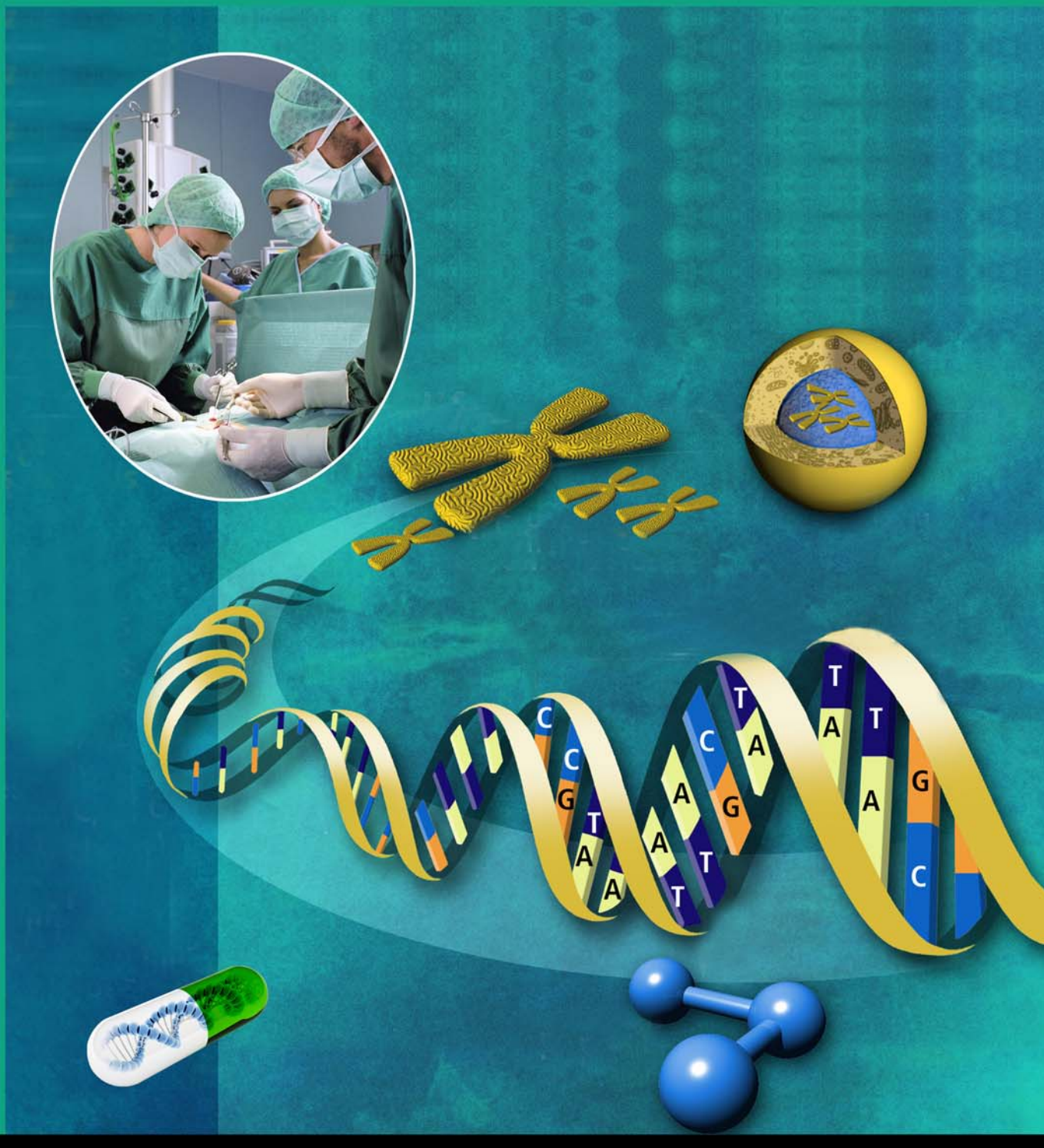

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Research Paper

A SINGLE BLIND RANDOMISED STUDY TO COMPARE THE EFFICACY OF PREEMPTIVE ANALGESIA OF ROPIVACAINE VERSES BUPIVACAINE FOR POST TONSILLECTOMY PAIN RELIEF IN CHILDREN

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Pre-emptive analgesia is an effective tool to manage post surgical pain. We conducted the study to evaluate the efficacy of ropivacaine and bupivacaine for pre-emptive analgesia in patients undergoing tonsillectomy. **AIMS**: To compare the efficacy of pre incisional infiltration of tonsillar Fossa with 0.5% Ropivacaine with 1:5,00000 adrenaline verses 0.5% Bupivacaine with 1:5,00000 adrenaline on pain following tonsillectomy under general anaesthesia. **PATIENTS AND METHODS:** A total of 108 patients aged 7-18 years, ASA grade I & II, who came for tonsillectomy or adenotonsillectomy were recruited for the study. They were allotted randomly into two Groups. A Group (n= 54) patients received 0.5% Ropivacaine with 1:5,00000 adrenaline and patients in B Group (n = 54) were administered 0.5% Bupivacaine with 1:5,00000 adrenaline preoperatively 5 mins before the incision. Post operative pain was assessed by Visual Analogue scale (VAS), and Objective Pain Score (OPS) at 30 mins 1, 2, 4, 6, 8, 12 and 24 hrs and time of first request of analgesia. **RESULTS**: In both the Groups mean ops and VAS scores were comparable. The average time of first request of analgesic in group A was 80min while that in the Group B was 97min. Thus the degree of post operative pain relief in both the groups was comparable. **CONCLUSION**: Ropivacaine is as effective as bupivacaine in treating the post tonsillectomy pain.

Keywords: Ropivacaine, Bupivacaine, Pre-emptive analgesia, Pain

INTRODUCTION

Tonsillectomy is among the commonly performed surgery in children worldwide. Post tonsillectomy pain remains a difficult management problem. Traditional approach to post operative analgesia is to begin the therapy when surgery is completed and pain is experienced. But now, evidence is accumulating that tissue injuries, even those occurring during general anaesthesia, produces changes in the peripheral and central nervous

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system which contributes to a state of post injury pain hypersensitivity or hyperalgesia (Mendell L M, 1966; Coderre T J and Melzack R, 1987; Dubner R, 1981; Dubner R and Ruda M A, 1992). Thus nociceptors respond to low threshold normally innocuous stimulus and elicit a painful response. This effect is known as allodynia. Once this state has been induced, large doses of analgesics are required to suppress it. Experimental studies have suggested that blocking the afferent neurons with local anaesthetics before peripheral tissue damage occurs prevents this central sensitization (Boliston T A and Upton J J M, 1980). Thus noxious stimulus induced neuroplasticity i.e., changes occurring in central nervous system function in response to its input can be prevented or pre-empted by administration of analgesic agent prior to injury. Based on this theory pre-emptive analgesia (Woolf C J, 1989; Wall P D, 1988) has been advocated as an effective tool to manage post surgical pain.

The basic idea of preemptive analgesia is to prevent the establishment of noxious stimulus induced central neuroplasticity by administration of analgesia agent prior to injury. But systemic analgesics alone cannot prevent the peripheral expansion of receptor fields and decrease in the threshold of dorsal horn neurons. These peripheral events can be blocked by local anesthetics, thus, contributing to post operative pain relief (Penn S E, 1952; Smith J P, 1963; Jebeles J A *et al*., 1991).

Ropivacaine is a new amide local anaesthetic structurally similar to Bupivacaine possessing a propyl Substitution for butyl side chain of Bupivacaine. Unlike bupivacaine it is produced as the S (-) Enantiomer instead of racemic mixture. Studies in both animals and human volunteers have indicated that these difference result in lower cardiotoxicity when compared to bupivacaine. This is an important improvement since bupivacaine is thought to be more cardio toxic than other amide local anaesthetics. Ropivacaine has significantly higher threshold for cardiovascular and CNS toxicity than bupivacaine in animals & healthy human volunteers (Morism S G *et al*., 2000; and Steinstra R, 2003).

In order to evaluate the efficacy of ropivacaine and bupivacaine for pre-emptive analgesia, we conducted the study to compare the efficacy of pre incisional infiltration of tonsillar fossa with 0.5% Ropivacaine with 1:5,00000 adrenaline verses 0.5% Bupivacaine with 1:5,00000 adrenaline on pain following tonsillectomy under general anaesthesia.

MATERIALS AND METHODS

This was a Prospective randomized single blinded study in the Department of Otorhino-laryngology, KEM hospital and Seth G.S. Medical College, Parel, Mumbai. A total of 108 patients aged 7-18 years, ASA grade I & II, who came for tonsillectomy or adenotonsillectomy were recruited for the study. Exclusion criteria were the following: coagulopathy, peritonsillar abscess, congenital heart disease, and hypersensitivity to the study drugs. They were allotted randomly into two groups using sealed cover containing computer generated random code. A group (n= 54) patients received 0.5% Ropivacaine with 1:5,00000 adrenaline and patients in B Group (n = 54) were administered 0.5% Bupivacaine with 1:5,00000 adrenaline. The study was approved by the institutional ethics committee. Parents of the participating children applicable were required to provide written informed consent prior to entering the study.

In the pre anaesthetic visit, assessment of each case was done by history taking and thorough clinical examination. Investigations done were Haemoglobin percentage, total and differential white cell count, bleeding time, clotting time, urine routine and microscopy, chest-x-ray. The, nature and purpose of the study was explained to child in the presence of parents. Visual Analogue scale (VAS). Edwards R R (2006) was explained in the language which was understood by the patients and parents. patient were informed that he/she will be asked, after the operation to indicate how much it pains on visual Analogue scale.

Anesthetic Protocol

All patients received inj. Glycopyrrolate 0.004 mg/kg intra muscular for premedication. On arrival to operating theatre; monitors such as sphygmomanometer, cardioscope, and pulse oximeter were attached. Heart rate, blood pressure, oxygen saturation were noted. Intravenous access was secured and all patients received Inj. Fentanyl 2 μg/kg body weight and Inj. Midazolam 0.03 mg/kg intravenously. Induction was done with Inj. Propofol 2mg/kg intravenously. After intubation with adequate sized PVC cuffed endotracheal tube, muscle relaxation was achieved with Inj. Vecuronium 0.1mg/kg iv. Maintenance was with 40% oxygen 60% Nitrous oxide. Intravenous fluids were administered to maintain haemodynamic parameters within 20% of baseline during surgery.

After achieving age appropriate haemodynamics, the tissue surrounding the tonsil was infiltrated with the test drugs by surgeon five minutes before incision.

Patients were randomly allocated into two groups.

Dosage

1. Group A: 0.5% Ropivacaine 2 mg/kg body weight with adrenaline 1:5,00000 .
2. Group B: 0.5% Bupivacaine 2 mg/kg body weight with adrenaline 1:5,00000.

Infiltration was done under all aseptic precautions, following aspiration, under the mucus membrane of anterior and posterior palatal arches, between the tonsillar capsule and surrounding tissue was infiltrated. Thus displacing the tonsils towards midline and helping to enhance the plane of dissection. Incision was taken 5 minutes after infiltration. Intra operative vital parameters were monitored and noted. After surgery muscle relaxation was reversed with inj. Glycopyrrolate 0.008mg/kg iv and Inj. Neostigmine 0.05mg/kg iv.

After confirming the signs of adequate reversal, thorough suction of oral secretions was performed. Fresh bleeding, tonsillar tags and blood clots in tonsillar fossa were checked. The patients were extubated and transferred to recovery room, given head low and tonsillar position.

Post Operative Management

For post operative pain Inj. Diclofenac Sodium 1mg/kg iv was given to patients who complained of severe pain and who had VAS score more than 7. Time for postoperative analgesic requirement was noted in all the cases. Syrup combiflam thrice daily were given to patients for 5 days in the post operative period. Post operative pain on first day was assessed by VAS and Objective Pain Scale (OPS) (Broadman L M, Hannallah R S *et al*., 1988) at 30 mins 1, 2, 4, 6,8, 12 and 24 hrs. All patients were discharged after 24 hrs of operation unless there were any complications. Both

Constant incisional pain and Pain on swallowing were assessed by VAS.

STATISTICAL ANALYSIS

The data was entered using MS-Excel-2007 and analysed using SPSS-16 software. Appropriate statistical tests like un-paired t test (For comparison of mean between two groups – numerical data) & Chi square test (For comparison of proportions between two groups – categorical data) etc are used as per the data. The p value less than 0.05 were taken as significant.

RESULTS

In our study, 108 ASA Grade I and II patients, 7-18 years of age, coming for tonsillectomy were randomly divided into 2 Groups: Group A – Ropivacaine 0.5% with 1:5,00000 adrenaline and Group B – Bupivacaine 0.5% with 1:5,00000 adrenaline.

Mean age in Group A was 11.59±3.11 years and in Group B 11.76±3.10 years. In Group A 49.2% of total cases were males and 51.80% were females. In Group B 50.8% of total patients were males and 48.9% were females. So with respect to age and sex both the Groups were comparable. Mean weight in Group A was 26.13±6.23kgs and in Group B mean weight was 23.67±5.8kgs and the difference was statistically significant (P =0.037). Since drugs were administered according to body weight, so it was not significant clinically.

Mean Objective pain scores were not significant in the first 24 hrs in both the groups. Mean Visual Analogue Scale for constant pain for first 24 hrs postoperatively was not significant in

Table 1: Patient Demographics

Characteristics	Group A (ropivacaine) n = 54	Group B(bupivacaine) n = 54	P value
Age (years)	11.59	11.76	0.781
Weight (kgs)	26.13	23.67	0.037
Sex Malefemale	30 (49.2%)24 (51.1%)	31 (50.8%)23 (48.9%)	0.846

Table 2: Mean Objective Pain Scores

Time osp	Group A (Ropivacaine)	Group B – (Bupivacaine)	P value
30 mins	7.91	7.78	.667
1 hr	7.67	7.50	.598
2 hr	6.85	6.72	.644
4 hr	6.20	6.17	.888
6	5.54	5.30	.396
8	4.78	4.61	.524
12	4.59	4.57	.938
24	4.17	4.28	.533

Table 3: Mean VAS for Constant Pain			
Time	Group A (Ropivacaine)	Group B – (Bupivacaine)	P value
30 mins	6.00	5.83	.442
1 hr	5.94	5.83	.622
2 hr	4.96	4.87	.681
4 hr	4.41	4.35	.751
6	4.09	4.07	.897
8	3.56	3.61	.741
12	3.13	3.11	.904
24	2.93	2.96	.747

Table 4: Mean VAS for Pain During Swallowing			
Time	Group A (Ropivacaine)	Group B – (Bupivacaine)	P value
30 mins	7.11	6.93	.409
1 hr	6.87	6.57	.194
2 hr	6.09	5.94	.497
4 hr	5.61	5.31	.165
6	5.15	5.06	.606
8	4.39	3.98	.026
12	4.00	3.67	.043
24	3.35	3.22	.307

Table 5: Average Time for Request of Analgesics			
	Group A (ropivacaine) n = 18	Group B(bupivacaine) n = 14	P value
Time of 1st request of analgesia	80.25	97.50	.457

both the Groups. Mean visual Analogue score for pain on swallowing was not significant for first 24 hours except at 8 and 12 hours. Of the 54 patients in Group A only 18 required diclofenac injection postoperatively & 14 patients in the Group B. The average time of diclofenac injection in Group A was 80min while that in Group B was 97 min it was not significant (p=0.457). From the above analysis we came to know that there was no requirement of rescue analgesia for 97 minutes in Group B and 80 minutes in Group A.

DISCUSSION

Our knowledge and understanding of the physiology of pain has improved in recent years. The study by Wall and Woolf (1986) has stimulated much discussion on the potential clinical implication of this knowledge for the

management of pain occurring in the post operative period and the concept of preemptive analgesia has gained widespread acceptance. The basic idea of preemptive analgesia is to prevent the establishment of noxious stimulus induced central neuroplasticity by administration of analgesia agent prior to injury. But systemic analgesics alone cannot prevent the peripheral expansion of receptor fields and decrease in the threshold of dorsal horn neurons. These peripheral events can be blocked by local anesthetics, thus, contributing to post operative pain relief.

The aims and objectives of our study were to compare the preemptive analgesic effects of 0.5% ropivacaine with 1:5,00000 adrenaline and 0.5% bupivacaine with 1:5,00000 adrenaline. In both the Groups mean OPS and VAS scores were comparable. Of the 54 patients in Group A only 18 required injection diclofenac sodium post operatively as compared to 14 patients in the Group B. The average time of first request of analgesic in Group A was 80min while that in the Group B was 97min & was not significant statistically. Thus the Degree of post operative pain relief in both the Groups was comparable and similar. Most of the data obtained in the study were consistent with the data available in the literature. Yousuf U *et al.* in 2007, compared the preincisional infiltration of 0.25% bupivacaine or 0.2% ropivacaine with 1:200000 adrenaline, they found that analgesia produced by both the drugs is comparable, and VAS scores and OPS scores were comparable in both the Groups.

In a study done by Ertap A *et al*. (2006) the pain scores were similar between the bupivacaine and ropivacaine Groups and they also found that analgesic requirements and the time to first analgesia were also comparable between bupivacaine and ropivacaine Groups

The decrease in post operative pain caused by 0.5% ropivacaine or 0.5% bupivacaine infiltration is evident for prolonged period post operatively hence providing support for pre emptive analgesia. The requirements of postoperative rescue analgesia are reduced and there is delay in the requirement of analgesic post operatively in both the Groups. An explanation for the long lasting pain relief is that neural blockade prior to injury prevents nociceptive impulses from entering the central nervous system, thus suppresses formation of the sustained hyperexcitable state that is responsible for postoperative pain. The main drawback of the study is the small sample size and non inclusion of placebo Group. Including a placebo Group and increasing the sample size in the trial would make the results more appropriate.

CONCLUSION

Ropivacaine is as effective as bupivacaine in treating the post tonsillectomy pain. The preemptive analgesia provided by blockade of peripheral nerves can provide reliable, long lasting relief of post operative pain.

DECLARATIONS

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Competing interests: None declared

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