ORIGINAL RESEARCH

To Study the Effect of Pre-incisional Infiltration of Ropivacaine for Post-tonsillectomy Pain Relief

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Abstract

Aim: To assess the effect of pre-incisional peritonsillar infiltration of ropivacaine on severity of pain after tonsillectomy.

Background: Ropivacaine is a local anesthetic drug that has recently been gaining popularity. It is a synthetic drug of long-acting, amide type. It has a high protein-binding capacity of 90–95% that results in a longer duration of action of 6–8 hours. The onset of action, however, is delayed due to a lower lipid solubility as compared to lidocaine. When compared to bupivacaine, ropivacaine is relatively less cardiotoxic, thereby gaining popularity as an agent for epidural analgesia in gynecological procedures and for motor or sensory blocks in orthopedic surgeries.

While the contribution of ropivacaine in treatment of pain that occurs after tonsillectomy has been evaluated, the reports are inconsistent, with respect to clinical trials that include lesser number of patients, and the conclusions have been disputable. Therefore, the study was conducted to assess the efficacy of ropivacaine in the management of post-tonsillectomy pain.

Materials and methods: Patients were divided into two groups: Group "R"—administered 0.2 mL/kg of 0.75% ropivacaine hydrochloride infiltration into each peritonsillar fossa under general anesthesia but before tonsillectomy, and Group "S"—not administered anything in peritonsillar fossa under general anesthesia before tonsillectomy. Postoperative pain was assessed using a simple descriptive pain scale as subjective indicator for severity of pain.

Results: Mild, moderate, and severe pain was reported among 84%, 16%, and 0%, respectively, with ropivacaine infiltration and 32%, 28%, and 40%, respectively, without ropivacaine infiltration. When severity of pain was compared among subjects with and without ropivacaine infiltration using, it was found to be statistically significant as $p < 0.05$.

Conclusion: Infiltration of 0.75% of ropivacaine pre-incisionally into the tonsillar bed is an effective measure to manage the postoperative pain in patients undergoing tonsillectomy.

Clinical significance: Ropivacaine is an upcoming cardio-safe drug that has a very high threshold to achieve toxicity levels. It significantly helps to reduce immediate postoperative pain following any procedure and pain is one of the main factors causing morbidity in a procedure like tonsillectomy. Thus, there is the need for a research in the field.

Keywords: Local anesthetic, Pain, Pre-incisional infiltration, Ropivacaine, Tonsillectomy.

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Introduction

Tonsillectomy is one of the popularly performed procedures in the pediatric age-group that is being practiced since 2,000 years, with varying popularity over the centuries.[1] The most common postoperative sequela that occurs post-tonsillectomy is pain. Pain will usually persist for approximately 2 weeks following surgery.[2,3] Postoperative pain seems to be more in adults as compared to children.[4] Thus, the relief of pain after tonsillectomy is a major concern for the well-being of patients after tonsillectomy. To explain the reduction of the post-tonsillectomy pain via the use of local anesthetics, various theories have been proposed. Blockade of the peripheral nerves from conducting pain impulses to the central nervous system during surgery can prevent the formation of a hyperexcitable state in the CNS and subsequently result in reduction of postoperative pain.[5,6]

Ropivacaine is an upcoming long-acting local anesthetic that is structurally closely related to bupivacaine. It exists as an S-enantiomer and is the first enantiomerically pure local anesthetic.[7] It exhibits less cardiovascular or CNS toxicity when compared with bupivacaine in healthy volunteers.[8,9]

While the contribution of ropivacaine in management of post-tonsillectomy pain reduction has been assessed, the reports have been inconsistent, with studies including fewer number of patients, and the results are controversial.[10] Therefore, the current study was undertaken to assess the efficiency of the local

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anesthetic, ropivacaine, in the management of post-tonsillectomy pain relief.

Materials and Methods

A total of 50 patients were planned as the sample size and were divided into two groups: Group "R"—administered 0.2 mL/kg of 0.75% ropivacaine hydrochloride infiltration into each peritonsillar fossa under general anesthesia but before tonsillectomy, and Group "S"—not administered anything in peritonsillar fossa under general anesthesia before tonsillectomy.

Inclusion Criteria

- Children above the age of 5 years and adults below the age of 50 years.
- With or without adenoids.
- Patients with chronic tonsillitis in whom the most recent episode occurred 3 weeks before the procedure.
- American Society of Anesthesiologists (ASA) physical status I or II.

Exclusion Criteria

- An acute attack of tonsillitis, peritonsillar abscess, quinsy, bleeding disorder, and anemic status.
- Patients undergoing other ENT procedures like myringotomy.
- Patients with hypersensitivity to ropivacaine.
- Patients aged less than 5 years and more than 50 years.
- Patients having an ASA status of III and above.
- Patients that are unwilling for surgery.

Postoperative pain assessed using a simple descriptive pain scale as subjective indicator for severity of pain at 4 and 8 hours after the surgery. Postoperatively, the patients were judged on the following criteria:

Pain score	*Severity*
10	Unable to move
9	Severe
8	Intense
7	Unmanageable
6	Distressing
5	Distracting
4	Moderate
3	Uncomfortable
2	Mild
1	Minimal
0	No pain

Pain (on a scale of 1–10): The severity of 7–10 was considered as severe, 4–6 as moderate, 1–3 as mild, and 0 as none. The mean responses were identified and tabulated.

Results

After 4, 8, and 24 hours of surgery, mean pain score was lowest in subjects with ropivacaine infiltration as compared to subjects without ropivacaine infiltration with statistically significant difference as $p < 0.05$. After 48 and 72 hours of surgery, mean pain score was approximately similar in both the groups. At seventh day, mean pain was 0.24 and 0.68 among subjects with and without ropivacaine infiltration, respectively. When mean pain score at seventh day was compared among subjects with and without ropivacaine infiltration using *t*-test, it was found to be statistically significant as $p < 0.05$ (Table 1).

Eighty-four percent of individuals of Group R had mild pain, 28% had moderate, and 0% had severe pain post-tonsillectomy as compared to Group S where 32% had mild, 28% had moderate, and 40% had severe pain. When severity of pain was compared among subjects with and without ropivacaine infiltration using Chi-square test, it was found to be statistically significant as $p < 0.05$ (Table 2).

Post-op analgesics were required in 16 and 68% of the subjects with and without ropivacaine infiltration, respectively. When post-op requirement was compared among subjects with and without ropivacaine infiltration using Chi-square test, it was found to be statistically significant as $p < 0.05$ (Table 3).

Discussion

After 4, 8, and 24 hours of surgery, mean pain score was lowest in subjects with ropivacaine infiltration as compared to subjects without ropivacaine infiltration with a statistical significant difference as $p < 0.05$. After 48 and 72 hours of surgery, mean pain score was approximately similar in both the groups. At seventh day, mean pain was 0.24 and 0.68 among subjects with and without ropivacaine infiltration, respectively. When mean pains score at seventh day was compared among subjects with and without ropivacaine infiltration using *t*-test, it was found to be statistically significant as $p < 0.05$ in our study. Mild, moderate, and severe pain was reported among 84, 16, and 0%, respectively, with ropivacaine infiltration and 32, 28, and 40%, respectively, without ropivacaine infiltration. When severity of pain was compared among subjects with and without ropivacaine infiltration using Chi-square test, it was found to be statistically significant as $p < 0.05$.

Arikan et al.[11] found similar results in their study.

Table 1: Time after surgery and degree of pain among the study groups

		Pain					
Ropivacaine infiltration		*4 hours*	*8 hours*	*24 hours*	*48 hours*	*72 hours*	*7th day*
No (group S)	Mean	4.96	4.28	3.00	1.92	1.12	0.68
	SD	2.189	1.969	1.528	1.256	0.781	0.802
Yes (group R)	Mean	1.64	2.40	2.12	1.72	1.24	0.24
	SD	1.578	1.472	0.971	1.100	0.879	0.436
t test		37.85	14.62	5.91	0.36	0.26	5.81
p value		<0.01*	<0.01*	0.019*	0.55	0.61	0.02*

*Statistically significant

Table 2: Severity of pain among the study groups

		Ropivacaine infiltration			
Severity		*No (group S)*	*Yes (group R)*	*Chi-square*	*p value*
Mild	*N*	8	21	16.64	<0.01*
	%	32%	84%		
Moderate	*N*	7	4		
	%	28%	16%		
Severe	*N*	10	0		
	%	40%	0%		
Total	*N*	25	25		
	%	100.0%	100.0%		

*Statistically significant

Table 3: Post-op analgesics

		Ropivacaine infiltration			
Post-op analgesics		*No (group S)*	*Yes (group R)*	*Chi-square*	*p value*
Given	*N*	17	4	13.88	<0.01*
	%	68%	16%		
Not given	*N*	8	21		
	%	32%	84%		
Total	*N*	25	25		
	%	100.0%	100.0%		

*Statistically significant

Oghan et al.,[12] in a study that was undertaken to demonstrate the effect of topical ropivacaine hydrochloride on reduction of postoperative morbidity occurring after adenotonsillectomy, concluded that in first hour, the effect of ropivacaine in relief of pain was not statistically significant ($p > 0.05$).

On the contrary, Park et al. gave a report of no reduction in the pain postoperatively when epinephrine with ropivacaine was injected immediately after adenotonsillectomy.[13]

Conclusion

From the results of the study that we conducted, it was concluded that 0.75% ropivacaine when administered pre-incisionally is an effective technique to lower the postoperative pain in patients following tonsillectomy. It has also been proven to be effective for starting of an early postoperative oral feed and to also reduce the cost of prolonged postprocedure hospital stay. There were no additional complications that were raised because of the use of ropivacaine, and thus, we recommend routine use of 0.75% ropivacaine as pre-incisional infiltration in patients that are planned for tonsillectomy.

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