

Peritonsillar Infiltration of Epinephrine in Reduction of Blood Loss in Tonsillectomy

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Abstract:

Background: Tonsillectomy is one of the most performed surgeries in the field of otorhinolaryngology. Despite being commonest and simplest one the operating surgeon is always keen to its high risk of complication i.e., intra & post-operative haemorrhage which may even lead to shock & death. A variety of hemostatic agents & specialized surgical techniques have been used to reduce intra & post-operative bleeding. The effects of most of the substances and techniques have been just primarily on clinical impression because of paucity of prospective studies. Keeping these things in mind this randomized prospective study of peritonsillar infiltration of epinephrine in maintaining hemostasis in tonsillectomy is undertaken.

Methods: Patients with tonsillar hypertrophy undergoing tonsillectomy under general anesthesia in tertiary hospital in Chennai were studied for a period of two years. They were assessed clinically and all basic investigation was done. Informed written consent was obtained from the patients. Left sided tonsillectomies were chosen for peritonsillar infiltration of epinephrine and the right side were chosen as the control group, automatically making patients their own controls thus eliminating other potential influencing physiological factors. The amount of blood loss in both the group was calculated.

Result: The mean age of patients undergoing the study was $20.96 \pm SD$ years. In this study 34% were male and 66% were female. The patients had different grades of tonsils. Unpaired student 't' test shows P value = 2.58 which is less than 0.005 level of significance. This shows there is a significant difference between group C and group T. This indicates there is a remarkable reduction in blood loss in group T.

Conclusion: Peritonsillar infiltration of epinephrine helps in reduction of intraoperative blood loss.

Keywords: Tonsillectomy, Peritonsillar Infiltration, Epinephrine, Blood Loss.

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Introduction

The palatine tonsil is the accumulation of mucosa-associated lymphoid tissue covered by stratified squamous non-keratinizing epithelium and as a part of Waldeyer's ring, the palatine tonsil is a major source of T and B lymphocytes for local mucosal defense.[1] Tonsillectomy is one of the most performed surgeries in the field of otorhinolaryngology. Tonsillectomy by Dissection & Snare method is the commonest performed technique.[2] Yet being the commonest performed surgery the surgeons who perform surgery are keenly aware of the threat of its most frequent and dreaded complication that is haemorrhage.[3] Cornélio Celsus, in the 1st century B.C., was the first to describe tonsillectomy surgery; he reported

the procedure performance for dissection and removal of the structures. Celsus applied a mixture of vinegar and milk in the surgical specimen to hemostasis and described his difficulty doing that due to lack of proper anesthesia.[4] The intra operative hemorrhage with loss of greater than 10% of the patient's blood volume is reported to be as high as 18% & post-op hemorrhage occurs in 0-10% of cases. The mortality has been reported to be between 1 per 1100 & 1 per 16000 respectively. Much of the mortality associated with tonsillectomy is directly or indirectly associated with its complication.[3] A variety of hemostatic agents & specialized surgical techniques have been used in an attempt to reduce intra & post-operative

bleeding, Topical use of silver nitrate, tannic acid has been used. Intra venous administration of epsilon amino caproic acid (fibrinolytic agent) also used to reduce blood loss during surgery. Other methods of controlling bleeding while surgery is ligation, electrocauterization of tonsils by bipolar diathermy, cryosurgery and by laser, radio frequency and ionic coblation.[5] In spite of all these efforts, bleeding following tonsillectomy is still a life-threatening complication & so of significant concern. Peritonsillar infiltration of epinephrine is also quite an effective technique used to maintain hemostasis during tonsillectomy. The effects of most of the substances and techniques have been just primarily on clinical impression because of paucity of prospective studies. Keeping these things in mind this randomized prospective study of peritonsillar infiltration of epinephrine in maintaining hemostasis in tonsillectomy is undertaken.

Materials and Methods:

A randomized prospective study was conducted among patients admitted in a tertiary care hospital in Chennai. Patients admitted during the period of 2022 and 2023 were included in the study. Patients were assessed clinically to determine tonsillar hypertrophy, congestion of anterior pillars, and palpable jugulo-diaphragmatic lymph nodes.

All patients undergoing tonsillectomy under general anesthesia within duration of 2 years having signs of chronic tonsillitis are included into this study. Patients with bleeding disorders such as leukemia, purpura, aplastic anemia & with abnormal BT, CT, Platelet counts, aPTT value and patients undergoing adenoidectomy, children less than 5 years of age, patients with ischemic heart diseases, hypertension, renal impairment, thyroid abnormalities are excluded from the study. All basic investigation for fitness of surgery under general anesthesia were done other investigations like thyroid function tests, renal profile was done to rule out abnormal thyroid values and renal

impairment which are contraindications for using epinephrine(adrenaline). Pregnancy is also ruled out. Left sided tonsillectomies were chosen for peritonsillar infiltration of epinephrine (1:100000) and the right side were chosen as the control group and infiltrated with normal saline, automatically making patients their own controls thus eliminating other potential influencing physiological factors. Patients were under continuous cardiac monitoring. In order to measure the intra operative blood loss, the bottles of two suction apparatus will be used for each fossa separately.

The numbered plain soaked cotton and gauze balls which were used for pressure hemostasis was weighed pre-operatively and post-operatively. Blood collected in suction bottles was also measured. The amount of blood loss for each fossa will be measured by calculating the difference in weights of swabs etc. before and after use and then adding the total so obtained (1 gm=1ml) to the volume of blood collected in the respective suction bottles. Institutional scientific and ethical committee clearance was obtained prior to the commencement of the study. Informed written consent was obtained from the patients before including in the study.

Results on continuous measurements are presented on mean standard deviation and results on categorical measurements are presented in numbers (%). Significance is assessed in 0.5% (0.005) level of significance. Student 't' test was applied to find the significance of study parameters between two groups. Results: A total of 50 patients were included in the present study.

Out of which maximum number of patients were in the age group of 16-25 years (30%) followed by 26-35 years (28%), the mean age of patients in the current study was $20.96 \pm SD$ years. In this study 34% were male and 66% were female. The patients in the current study had different grades of tonsils, where maximum number of patients were in grade II (30%) followed by grade III (24%).

Table 1: Distribution of cases based on Age, Gender, and Tonsillar Grade

Variable	Frequency (n)	Percentage (%)
Age Group:		
5-15 Years	17	35
16-25 Years	15	30
26-35 Years	14	28
36-45 Years	4	8
Gender:		
Male	17	34
Female	33	66
Tonsillar Grade:		
I	12	24
II	15	30
III	12	24
IV	11	22
Total	50	100

The total amount of blood loss was high among the control group (2071.6 ml) compared to the test group (1201.5 ml), which included blood collected in suction apparatus and gauze roll. Unpaired student 't' test shows P value = 2.58 which is less than 0.005 level of significance.

Table 2: Blood Group in Control Group and Test Group

	Control Group		Test Group		p Value
	ml	%	ml	%	
Blood Loss in Suction	764	37	527	44	< 0.005*
Blood Loss in Gauze	1313.68	63	674.5	56	
Total Blood Loss	2071.6	63.3	1201.5	36.7	

*Unpaired student "t" test Applied.

This shows there is a significant difference between group C and group T. This indicates there is a remarkable reduction in blood loss in group T. no side effects of Epinephrine were noted during the study.

Discussion

The intra operative hemorrhage with loss of greater than 10% of the patient's blood volume is reported to be as high as 18% & post-op hemorrhage occurs in 0-10% of cases. The mortality has been reported to be between 1 per 1100 & 1 per 16000 respectively. Much of the mortality associated with tonsillectomy is directly or indirectly associated with its complication that is intra-op and post -op hemorrhage.

The intra op hemorrhage with loss of more than 10% of patient's blood volume is reported to be as high as 18% and post op hemorrhage occurs in 0-10% of the cases. The mortality has been reported to be in between 1/ 1100 and 1/16000 respectively. Rasgon et al [6] in his randomized prospective double blinded study of infiltration of epinephrine in tonsillectomy showed that a variety of hemostatic technique have been used in attempt to reduce intra operative blood loss and post-operative hemorrhage in tonsillectomy. In his study he has taken 92 as the sample size and they were taken as their own controls. In our study the sample size is 50 and we too have taken the same patients as test and control.

In both the studies 1:1,00,000 epinephrine was used as infiltration in the test and control remove other factors which may affect intra operative blood loss. Other literatures like Broadman et al [7] and YT Pang et al.[8] have conducted study on pediatric population; whereas in present study was conducted from 5-45 years of age group. Broadman et al has divided his sample size into 4 groups; one with bupivacaine and epinephrine, normal saline with 1:2,00,000; normal saline and 4 with no infiltration. But in our study, we have used same patients as test and control and used 1:1,00,000 epinephrine and normal saline respectively. In his study YT Pang et al has used different dissection techniques like cold dissection and diathermy method where in present study dissection and snare method is used for all 50 patients and the same

operating surgeon has operated for all cases to avoid variation of surgical techniques to remove the intra personal bias. Strub KA et al [9] conducted a study on local infiltration epinephrine and bupivacaine before tonsillectomy in a randomized double blinded trial on 103 students in which patients were divided into 3 groups. Controls were injected with 0.9% NaCl and the rest of the groups were injected with 0.4 ml/kg (1:2,00,000) epinephrine with 0.25% bupivacaine and only 1:2,00,000 epinephrine. All cases are performed as our study and the results show that there is significantly less hemorrhage in epinephrine and epinephrine and bupivacaine group. In his study Boliston TA [10], Upton JJ showed that infiltration with lignocaine and adrenaline in adult tonsillectomy, there was significantly higher systemic blood pressure and heart rate in the injected patients were thought to be due to the systemic effects of adrenaline unlike to our study, where test and control groups included age group of 5-45 years and no significant changes in heart rate and blood pressure was noted.

Conclusion:

Peritonsillar infiltration of epinephrine helps in reduction of intraoperative blood loss. There is a significant amount of blood loss seen in gauze pieces which are used to pack the tonsillar fossa while dissecting the tonsils out and after dissection for pressure hemostasis. This volume of blood loss is more than the amount of blood collected in the suction apparatus. So, it is important to consider the blood soaked in the gauze pieces because most of the time surgeons tend to avoid the blood soaked in gauze pieces and only concentrates on the blood collected in the suction apparatus. Peritonsillar infiltration of Epinephrine used in dilution of 1:1,00,000 does not produce any major side effects while surgery under general anesthesia and so can be used in control of blood loss while tonsillectomy.

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