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**ORIGINAL ARTICLE**

# Comparison of Peritonsillar Injection of Lignocaine-Adrenaline and Normal Saline (placebo) Before Tonsillectomy in Terms of Mean Peri-Operative Blood Loss

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## ABSTRACT

**Objective:** To compare peritonsillar injection of lignocaine-adrenaline and normal saline (placebo) before tonsillectomy in terms of mean perioperative blood loss.

**Patients and Methods:** This randomized controlled trial was carried out at Department of ENT Head and Neck Surgery, Pakistan Institute of Medical Sciences, Islamabad study in six months' time. A total of 60 patients were included in the study, their demographics data and clinical findings were noted. Subjects were randomly divide in two groups (30 in each group). Group A received injection of lignocaine-adrenaline in peritonsillar region and group B received normal saline (placebo), prior to tonsillectomy. Blood loss in both groups during surgery was measured by means of gauze pieces used and suction bottle.

**Results:** Both groups were assessed for intraoperative blood loss. Despite marked reduction of blood loss in group A, the difference in two groups was not statistically significance ( $p$ -value=0.213) after applying independent sample t test. Post-stratification student t test showed a statistical significance in the age groups 15 – 20 years ( $p$ -value=0.018).

**Conclusion:** Our study concludes that the group injected with lignocaine-adrenaline in the peritonsillar area had a marked reduction in perioperative blood loss as compared to the group that was injected with normal saline (placebo).

**Key words:**

Author's Contribution

<sup>1</sup> Conception, synthesis, planning of research and <sup>2</sup> manuscript writing Interpretation and discussion

<sup>3,4</sup> Data analysis, interpretation and manuscript writing, <sup>5</sup> Active participation in data collection.

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## Introduction

Tonsils are important components of the immune system and their infections are one of the most frequently involved diseases in humans. Tonsils are immunologically more active in the first years of life.<sup>1</sup> With aging, however lymphoid tissue regresses, subepithelial tissue changes into fibrotic tissue and crypts alter into cavities filled with

keratin. In case of infection, bacteria that inhabit the crypts spread into the tonsil and leave their toxins and other products in it, eventually leading to polymorphonuclear leukocyte infiltration, swelling, necrosis and surface ulceration in tonsils. Consequently, after acute infection, bacteria may inoculate into the core.<sup>2</sup>

These infections are highly frequent especially in childhood. Although antibiotic therapy may be sufficient in the treatment of acute tonsillitis, tonsillectomy remains the treatment of choice in the management of recurrent and chronic tonsillitis.<sup>3</sup> Tonsillectomy is a surgical procedure in which each tonsil is removed from a recess in the side of the pharynx called the tonsillar fossa.<sup>4</sup> The procedure is performed in response to repeated occurrence of acute tonsillitis, sleep surgery for obstructive sleep apnea, nasal airway obstruction, diphtheria carrier state, snoring, or peritonsillar abscess.<sup>5</sup>

For children, the adenoids (also known as a pharyngeal tonsil or nasopharyngeal tonsil) are usually removed, a procedure called adenoidectomy (or tonsilloadenoidectomy or adenotonsillectomy when combined). Adenoidectomy is uncommon in adults in whom the adenoids are usually vestigial. Although tonsillectomy is performed less frequently than in the 1950s, it remains one of the most common surgical procedures in children.<sup>6</sup>

Tonsillectomy can be performed in many different ways depending on the preference and experience of the surgeon. Generally, it may be divided into two stages: excision of the tonsil followed by control of bleeding. However, newer techniques combine these stages so that they are undertaken simultaneously. Cold dissection tonsillectomy involves cutting the pharyngeal mucosa with scissors followed by blunt dissection of the tonsil from the lateral pharyngeal wall, employing no form of heat or cautery. Hemostasis can then be achieved by ligatures or sutures.<sup>7</sup>

Although tonsillectomy is a worthwhile surgical intervention when indicated,<sup>11</sup> it is not without its complications. The most serious risk associated with the procedure is postoperative hemorrhage, and a multitude of reports have discussed its relationship to operative technique.<sup>12,13</sup> Different techniques have attracted controversy around their complication rates, in particular the incidence of hemorrhage. This controversy perseveres due to the difficulty in reliably proving or disproving a small difference in the rate of a relatively uncommon complication.<sup>14</sup>

Several treatment options have been used to minimize pre and post-operative complications, including steroids, analgesics, antibiotics, and have been shown to have

some positive outcomes in randomized controlled trials. One of these techniques is injection of adrenaline and local anesthetic agent into the peritonsillar region to reduce blood loss during and after tonsillectomy.<sup>18</sup>

The current study was planned to compare peritonsillar injection of lignocaine-adrenaline and normal saline (placebo) before tonsillectomy in terms of mean perioperative blood loss.

## Patients and Methods

This study was conducted in the Department of ENT Head and Neck Surgery, Pakistan Institute of Medical Sciences, Islamabad. It was a randomized controlled trial carried out in 6 months. Sample of 60 patients were calculated through WHO sample size calculator by using level of significance = 5% and power of test = 80%. Percentage change used for group A (local anesthetic with adrenaline group) and B (saline group) was 21% and 55% respectively. Patients of both genders, between 15 to 40 years of age undergoing tonsillectomy in ENT department were included in the study. Patients with acute infection of the nose, upper respiratory tract and paranasal sinuses and diabetic patients due to increased chances of infection and post-operative complications were excluded from the study. Hypertensive patients, patient with bleeding diathesis and deranged coagulation profile due to increased risk of bleeding and pregnant ladies which are considered as relative contraindication for tonsillectomy were also excluded.

An approval letter was taken from the hospital's ethics committee prior to start of this study. Patients were collected and admitted from the outdoor department of the ENT department, Pakistan Institute of Medical Sciences Islamabad. Patient demographic data along with registration number were entered on Performa. Informed written consent was obtained from all patients preoperatively. After the informed consent, patients were randomly divided into two groups on lottery basis. Group A was injected lignocaine-adrenaline and group B was given normal saline. Total 3 ml of 2% lignocaine-adrenaline (1:100000) was injected in tonsillar region on each side in Group A. Normal saline of equal amount was injected to Group B. Intra operative blood loss was calculated in ml and compared in both groups. Total blood loss was measured from suction bottle and gauze pieces

used. We used gauze pieces of sizes 4x4 cm and 2x2 cm, which absorbed 10 ml ± 2 ml and 3.25 ml ±1.25 ml of blood at 100% saturation respectively. Blood from the suction bottle was measured by subtracting the amount of normal saline in the bottle from total blood present in the bottle. The overall blood loss was measured by adding the amount of blood from suction bottle and amount of blood absorbed on gauze pieces.

All the collected data was entered in Statistical Package for Social Sciences (SPSS). Quantitative variable like age, blood loss was presented by mean and standard deviation. The qualitative variable like gender was expressed by frequencies and percentages. Mean blood loss was compared between the two groups by applying independent sample t-test. Effect modifiers like age & gender were controlled by stratification. Post stratification student t-test was applied. p-value ≤ 0.05 was considered statistically significant.

## Results

Out of total 60 patients, 31(51.1%) were male and 29 (48.3%) were female. In Group A, female was 56.7 % (n=17) and male were 43.3 % (n=13). In group B, female was 40% (n=12) whereas male was 60 % (n=18). Mean age of total 60 patients was 24.32±8.18 years with an age range from 15 to 40 years. In group A, mean age was 24.87±8.71 years whereas in group B mean age was 23.77±7.727 years. Regarding age wise distribution maximum number of patients were in age group 15-20 year; 46.7% in group A and 50% in group B (Table 1).

**Table 1: Number of patients with respect to age group (n=60)**

Age group (years)	Group A (n=30) n(%)	Group B (n=30) n(%)	Combined (n=60) n(%)
15 – 20	14 (46.7)	15 (50)	29 (48.33)
21 – 25	3 (10)	4 (13.3)	7 (11.3)
26 – 30	4 (13.3)	4 (13.3)	8 (13.3)
31 – 35	4 (13.3)	3 (10)	7 (11.7)
36 – 40	5 (16.7)	4 (13.3)	9 (15)

Mean peroperative blood loss was measured in ml in both groups. In group A, minimum and maximum blood loss was 34 ml and 45.4 ml respectively.

Overall mean peroperative blood loss was 39.44±2.62 ml (Table 2). In group B, 66.5 ml and 106.2 ml was the minimum and maximum blood loss. Whereas the mean peroperative blood loss was recorded as 86.9±9.28ml (Table 3). Comparison of mean of both groups showed insignificant difference, p=0.21 (Table 4).

**Table 2: Mean Preoperative blood loss from right and left tonsillar fossa in Group A (n=30)**

Preoperative blood loss (ml)			
	Right tonsillar fossa	Left tonsillar fossa	Both
Minimum	15.7	16	34
Maximum	25.2	25	45.4
mean±SD	19.87±2.831	19.57±2.293	39.44±2.62

**Table 3: Mean Peroperative blood loss from right and left tonsillar fossa in Group B (n=30)**

Peroperative blood loss (mL)			
	Right tonsillar fossa	Left tonsillar fossa	Both
Minimum	33.5	28.9	66.5
Maximum	56.2	56.2	106.2
mean±SD	42.86±5.967	44.03±6.27	86.9±9.28

**Table 4: Comparison of mean peroperative blood loss between groups (n=60)**

Peroperative blood loss (mL) mean±SD		Group A	Group B
		39.44±2.62	86.9±9.28
t-test for equality of means	Degree of freedom	28	
	Mean difference	0.73303	
	S.E Difference	3.478	
	95 % CI	5.657 – 7.586	
	p-Value	0.213	

For further analysis, the mean of peroperative blood loss in both groups was compared with respect to different age groups (Table 5). In group A, the maximum mean peroperative blood loss was

observed in the age group 21 – 25 years whereas, the minimum mean peroperative blood loss was observed in the age group 26 – 30 years. In group B, the maximum mean peroperative blood loss was observed in the age group 26 to 30 years whereas the minimum mean intraoperative blood loss was observed in the age group 36 to 40 years. Analysis showed significant comparison for the age group 15 to 20 years (Table 5).

<b>Table 5: Comparison of peroperative blood loss between groups with respect to age groups (n=60)</b>			
<b>Age group (years)</b>	Peroperative blood loss (mL) mean±SD		p-value
	Group A	Group B	
15 – 20	39.38±2.61	85.95±8.72	0.018
21 – 25	40.25±4.49	84.55±9.82	0.253
26 – 30	38.03±3.01	95.60±5.54	0.687
31 – 35	39.10±3.00	94.43±5.56	0.964
36 – 40	40.27±1.81	78.45±8.09	0.398

The mean peroperative blood loss was also analyzed with respect to gender. Female were observed with slightly greater blood loss than male. A significant difference was observed between the male of two groups however, no significant difference was seen between the female of group A and group B (Table 6).

<b>Table 6: Mean peroperative blood loss with respect to gender (n=60)</b>		
<b>Gender</b>	Peroperative blood loss (mL) mean±SD	
	Male	Female
<b>Group A</b>	38.73±2.66	39.95±2.66
<b>Group B</b>	82.76±8.33	93.12±7.06
<b>p-Value<sup>a</sup></b>	0.42	0.106
<b>p-value<sup>b</sup></b>	0.046	0.310

p-value<sup>a</sup> with in each group, p-value<sup>b</sup> between two groups.

## Discussion

In the present study, a total of 60 patients were included. The mean age of these patients was 24.32 years (SD± 8.183) with an age range from 15 to 40 years. The Peak incidence was observed in the age group 15 to 20 years.

Moonka conducted a study regarding tonsillectomy in India and reported the peak incidence of tonsillectomies in the age group 11 to 20 years.<sup>22</sup> However, the number study subjects were large (n=376) as compared to our study subjects where 60 patients were enrolled for the study. Another study conducted in Iraq also reported the peak incidence of tonsillectomies in the age group 15 to 20 years (n=250).<sup>23</sup> In our study, males formed the predominant gender 51.1 % (n=31) whereas, females constituted 48.3 % (n=29). Dash conducted a study in Iran and reported the dominance of males (58 %, n=27), females constituted 42 % (n=19) of the study.<sup>24</sup> Adoga and Okeke in his study reported male predominance as 22 (59.5%) were males and 15 (40.5%) were females, giving a male-female ratio of 1.5:1.<sup>25</sup>

In the present study, we found that the mean peroperative blood loss in group A (pretreated with epinephrine: lignocaine) male was 38.7308 ml and in female it was 39.9882 ml. In the second group (pretreated with placebo) the blood loss was found to be 82.98824 ml in male and 92.01538 ml in female. The blood loss in males of both groups was statistically significant (p=0.046), however, the blood loss in females of both groups was statistically not significant (p=>0.05).

Similar to our results, Broadman et al have demonstrated the benefits of using peritonsillar infiltration with adrenaline and concluded that, infiltrations should be performed with either normal saline containing epinephrine (1:200,000) or lidocaine containing epinephrine (1:200,000).<sup>26</sup> Rasgon et al. reported that dissection is easier with peritonsillar injections with epinephrine and that it can be used safely with the appropriate inhalation anesthetics.<sup>27</sup> Manikandan et al,<sup>28</sup> reported from his study that, in males, the mean blood loss was 98.48 ml and in female it was 88.45 ml. Though the blood loss was 10.03 ml more in male, it was not statistically significant (P > 0.05).<sup>28</sup> Rugglesand Prasad's work revealed that, the blood loss during adenotonsillectomy was comparatively less than tonsillectomy alone.<sup>29</sup> Since the tonsillectomy alone was performed in adults, blood loss was more in tonsillectomy alone group than adenotonsillectomy group. The mean of actual blood loss was 90.57 ml and the mean of estimated blood loss was 94.35 ml. The average blood loss of these two parameters was 92.46 ml.<sup>29</sup> Contradictory to our

results, Prasad et al,<sup>30</sup> reported from his study that average blood loss in male during tonsillectomy was 106.91 ml whereas the average blood loss in female during tonsillectomy was 96.26 ml.<sup>30</sup> In cases of adenotonsillectomy, the average blood loss in males was 81.44 ml and that in female was 76.82 ml. The average blood loss (in milliliters) in male and female in the 5 – 9 years' age group was 79.79 and 72.70, respectively, in the 10–14 year group, 84.23 and 78.12, in the 15–19 year group 92.63 and 81.96, respectively.<sup>31</sup>

Callanan et al, reported a blood loss of 130 ml in tonsillectomies in their control group.<sup>31</sup> Boliston and Upton, reported a blood loss of 152 ml in their control group.<sup>32</sup> In the series by Shalom<sup>33</sup>, the average blood loss in tonsillectomy in adults was 179.3 ml (range 75–349 ml).<sup>33</sup> de Reynier found an average loss of 165 ml in 12 adults, when the operation was performed under general anesthesia but only 16 ml when performed under local anesthesia.<sup>34</sup> Maier and Bogue measured the blood loss by the swab weighing technique and found an average loss of 130 ml (range 20–449 ml).<sup>35</sup> In ten cases the loss was over 200 ml. They found that the older the children the greater were the losses. Ruggles<sup>36</sup> measured blood loss in tonsillectomy and adenoidectomy by blood volume studies utilizing 51Cr in 17 children.<sup>36</sup> He found an average loss of 119 ml. Mann et al, reported tonsillectomies by electrocoagulation, which markedly diminished blood loss.<sup>37</sup> They also compared blood loss by electrocoagulation method (hot) versus dissection method (cold) in 95 patients. According to them average blood loss by hot method was 11.8 ml and in cold was 66.3 ml for each tonsil. Carithen et al, reported that 1.2% of tonsillar hemorrhage and 3.2% of adenoidal hemorrhage were severe, though he has not assessed the exact quantity of blood loss.<sup>38</sup>

Our study demonstrated a marked reduction in intraoperative blood loss by pretreatment with adrenaline: lignocaine injection in tonsillar region. Prasad et al, pretreated patients, undergoing tonsillectomy, with antibiotics and reported that the average blood loss in 46 patients who received antibiotics was 80.75 ml whereas in the other group of 54 patients who had not received the antibiotics the average blood loss was 97.06 ml.<sup>30</sup> It was observed that bleeding was less after an antibiotic course. Imperfections of anesthetic technique, which produce

laryngospasm, gagging or straining, may contribute materially to blood loss.<sup>39</sup>

The present study found that the group that received pretreatment with adrenaline: lignocaine injection prior to surgery had reduced amount of blood loss during surgery, compared to the other group. However, regarding our results, a lot of similarities and contradiction exists in literature. There is a need for further research in this regard to have clear guidelines in the management of intraoperative blood loss in tonsillectomies.

## Conclusion

The group that was injected with lignocaine-adrenaline in the peritonsillar area had a marked reduction in peroperative blood loss as compared to the group that was injected with normal saline (placebo). Although the result was statistically not significant, yet the intraoperative blood loss in group A was decreased 50%, compared to group B. Furthermore, the peroperative blood loss in the age group 15 to 20 years was statistically significant ( $p=0.018$ ). Considering the reduced potential in intraoperative blood loss, it is recommended that patients, especially teenagers, undergoing tonsillectomy should be injected with lignocaine-adrenaline, prior to surgery, to minimize the rate of intraoperative blood loss.

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