

Original Research Article

A clinical study of effect of peri-tonsillar infiltration of ropivacaine on tonsillectomy haemorrhage

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ABSTRACT

Background: The aim of this study to determine the relationship between the peritonsillar infiltration of ropivacaine hydrochloride and haemorrhage in patients undergoing tonsillectomy.

Methods This prospective study was conducted in the department of otorhinolaryngology and head and neck surgery, Adichunchanagiri institute of medical sciences, B. G. Nagara, Mandya district. A sample size of 30 patients which satisfied the inclusion criteria were included in the study.

Ropivacaine (0.75%) was locally infiltrated on the right side (R-side) in the peri-tonsillar region before the surgery. The left side was considered as the control side. Intra-operative blood loss was estimated separately for both the sides. The data from the study will be analysed using chi square test and Student t test technique.

Results: The 17 (56.7%) females and 13 (43.3%) males participated in the study. Majority of the cases belonged to <10 years of age group. By analysing the data, blood loss was found to be higher on the left side (control side) compared to the right side on which peri-tonsillar infiltration of ropivacaine was given. The association between the blood loss on the right side and the left side (control side) was found to be significant ($p < 0.0001$).

Conclusions: Based on the result of our study it can be derived that the peri-tonsillar infiltration of Ropivacaine (0.75%) is very effective in reducing intra-operative bleeding and at the same time providing a better bloodless field during surgery. Hence, we recommend the use of peri-tonsillar infiltration of Ropivacaine (0.75%) in view of better management of intra-operative blood loss

Keywords: Tonsillectomy, Peri tonsillar infiltration, Ropivacaine, Haemorrhage

INTRODUCTION

Tonsillectomy is one of the most frequently performed procedures in an ENT department. Despite advancements in surgical and anaesthetic techniques, bleeding and pain are still the most common complications of tonsillectomy.¹ Several different treatment techniques have been developed for use during and after surgery to reduce these complications.

Haemorrhage is the most common complication following tonsillectomy. Haemorrhage after tonsillectomy occurs most commonly till 10 days after surgery. The risk of haemorrhage is approximately 1-2%

and it is higher in adults, especially males and in about 75% of the cases the haemorrhage occurs on the day of surgery. Approximately 3% of the patients develop significant haemorrhage which requires surgical intervention.²

All local anaesthetic drugs except ropivacaine is racemic mixtures. Ropivacaine has a pure chiral form. Racemic mixtures will have different potencies and toxicities. Because of this chiral form ropivacaine has less systemic toxicity than others but the duration of action is similar.³

This new long-acting amino-amide local anesthetic, ropivacaine, combines the anaesthetic potency and long

duration of action of bupivacaine with a toxicity profile intermediate between bupivacaine and lidocaine. Ropivacaine is 2-3 times less lipid soluble and has a smaller volume of distribution, greater clearance, and shorter elimination half-life than bupivacaine in humans. Low concentrations of ropivacaine may produce clinically significant vasoconstriction.^{4,5}

During intradermal or subcutaneous infiltration, the dose of the local anaesthetics can be reduced with the use of adrenaline, as adrenaline prolongs the action of these drugs. This can prevent the high dosing and toxicity of this drugs.⁶

The aim of this study is to determine the relationship between the peritonsillar infiltration of ropivacaine hydrochloride and haemorrhage in patients undergoing tonsillectomy.

METHODS

This is a prospective study conducted in the department of otorhinolaryngology and head and neck surgery, Adichunchanagiri institute of medical sciences, B. G. Nagara, Mandya district. The study period was from November 2017 to July 2019. A sample size of 30 patients with history of recurrent or chronic tonsillitis undergoing tonsillectomy was included in the study. We have used the hospital based convenient sampling technique to calculate the size of the sample with one side being the study or interventional side and another side is control. The exclusion criteria were patients with acute infections, hypersensitivity to ropivacaine, patients with history of bleeding disorders, liver, kidney and cardiovascular dysfunction. The study was approved by institutional ethics committee. Written informed consent was taken from all patients undergoing tonsillectomy. Dissection tonsillectomy was done in all the cases.

Ropivacaine (0.75%) was locally infiltrated on the right side (R-side) in the peri-tonsillar region before the surgery and in the tonsillar fossa after the surgery. The left side was considered as the control side. Intra-operative blood loss was estimated by weighing the swabs used before and after surgery (1 gm =1 ml) and

adding it to the total volume of blood collected in respective suction bottles separately on both the sides. The data from the study will be analysed using Chi square test and Student t test technique.

RESULTS

In our study, a total of 30 patients participated out of which 17 were females and 13 were males. Females constituted 56.7% of the total number of patients and males constituted 43.3% of the total cases. Majority of the cases belonged to <10 years of age group.

In our study, 30 cases were analysed, all the cases were given peri tonsillar infiltration of ropivacaine on the right side. It was found that >100 ml blood loss on the right side was found in 6 patients constituting about 20% of the total cases.

Table 1: Amount of right sided blood loss.

Intra op right side blood loss (ml)	Frequency	Percentage (%)
<50	6	20
50-75 l	9	30
76-100 l	9	30
>100	6	20
Total	30	100

In this study, for all the 30 cases, left side was considered as the control side and on this side peri-tonsillar infiltration was not given. It was found that, >100ml blood loss was seen in 10 patients constituting 33.3% of the total cases.

Table 2: Amount of left sided blood loss.

Intra op left side blood loss (ml)	Frequency	Percentage (%)
<50	2	6.7
50-75	7	23.3
76-100	11	36.7
>100	10	33.3
Total	30	100

By analyzing the above tabulated data, blood loss was found to be higher on the left side (control side) compared to the right side on which peri-tonsillar infiltration of ropivacaine was given.

The association between the blood loss on the right side and the left side (control side) was found to be significant ($p < 0.0001$).

Table 3: Comparison of mean blood loss between right and left sides.

Variables	Mean	N	Std. Deviation	95% confidence interval of the difference		T	Df	P value
				Lower	Upper			
R blood loss	75.73	30	31.055	-16.395	-9.338	-7.458	29	0.000
L blood loss	88.60	30	26.282					

DISCUSSION

At present, there are various methods to perform tonsillectomy but the bleeding and post-operative pain remains the most widely encountered obstacles for the surgery. Haemorrhage during tonsillectomy often results in result in significant morbidity such as shock, airway obstruction and need for blood transfusion. Various attempts have been tried to reduce the morbidity of tonsillectomy which includes changes in the surgical approach and peri-operative medications to reduce the risk of bleeding.⁷

There are several local anaesthetic solutions available for peri operative infiltration, such as lidocaine, prilocaine, mepivacaine, bupivacaine, and ropivacaine. However, there has been continuous research to find the ideal local anaesthetic solution with a prolonged duration of action, good postoperative analgesia, and low toxicity.^{8,9}

Lignocaine is perhaps the most commonly used local anaesthetic agent which is used in combination with epinephrine. Bupivacaine has been increasingly recommended during tonsillectomies due to its superior antinociceptive properties and its ability to reduce vascular permeability and inflammation.¹⁰ Bameshki et al in the Mashhad university of medical sciences, Mashhad, Iran-conducted a study of local injection of epinephrine and Bupivacaine on post-tonsillectomy pain and bleeding and from the results of their study it was interpreted that bleeding during surgery in the group who received pre-operative injections was less than in the control group. But comparative studies have reported that bupivacaine has higher tissue toxicity, neurotoxicity, and cardio toxicity than other local anaesthetics.¹¹

Ropivacaine is a long-duration local anaesthetic agent that is extensively used in various surgical procedures. Ropivacaine is a amide-type of local anaesthetic that is chemically similar to bupivacaine and mepivacaine. It is available at various concentrations (0.75%, 0.5%, 0.375%, or 0.25%) and is said to have inherent vasoconstrictive properties at low concentrations. Also, ropivacaine has a 75% greater margin of safety when compared to bupivacaine. It has less toxicity on the cardiovascular and central nervous systems than bupivacaine. Thus, ropivacaine can be used as a suitable local anaesthetic without a vasoconstrictor for nerve block anaesthesia.^{12,13}

There are studies related to the use of local infiltration of ropivacaine in various surgeries like ophthalmic and dental surgeries but according to our knowledge there are very few studies related to study of ropivacaine in tonsillectomy in relation to haemorrhage assessment.^{14,15}

In our study, all the 30 cases were given peri-tonsillar infiltration of ropivacaine on the right side and the left side was considered as control side. It was found that the percentage of the cases having blood loss >100 ml was

more on the left side compared to that with right side where ropivacaine peri tonsillar infiltration given.

It was also observed in our study, that ropivacaine achieved faster onset and longer duration of action. The longer duration of action helped in better bleeding control and analgesia effect. In this study, ropivacaine was found to be safe and no side effects or complications were reported in contrast to cardiovascular and neuro toxicity with bupivacaine infiltration

Mishra et al conducted a study with ropivacaine in periodontal surgery and found that, ropivacaine significantly reduced blood loss due to its vasoconstrictive properties. The above study also supports our result that peri-tonsillar infiltration of ropivacaine with adrenaline is effective in reducing intra-operative bleeding.¹⁶

A crucial result of our study was the decreased bleeding observed with ropivacaine peritonsillar infiltration when compared to the control group. Hence, we recommend the use of peri-tonsillar infiltration of ropivacaine (0.75%) in view of better management of intra-operative blood loss

The major limitation of the study was limitation of the study to intra operative tonsillectomy haemorrhage only and the study not involves the immediate post-operative and late complications. The study was limited only to the usage of ropivacaine in tonsillectomy rather comparison of ropivacaine with other local anaesthetics like bupivacaine, lignocaine etc. not included.

CONCLUSION

Tonsillectomy is one of the most common procedures performed in the otorhinolaryngology department. Haemorrhage and post-operative pain are very frequently encountered complications during the surgery. From our study it can be derived that the peri-tonsillar infiltration of ropivacaine (0.75%) is very effective in reducing intra-operative bleeding and at the same time providing a better bloodless field during surgery. Because of inherent vasoconstrictive properties and fewer cardiac and CNS adverse effects, ropivacaine is an ideal local anaesthetic drug for peritonsillar infiltration in reducing the tonsillectomy bleeding.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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