Check for updates

OPEN ACCESS

DOI: 10.46903/gjms/23.1.Special.1712

ORIGINAL ARTICLE

COMPARISON OF PERITONSILLAR INFILTRATION OF ADRENALINE VERSUS NORMAL SALINE IN CONTROLLING PER OPERATIVE HAEMORRHAGE DURING TONSILLECTOMY

Zainab Shahid[1], Saleh Khurshied[2], Ghazal Iftakhar[2], Imdad Ullah[2], Umera Iftikhar[3], Nawal Khurshid[2], Ahmed Hasan Ashfaq[1]

Departments of ENT, [1]Benazir Bhutto Hospital, Rawalpindi, [2]Pakistan Institute of Medical Sciences (PIMS) Islamabad, [3]Mohiuddin teaching hospital Mirpur, AJK,

ABSTRACT

Background: A popular, low-risk operation is tonsillectomy. It is among the ENT profession's most traditional operations. Techniques for tonsillectomy have undergone continuous modification. Haemorrhage is the most frequent, albeit rare, serious, potentially fatal side effect following tonsillectomy, especially with the development of contemporary preventative methods. The aim of this study was to determine the effect of pre-incisional peritonsillar infiltration of adrenaline versus normal saline on per-operative blood loss during tonsillectomy.

Materials & Methods : This six-month, double-blind, randomized clinical trial was conducted in the department ENT at Benazir Bhutto Hospital in Rawalpindi from July 20, 2022, to January 19, 2023. The study included 60 individuals in all, ages 6 to 18, who met certain inclusion and exclusion requirements. To facilitate blinding, the operation room nurse prepared identical syringes containing 1:200,000 adrenaline solution and Normal Saline. The syringes were then coded. The study was conducted in a double-blind fashion, meaning that neither the surgeon nor the patient knew which medication had been administered on which side. The tonsil was removed using a snare and dissection technique. SPSS version 25 was used to enter the data. An independent sample t-test was applied to see whether there was a significant association.

Results: The patients' mean age was 11.7±3.4 years. Out of total, 25 were female (41.7%) and 35 were male (58.3%). 33 patients (55%) had tonsils that were 1-2 on the Brodsky grading scale, while 27 patients (45%) had tonsils that were 3–4. In normal saline and adrenaline, the mean pre-operative blood loss was found to be 86.4±11.3 and 41.0±10.4, respectively. P value of less than 0.001 indicated a statistically significant difference between the two groups.

Conclusion: In conclusion, peritonsillar infiltration of adrenaline resulted in a significant decrease in intraoperative blood loss compared to the normal saline group. ($p<0.001$).

KEY WORDS: Adrenaline; Haemorrhage; Infiltration; Per-operative; Saline; Tonsillectomy.

Cite as: Shahid Z, Khurshied S, Iftakhar G, Ullah I, Iftikhar U, Khurshid N et al. Comparison of peritonsillar infiltration of adrenaline versus normal saline in controlling per operative haemorrhage during tonsillectomy. Gomal J Med Sci 2025 Jan-Mar;23(1)Special:170-73. https://doi.org/1046903/gjms/23.1.Special.1712

INTRODUCTION

Peritonsillar space is present between the tonsil capsule and the muscle wall. By dissecting this peritonsillar space the entire surgical removal of the palatine tonsils, including their capsule, is known as a tonsillectomy (from the Latin Tonsa, which means "oar").[1] Dating back to 3000 years ago, it is one of the most frequently performed surgeries in the field of otorhinolaryngology globally.[2] Crowe Davis established the cold knife dissection tonsillectomy technique in 1917, and tonsil surgery has continued to advance since then. To decrease complications during tonsillectomy, new procedures have been devised, such as harmonic scalpel, CO2 laser, Nd YAG laser, bipolar diathermy scissors, and Argon plasma coagulation. However, because of its low cost and low morbidity rate, the traditional cold knife approach is becoming more and more popular worldwide.[3] One common but potentially fatal side effect of tonsillectomy is hemorrhage.[4] To lessen it, researchers have experimented with electrocautery, sutures, chemicals like Adrenaline Feracrylum, and biomaterials including fibrin, gelatin, cellulose,

Corresponding Author:

Dr. Zainab Shahid
Consultant ENT Surgeon, Department of ENT
Benazir Bhutto Hospital
Rawalpindi, Pakistan
E-mail: drzainabshahid.ent@gmail.com

Date Submitted: 19-04-2024
Date Revised: 04-11-2024
Date Accepted: 02-02-2025

and Bismuth Subgallate. Nevertheless, a low-cost, widely accessible, simple to use, and successful method to stop haemorrhage after tonsillectomy is still undiscovered. A study conducted in Nigeria[5] in 2013 proposed pre-incisional peritonsillar infiltration of adrenaline as a straightforward and economical alternative to traditional cold knife tonsillectomy. The use of 5 mL of 1:200,000 adrenaline was effective in minimizing haemorrhage during tonsillectomy, with an average blood loss of less than 10 ml.

The rationale of the study was to identify an inexpensive, widely accessible, simple to use, and efficient method for preventing haemorrhage during tonsillectomy. Life-threatening consequences such as cerebral hypoxia, aspiration, hypotensive shock, and asphyxia can be prevented, and morbidity reduced by reducing the amount of blood lost during the tonsillectomy procedure. The Objective of the study was to to study the effect of pre-incisional peritonsillar infiltration of adrenaline versus normal saline on per-operative blood loss during tonsillectomy.

MATERIAL AND METHODS

This double-blinded randomized clinical trial was done over a period of six months from 20-07-2022 to 19-01-2023 at Department of ENT, Benazir Bhutto Hospital, Rawalpindi. The sample size was determined through the open EPI calculator at level of significance (α) = 5% and the power of test(1-β) = 95%.[6] By using a non-probability consecutive sampling technique, all patients who met the inclusion criteria were included in the study. The study comprised patients diagnosed with recurrent tonsillitis between the ages of 6 and 18 (any gender), hospitalized for bilateral elective tonsillectomy under general anaesthesia, and ASA grade I and II. Individuals having co-morbid conditions such as renal, hepatic, pulmonary, haematological, or cardiovascular diseases. Participants in the study were excluded if they had a history of using warfarin, heparin, or any other anticoagulant, or if there was a noticeable asymmetry in the size of both tonsils. The study also excluded patients undergoing tonsillectomy with adenoidectomy and those with a history of unilateral peritonsillar abscess.

Following approval from the Rawalpindi Medical University Research and Ethical Committee, screening was conducted on all patients being admitted for elective tonsillectomy in the ENT ward. After explaining our trial to patients who met the eligibility requirements, their informed written consent was obtained. Each patient's demographic information, ASA grade, and tonsillar hypertrophy grade according to the Brodsky Scale were recorded on a proforma. General anesthesia was used for surgical procedures on patients. The OT nurse coded and produced identical syringes of 1:120,000 Adrenaline solution and Normal Saline. Because the experiment was conducted under double blind conditions, neither the patient nor the surgeon knew which side of the body had received which injection. Randomization was done on the right side using random numbers generated by a scientific calculator. Adrenaline was injected to the right side if last digit of number was even and vice versa. To expose the tonsillar mucosa medial to the free edge of the anterior faucial pillar, each tonsil was grasped from the medial free border and gently dragged towards the uvula after correct placement of patient and before incision. Under sterile conditions, an equal volume of either 0.9% Normal Saline or 1:200,000 Adrenaline (2μg/kg of patient's body weight) was injected in the pericapsular plane by 23 Gauge needle using the aspiration-injection technique in 4 sites; Superior and Inferior pole of the tonsil, Plicae Triangularis and Plicae Semilunaris respectively. After waiting for 1 minute, a mucosal incision was given by using the cold knife. Snare and dissection technique was used to remove the tonsil. ligation after clamping was done to stop bleeding. Cotton gauze from the measured pad was used to pack the tonsillar fossa. Removed tonsil was thoroughly squeezed in cotton gauze taken from the measured pad and then discarded. Leftover Normal Saline in the bowl was suctioned and the suction tube was emptied. The level of fluid in suction bottle was noted for the respective side. All the lost blood was thus gathered in the suction bottle along with contaminated gauze pieces. The soiled gauze pieces of the respective side were weighed using physical balance. The unused cotton gauze was weighed similarly. Their cumulative weight was subtracted from 20g (taken as standard). The amount of blood loss was calculated using the Gravimetric method[7] by dividing the difference between weight of soaked gauze and dry gauze (standard 20g) with the specific gravity of blood (1.055) then adding the amount of blood collected in suction bottle. Same procedure was repeated on the contra-lateral tonsil. Standard anaesthetic and post-operative care protocols were observed.

All data were entered in SPSS version 25 for Windows. Descriptive statistics were used to analyze qualitative and quantitative variables. Qualitative variables including gender, ASA grade, and tonsil grade were represented by frequency and percentage. For quantitative variables including age, weight, and amount of blood loss mean ± standard deviation was calculated. To compare the amount of blood loss between the adrenaline-injected side and the normal saline-injected side, the independent sample's t-test was applied at 5% level of significance. Hence, age, gender, weight, and tonsillar size were same in each patient. Effect modifiers like age, gender, and weight were controlled by stratification. A post-stratification student t-test was applied. P-value ≤0.05 was taken as significant.

RESULTS

A total of 60 cases were enrolled in this trial. Patients' age ranged between 6-18 years. Mean age of the patients was 11.7±3.4 years (Table 1). As table 1 shows

that there were 25 (41.7%) females and 35 (58.3%) males. Mean weight of the patients was 35.5±7.6 kg (Table-1). Of the 60 patients, 24 (40%) fell into ASA grade-I and 36 (60%) into ASA grade-II (Table 1). According to Brodsky grading scale for tonsil size, 33 patients (55%) were having tonsil size 1-2 while 27 patients (45%) were having tonsil size 3-4 (Table-1). Mean per-operative blood loss was found to be 41.0±10.4 mL and 86.4±11.3 mL in adrenaline and normal saline respectively. There was statistically significant difference between the two groups (p <0.001) (Table-2). Stratification for age, gender and weight was also carried out with significant results in all (p <0.001) (Table 3).

Table 1: Demographics of patients (N=60)

Demographics	Distribution N (%)
Age (years)	6-10: 26 (43.3) 11-18: 34 (56.7) Mean ± SD: 11.7 ± 3.4
Gender	Male: 35 (58.3) Female: 25 (41.7) Total: 60 (100)
Weight (Kg)	≤30: 18 (30) >30: 42 (70) Mean ± SD: 35.5 ± 7.6
ASA grade	Grade I: 24 (58.3) Grade II: 36 (41.7) Total: 60 (100)
Tonsil size	1 and 2: 33 (55) 3 and 4: 27 (45) Mean ± SD: 2.2 ± 1.1

Table 2: Comparison of per-operative blood loss in two groups (N=60)

Group	Blood loss (Mean ± SD)	P value
Adrenaline	41 ± 10.4	P < 0.001
Normal Saline	86.4 ± 11.3	P < 0.001

DISCUSSION

Though tonsillectomy and adenotonsillectomy are among the most common surgeries, little research has been done on intraoperative blood loss during these procedures and the factors that influence it. Even though it can be difficult, calculating blood loss after a tonsillectomy is very important, especially for patients who cannot handle blood loss, including young children, those with factor VIII deficiency or anemia, or people on anticoagulant treatment. Furthermore, compared to adults, children's regular physiological mechanisms may not be as able to quickly adjust to a blood loss, and a smaller loss may be the catalyst for the collapse of these compensatory mechanisms.[7,8]

There were sixty patients in all involved in this study. These patients ranged in age from 6 to 18 years old, with a mean age of 11.7±3.4 years. Within the age range of 11 to 18 years, the highest incidence was noted. Comparable to our findings, a study on tonsillectomy by Moonka[9] revealed that tonsillectomies were most frequently performed on patients between the ages of 11 and 20.

In Iraq, Adel and Ahmed conducted a study that also revealed the incidence of tonsillectomies in the 15–20 age range.[10] Males constituted the majority gender in our study. According to a Beigh et al. study conducted in Iran, Men predominate.[11] Male predominance was shown by Adoga and Okeke in their study.[12]

In our research, the average blood loss during surgery was determined to be 41.0±10.4 for adrenaline and 86.4±11.3 for normal saline. There was a statistically significant difference (p<0.001) between the two groups. Our results aligned with a study carried out by Junaid et al.[6] According to Prasad et al. the average blood loss in 46 patients who received antibiotics was 80.75 ml, while the average blood loss in the other group of 54 patients who did not get antibiotics was 97.06 ml.[8]

In the current study, the mean per-operative blood loss in males of the Adrenaline group was 44.1±8.6ml and in females, it was 36.8±11.2ml while in normal saline group the blood loss was found to be 86.1±11.6ml in males and 86.8±11.2 ml in females. In both groups, the blood loss was statistically significant (p<0.001) for both males and females. The advantages of peritonsillar infiltration with adrenaline have been shown by Broadman et al., who came to the same conclusion as us on the use of either plain adrenaline or normal saline for infiltrations.[13]

Table 3: Stratification of blood loss with respect to different factors (N=60)

Factor	Group	Blood loss (Mean ± SD)		P value
		Adrenaline	Normal saline	
Age (years)	6-10	43.3 ± 11.8	84.7 ± 9.5	P < 0.001
	11-18	39.3 ± 8.8	87.7 ± 12.5	P < 0.001
Gender	Male	44.1 ± 8.6	86.1 ± 11.6	P < 0.001
	Female	36.8 ± 11.2	86.8 ± 11.2	P < 0.001
Weight (Kg)	≤30	41.6 ± 11.8	84.0 ± 10.3	P < 0.001
	>30	40.8 ± 9.8	87.4 ± 11.7	P < 0.001

Few articles in the worldwide literature discuss intraoperative blood loss during tonsillectomy. According to the authors, intraoperative blood loss might range significantly from 7.8 ml to 115 ml.[14] Carithas et al. observed a blood loss of around 70 milliliters for tonsillectomy and adenotonsillectomy.[15]

CONCLUSION

As compared to the normal saline group, peritonsillar infiltration of adrenaline resulted in a considerable reduction in per-operative blood loss ($p<0.001$). There was no effect of age, gender or weight in terms of effect of normal saline or adrenaline and results were significant in all groups. Because intraoperative blood loss can be fatal, it is advised that patients having tonsillectomy have an adrenaline injection right before the procedure to reduce the risk of intraoperative blood loss.

REFERENCES

1. Mitchell R, Archer S, Ishman S, Rosenfeld R, Coles S, Finestone S, et al. Clinical Practice Guideline: Tonsillectomy in Children (Update). Otolaryngol Head Neck Surg. 2019;160(1_suppl):S1–S42. https://doi.org/10.1177/0194599818801757
2. Mofatteh M, Salehi F, Hosseini M, Hassanzadeh Taheri M, Sharifzadeh G, Hassanzadeh-Taheri M. Comparison of postoperative morbidity between conventional cold dissection and bipolar electrocautery tonsillectomy: which technique is better? Braz J Otorhinolaryngol. 2020;86(4):427-33. https://doi.org/10.1016/j.bjorl.2018.12.013
3. Alm F, Stalfors J, Nerfeldt P, Ericsson E. Patient reported pain-related outcome measures after tonsil surgery: an analysis of 32,225 children from the National Tonsil Surgery Register in Sweden 2009–2016. Eur Arch Otorhinolaryngol. 2017;274(10):3711-22. https://doi.org/10.1007/s00405-017-4679-4
4. Galindo Torres B, De Miguel García F, Whyte Orozco J. Tonsillectomy in adults: Analysis of indications and complications. Auris Nasus Larynx. 2018;45(3):517-21. https://doi.org/10.1016/j.anl.2017.08.012
5. Ibekwe T, Obasikene G, Offiong E. Tonsillectomy: Vasoconstrictive hydrolytic cold dissection method. Afr J Paediatr Surg. 2013;10(2):150. https://doi.org/10.4103/0189-6725.115042
6. Junaid M, Shah G, Khawar A, Roohullah M, Khan MA. Compare peritonsillar injection of lignocaine adrenaline and normal saline (placebo) before tonsillectomy in terms of mean preoperative blood loss. JIMDC. 2018;7(1):29–35.
7. Muthubabu K, Rekha A, Thejas S, Vinayak R, Srinivasan M, Alagammai S, et al. Tonsillectomy by Cold Dissection and Coblation Techniques: A Prospective Comparative Study. Indian J Otolaryngol Head Neck Surg. 2018;71(4):665–70. https://doi.org/10.1007/s12070-018-1472-7
8. Prasad KC, Prasad SC. Assessment of Operative Blood Loss and the Factors Affecting it in Tonsillectomy and Adenotonsillectomy. Indian J Otolaryngol Head Neck Surg. 2011;63(4):343–8. https://doi.org/10.1007/s12070-011-0268-9
9. Moonka PK. Ligation vs. bipolar diathermy for haemostasis in tonsillectomy—a comparative study. Indian J Otolaryngol Head Neck Surg. 2002;54(1):35–8. https://doi.org/10.1007/BF02911003
10. Adel SA, Ahmed SH. Haemostasis during tonsillectomy: silk ligation versus diathermy. Med J Babylon. 2010;7(2):274-80.
11. Beigh Z, ul Islam M, Ahmad S, Pampori RA. Effects of peritonsillar injection of tramadol and adrenaline before tonsillectomy. Iran J Otorhinolaryngol. 2013;25(72):135-40.
12. Adoga AA, Okeke ED. Hemostasis during cold dissection tonsillectomy: Comparing the use of adrenaline and normal saline. J Clin Med Res. 2011;3(3):105-8. https://doi.org/10.5897/JCMR11.059
13. Broadman LM, Patel RI, Feldman BA, Sellman GL, Milmoe G, Camilon F. The effects of peritonsillar infiltration on the reduction of intraoperative blood loss and post-tonsillectomy pain in children. Laryngoscope. 1989;99(6 Pt 1):578–81. https://doi.org/10.1288/00005537-198906000-00002
14. Raut V, Bhat N, Kinsella J, Toner JG, Sinnathuray AR, Stevenson M, et al. Bipolar scissors versus cold dissection tonsillectomy: a prospective, randomized, multiunit study. Laryngoscope. 2001;111(12):2178–82. https://doi.org/10.1097/00005537-200112000-00020
15. Carithers JS, Gebhart DE, Williams JA. Postoperative risks of pediatric tonsilloadenoidectomy. Laryngoscope. 1987;97(4):422-9. https://doi.org/10.1288/00005537-198704000-00004

CONFLICT OF INTEREST
Authors declare no conflict of interest.
GRANT SUPPORT AND FINANCIAL DISCLOSURE
None declared.

AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	ZS, SK
Acquisition, Analysis or Interpretation of Data:	ZS, SK, GI, IU, UI, NK
Manuscript Writing & Approval:	ZS, SK, GI, IU, AHA

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.