

ORIGINAL ARTICLE

EFFICACY OF PROPHYLACTIC ANTIBIOTICS IN REDUCING POST-TONSILLECTOMY HAEMORRHAGE

Nadeem Ahmed Sheikh, Kanwal Nadeem*

Department of Otolaryngology, Combined Military Hospital, Abbottabad, *Army Burn Hall College (For Girls), Abbottabad-Pakistan

Background: This study aims toward establishing the impact of prophylactic pre-operative antimicrobial therapy on tonsillectomy related haemorrhage. **Methods:** In this randomized controlled trial conducted at Combined Military Hospital, Abbottabad from January 2017 till August 2019, 121 children and adult patients who had consented and had undergone tonsillectomy were evaluated for procedure related haemorrhage. **Results:** Incidence rate of secondary post-tonsillectomy haemorrhage and need for re-hospitalization was significantly less in patients who had completed pre-operative prophylactic antibiotics. Patient-reported secondary haemorrhage was recorded in 4.59% (n=9) cases who did not receive pre-operative antibiotic prophylaxis, thereby increasing morbidity and prolonging hospital stay. Secondary post-operative bleeding only occurred in 1.18% (n=2) patients who received appropriate pre-operative anti-microbial prophylaxis. **Conclusion:** We strongly imply that prophylactic pre-operative antibiotics reduce procedure related complications in all patients undergoing tonsillectomy.

Keywords: Tonsillectomy, morbidity, haemorrhage, anti-bacterial agents.

Citation: Sheikh NA, Nadeem K. Efficacy of prophylactic antibiotics in reducing post-tonsillectomy haemorrhage. J Ayub Med Coll Abbottabad 2020;32(1):94–8.

INTRODUCTION

Tonsillectomy, despite various innovations in technique, is most commonly performed otolaryngologic operative intervention in all paediatric and young adult population, worldwide.¹ Ever growing volume of tonsillectomy has always called for innovations in surgical techniques and evolved through a cutting edge paraphernalia of surgical arsenal to ensure patient safety. Despite this innovation in techniques and equipment, blood loss has always remained most feared complication of this operation.

Incidence ratio of tonsillectomies performed in the US was 260,000 in year 1987.² 37000 paediatric tonsillectomy operations were conducted by the NHS between April 2016 till March 2017.³ Haemorrhage invariably ensues in 1–20% of tonsillectomies regardless of the patients' gender, age and indication for operation.^{4,5} 3.9% of patients would experience re-hospitalization due to tonsillectomy-related complication. Post-tonsillectomy haemorrhage not only carries significant distress for the patient, but also it indicates small yet definite potential mortality. Death occurs in 1 out of 2360 operations, whereupon haemorrhage is the reason in one third.⁶ Nationwide data indicates 2.2–6.6% incidence of blood loss associated with tonsillectomy.^{7,8}

Infected tonsils characteristically exhibit increased blood flow and necrosis or traumatic erosion of an engorged tonsillar vessel causes intractable bleed. Loss of red blood cells in such situation may provoke diffused parenchymal

haemorrhage. Many parents of our patients request for tonsillectomy on account of frequent sore throat. 'Sore throat' is reported to primary care physician in the UK as frequent as 0.1 consultations per capita per annum.^{9,10} Only 11.7% (2144/18281) children who underwent tonsillectomy in the UK, had justified evidence-based indication.³

Antimicrobial prophylaxis aims at decreasing bacteria below a threshold of triggering infectious process, or more precisely 10 million/g of tissue (in absence of a foreign object or prosthesis). Prophylactic antibiotic coverage is reserved for clean or potentially contaminated surgeries with a probability of post-operative sepsis. On the contrary, contaminated surgeries mandate the need for curative antimicrobial therapy. Modern day literature strongly advocates post-operative use of antibiotics, but little work has been done on pre-operative antimicrobial prophylaxis.^{11,12} Our study aimed at establishing and highlighting the need for pre-tonsillectomy surgical antibiotic prophylaxis in the perspective of our local setting. We shall be discussing its benefits in minimizing post-tonsillectomy haemorrhage.

MATERIAL AND METHODS

This study was conducted at the Department of Otolaryngology, Combined Military Hospital Abbottabad, from December 2016 till August 2019 after seeking a prior approval from the hospital's research ethics committee. Population of eight districts of Hazara division has estimated to be 5050117 in 2017. And estimated prevalence of post-tonsillectomy haemorrhage is 6.6. Foregoing in view,

keeping accuracy at 0.07% and 95% confidence, our minimal sample size turned out to be 95. One hundred and twenty-one patients older than 3 years of age, regardless of gender, who (themselves or their parents) consented to undergo tonsillectomy in general anaesthetic were enrolled in this study. Careful history, clinical examination and counselling were carried out before their randomization into two groups. Group-1 patients received oral Amoxicillin 30mg/kg body weight, TDS for 7 days before operation. Adult patients (≥ 12 years of age) belonging to Group-1 received oral Clavulinated Amoxycillin 1g BID for 5 days before tonsillectomy. Patients belonging to Group-2 did not receive antimicrobial agent, instead, they were prescribed oral analgesics and antihistamines as per their requirement before surgery. Patients with clear history of ≥ 7 episodes of acute tonsillitis in 1 year; ≥ 5 episodes in 2 years; or ≥ 3 episodes over the past 3 years were included. Any patient who had suffered from a single episode of quinsy was also included. Individuals with sleep disordered breathing attributed to hypertrophied grade-III or grade-IV tonsils were also included in our research. Those subjects having an acute coryza or sinusitis, haemoglobin ≤ 9 g/dl, blood dyscrasia, adults receiving anti-platelet medication and children younger than 3 years of age were excluded. Surgeries were conducted under general anaesthetic applying cold steel dissection, sparingly using low voltage mono-polar galvanic point coagulation, by the same surgeon.

Primary, reactionary or secondary haemorrhage was documented. All operated patients were released from hospital at least after 24 hours of operation, with oral Clavulinated Amoxycillin, Paracetamol for 5 days, diet chart and clearly documented instructions to immediately report back to hospital in case of bleeding from the throat or nose. Any patient who reported back would be re-hospitalized, re-evaluated and managed accordingly.

We maintained the database in IBM-SPSS version-25, whereupon frequencies were measured using descriptive statistics. We applied Fisher's exact test on descriptive cross-tabulation to ascertain statistical significance between categorical (ordinal) test variables. Independent sample t test was applied to measure significance of interval variable between the two study groups.

RESULTS

One hundred and twenty-one patients belonging to both genders were randomized into two groups for study purpose. 50.4% (n=61) patients were offered pre-operative prophylactic antibiotics and were

labelled as Group-1, similarly, 49.6% (n=60) patients were included in Group-2 and they were offered analgesics and oral H1 histamine antagonists, as per their need before operation. Mean age of operated patients was 9.57 years (SD \pm 7.82). Minimum age being 3 years and eldest patient operated at 46 years of age. All patients were classified in ASA-1 category in pre-anaesthesia assessment.

Recurrent tonsillitis was major indication for tonsillectomy. 91.7% (n=111) patients were operated on account of recurrent tonsillitis. 7.4% (n=9) patients were offered tonsillectomy due to recurrent tonsillitis as well as their obstructing symptoms. Parents of 0.8% (n=1) patient requested for tonsillectomy exclusively due to sleep disordered breathing.

All surgeries were performed by the same surgeon. We performed most of the operations through cold steel extracapsular dissection using mono-polar point galvanic coagulation at 20 watts setting, i.e., 60.3% (n=73) patients, (Figure-1).

Regardless of operative technique applied, primary haemorrhage was observed in 21.5% (n=26) patients. None of our patients experienced reactionary bleed. Six patients (5.0%) presented with secondary post-tonsillectomy bleeding. A total of 4.1% (n=5) patients sustained primary as well as secondary blood loss warranting specialized remedial intervention.

Primary post-tonsillectomy haemorrhage invariable occurred in number of surgical operation indiscriminate of the operative technique, (Fisher's exact $p=0.563$). However electro-dissection; and steel dissection combined with bipolar cautery led to significant risk of post-tonsillectomy secondary haemorrhage (Fisher's exact $p=0.002$).

Considering the two study groups, no significant difference was observed in incidence of primary haemorrhage (Fisher's exact $p=0.063$), (Table-1). However, the incidence of secondary post-tonsillectomy haemorrhage in patients who did not receive prophylactic anti-microbial agents remained significantly high (Fisher's exact $p=0.030$).

Cross-tabulation analysis of re-hospitalization between the two groups, 1.2% (n=2); and 4.59% (n=9) patients required re-hospitalization for specific remedial intervention on account of secondary bleed in study groups 1 and 2, respectively (Fisher's exact $p=0.030$). Mean hospital stay was recorded as 1.21 days (SD \pm 0.520), and 2.10 days (SD \pm 0.573) in groups 1 and 2 respectively (Table-2).

Figure-1: Surgical techniques of tonsillectomy

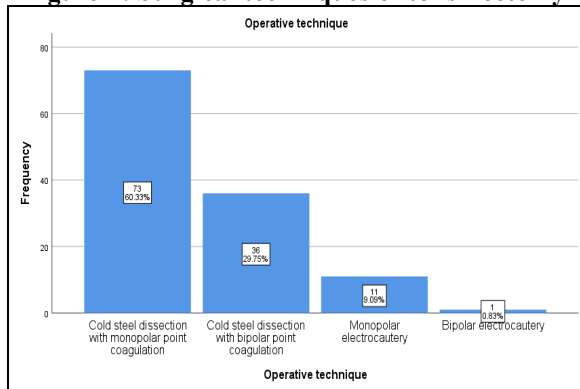


Figure-2: Sub-epithelial vascular hyperemia and reactive lymphoid hyperplasia in infected tonsils

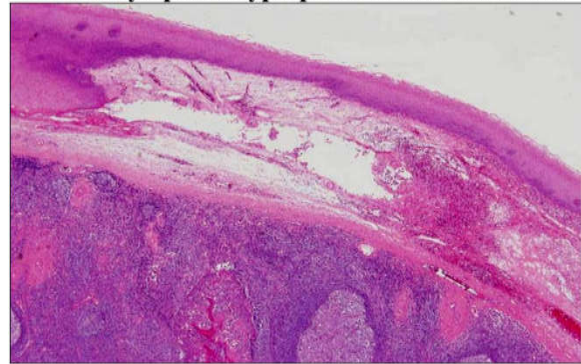


Table-1: Frequency of tonsillectomy-related haemorrhage between the two study groups

	Primary haemorrhage		Secondary haemorrhage	
	Required specialized intervention	No specialized intervention	Required specialized intervention	No specialized intervention
Prophylactic antibiotics given	11	50	2	59
No prophylactic antibiotics	20	40	9	51
Total	31	90	11	110

Table-2: Duration of hospital stay after tonsillectomy

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Hospital stays (in days)	Equal variances assumed	.066	.797	-8.914	119	.000	-.887	.099	-1.084	-.690
	Equal variances not assumed			-8.907	117.476	.000	-.887	.100	-1.084	-.690

DISCUSSION

Tonsils are perfused through ascending pharyngeal artery and lesser palatine artery in their superior pole, and through dorsal lingual and ascending palatine branches of facial artery in lower pole. Venous flow is conducted through an extracapsular sub-mucosal plexus, lingual vein and the pharyngeal plexus. Haemorrhage following tonsillectomy can be primary, resulting from severing of blood vessel during surgical dissection of tonsils; reactionary, occurring in 24 hours often due to slipping of a tie, or results from sloughing of a suture inadvertently passed through a blood vessel; secondary haemorrhage comes about due to sepsis in the tonsillar bed usually from 5th to 8th day of operation.

Average blood loss in an uncomplicated tonsillectomy is 165 ml (range 130–200 ml).⁸ Many established factors like patient’s preparation for surgery based on acute and/or recurrent infection, age, degree of atherosclerosis, bleeding diathesis, surgical technique, season, atmospheric temperature and water vapor pressure have been implicated toward post-tonsillectomy haemorrhage.^{13–16} The fact that definite

causative organism responsible for tonsillitis remains shrouded with controversy, as viruses, GABHS, H Influenzae and anaerobes may be isolated inconsistently from the tonsillar surface and the crypts.^{17,18} Following tonsillectomy, the risk of sepsis increases many fold due to direct contact of pre-existing throat commensal viruses and microbes to the surgically exposed tonsillar fossae. Convalescence following enucleating tonsils can protract due to contamination of open tonsillar fossae by oral microbial flora causing intense local inflammatory reaction, and presents with excruciating pain, odynophagia, referred otalgia, refusal to feed, dehydration, pyrexia. Exposed nerve endings and collective action of chemical mediators of acute inflammation like prostaglandins, lactic acid and leukotrienes lead to muscle spasm. Greater the muscle spasm more is ischemia, and the pain cycle goes on. Moreover, dissection on already inflamed tonsils may involve extensive galvanic coagulation for haemostasis that results into more necrotic sloughing and infection. The latter is notoriously a harbinger of secondary haemorrhage. Pre-empt avoidance of this contamination

is the rationale behind prescribing prophylactic pre-operative antibiotics.

Haemorrhage nevertheless remains the foremost concerned morbidity associated with tonsillectomy.¹⁹ In our setting, tonsillectomies are routinely performed to ease the symptoms of recurrent sore throat and to address sleep disordered breathing. Social and family factors are also accounted for planning a tonsillectomy. Equivocal justification of surgical outcome has given rise to a steady decline in tonsillectomies in the west.^{20,21} Haemorrhage is most frequently documented and distraught morbidity associated with this operation, which may at times warrant the need to undergo re-hospitalization, re-intubation for intervention in general anaesthetic, and blood transfusion. Extensive primary haemorrhage may call for prolonged hospital stay of the patient. Indiscriminate tonsillectomies must therefore be discouraged, and the indication for operation must be individualized and rationalized basing on strict entry criteria and clinical practice guidelines. Engorged sub-epithelial vessel beneath stratified squamous epithelium and reactive hyperplasia of lymphoid germinal centre.

Patel *et al* proscribed peri-operative use of antibiotics in routine, clean and uncomplicated otolaryngologic operative procedures and recommended peri-operative antibiotics in complex operative procedures, operations violating alimentary tract and those involving free tissue transfer.¹¹ Baloch *et al* also concluded no significant advantage of prescribing peri-operative antibiotics in tonsillectomy.²² Concurrently, various studies strongly advocate surgical use of prophylactic antibiotics.^{23,24} Tamimi found out favourable results in procedure related complications in his patients who received prophylactic antibiotics (2.5%) as compared to patients who did not (15%). In a research carried out at Rawalpindi General Hospital, reduced risk of secondary haemorrhage in response to pre-operative lincomycin prophylaxis has been reported by Aslam and Mustafa.¹¹ As cited by Kuller *et al*, Strong advocated shorter effective courses covering organisms responsible for post-operative infection, instead of long-term use of broad spectrum antimicrobial agents.²⁵ Udaipurwala and Soomro proclaimed the benefits of prophylactic broad spectrum β -lactam antimicrobial agents in early post-tonsillectomy period by significantly decreasing the risk of haemorrhage.²⁶

It is logical to assume that reducing viable bacterial colonization at open surgical wound would decrease local inflammatory response, encourage healing and step up revival. With growing evidence-based indication of pre-operative prophylactic antibiotics, the duration may vary, but peak concentration must be achieved in the tissue 30–60 minutes before the first incision is made. While

scheduling a child or an adult to undergo tonsillectomy, appropriate antimicrobial selection, concentration at wound site, compliance to dosing, timing of administration, re-dosing and duration of treatment must be ensured.

CONCLUSION

A consensus must be developed to strictly restrict ourselves to evidence-based and locally relevant indications for tonsillectomy. We conclude that surgical antibiotic prophylaxis is safe, ensures a cleaner operative field, significantly reduces post-operative haemorrhage, decreases procedure-related morbidity and minimizes hospital stay. We recommend oral Amoxicillin 30mg/kg body weight TDS for 7 days before operation in paediatric age group and oral Co-Amoxy Clav 1g BID for 5 days in adults. Standardized guidelines must be adopted for pre-operative prophylactic antibiotics to reduce post tonsillectomy distress.

AUTHORS' CONTRIBUTION

NAS: Literature search conceptualization of study design, data collection, data analysis, data interpretation, write-up, proof reading. KN: Data collection, proof reading.

REFERENCES

1. Abdelhamid AO, Sobhy TS, El-Mehairy HM, Hamid O. Role of antibiotics in post-tonsillectomy morbidities; A systematic review. *Int J Pediatr Otorhinolaryngol* 2019;118:192–200.
2. Verma R, Verma RR, Verma RR. Tonsillectomy-Comparative Study of Various Techniques and Changing Trend. *Indian J Otolaryngol Head Neck Surg* 2017;69(4):549–58.
3. Šumilo D, Nichols L, Ryan R, Marshall T. Incidence of indications for tonsillectomy and frequency of evidence-based surgery: a 12-year retrospective cohort study of primary care electronic records. *Br J Gen Pract* 2019;69(678):e33–41.
4. Johnson RF, Chang A, Mitchell RB. Nationwide readmissions after tonsillectomy among pediatric patients-United States. *Int J Pediatr Otorhinolaryngol* 2018;107:10–3.
5. Kshirsagar R, Mahboubi H, Moriyama D, Ajose-Popoola O, Pham NS, Ahuja GS. Increased immediate postoperative haemorrhage in older and obese children after outpatient tonsillectomy. *Int J Pediatr Otorhinolaryngol* 2016;84:119–23.
6. Mitchell RB, Archer SM, Ishman SL, Rosenfeld RM, Coles S, Finestone SA, *et al*. Clinical practice guideline: tonsillectomy in children (update). *Otolaryngol Head Neck Surg* 2019;160(1_Suppl):S1–42.
7. Anwar K, Ahmad R, Khan M. Control of bleeding by silk ligation and diathermy coagulation during tonsillectomy: A comparison of efficacy of the two techniques in the first 24 hours after surgery. *Pak J Med Sci* 2015;31(4):961–4.
8. Junaid M, Shah G, Khawar A, Roohullah M, Khan MA. Comparison of Peritonsillar Injection of Lignocaine-Adrenaline and Normal Saline (placebo) Before Tonsillectomy in Terms of Mean PerOperative Blood Loss. *J Islamabad Med Dent Coll* 2018;7(1):29–35.
9. Patel C, Green BD, Batt JM, Kholmurodova F, Barnes M, Geyer WJ, *et al*. Antibiotic prescribing for tonsillopharyngitis

- in a general practice setting. *Aust J Gen Pract* 2019;48(6):395–401.
10. Albarasi A. Effect of Postoperative Antibiotic on Postoperative Infection in Tonsillectomy Operations--Prospective Study at Benghazi Medical Center Between October 2012 and May 2013. *Int J Otorhinolaryngol* 2016;2(2):5–8.
 11. Patel PN, Jayawardena AD, Walden RL, Penn EB, Francis DO. Evidence-based use of perioperative antibiotics in otolaryngology. *Otolaryngol Head Neck Surg* 2018;158(5):783–800.
 12. Sandora TJ, Fung M, Melvin P, Graham DA, Rangel SJ. National variability and appropriateness of surgical antibiotic prophylaxis in US children's hospitals. *JAMA Pediatr* 2016;170(6):570–6.
 13. Cadd B, Rogers M, Patel H, Crossland G. (Ton) silly seasons? Do atmospheric conditions actually affect post-tonsillectomy secondary haemorrhage rates? *J Laryngol Otol* 2015;129(7):702–5.
 14. Canche-Martín E, Lugo-Machado JA. Prevalence and factors associated with post-tonsillectomy bleeding. *An Otorrinolaringol Mex* 2018;63(1):40–5.
 15. Manikandan D, Musarrat F, Preetham A, Anjali R. Measurement of blood loss during adenotonsillectomy in children and factors affecting it. *Case Rep Clin Med* 2015;4(5):151.
 16. Spektor Z, Saint-Victor S, Kay DJ, Mandell DL. Risk factors for pediatric post-tonsillectomy haemorrhage. *Int J Pediatr Otorhinolaryngol* 2016;84:151–5.
 17. Horwood J, Cabral C, Hay AD, Ingram J. Primary care clinician antibiotic prescribing decisions in consultations for children with RTIs: a qualitative interview study. *Br J Gen Pract* 2016;66(644):e207–13.
 18. Fletcher-Lartey S, Yee M, Gaarslev C, Khan R. Why do general practitioners prescribe antibiotics for upper respiratory tract infections to meet patient expectations: a mixed methods study. *BMJ Open* 2016;6(10):e012244.
 19. Ahmad R, Salam F, Khan AS, Bashir F, Raique A. Tonsillectomy in paediatric population; comparison of bipolar electrocautry and cold dissection method. *Prof Med J* 2016;23(4):499–503.
 20. Boss EF, Mehta N, Nagarajan N, Links A, Benke JR, Berger Z, *et al.* Shared decision making and choice for elective surgical care: a systematic review. *Otolaryngol Head Neck Surg* 2016;154(3):405–20.
 21. Douglas-Jones P, Fagan JJ. Tonsillectomy rates in the South African private healthcare sector. *S Afr Med J* 2016;106(11):1134–40.
 22. Baloch MA, Akhtar S, Ikram M, Humayun HN. The rationality of prescribing antibiotics after tonsillectomy. *J Pak Med Assoc* 2012;62(5):445–7.
 23. Khosa SH, Ahmad S, Rahi E. Prophylactic antibiotics for tonsillectomy. *Pak J Med Health Sci* 2015;9:989–91.
 24. Al-Tamimi SF. Should antibiotics be mandatory in perioperative tonsillectomy and/or adenotonsillectomy? *J Coll Physicians Surg Pak* 2000;10(6):207–8.
 25. Kullar R, Frisenda J, Nassif PS. The More the Merrier? Should Antibiotics be Used for Rhinoplasty and Septorhinoplasty?—A Review. *Plast Reconstr Surg Glob Open* 2018;6(10):1–8.
 26. Yaseen MA, Ameen HH. The role of amoxicillin in preventing post-tonsillectomy complications. *Zanco J Med Sci* 2013;17(1):280–5.

Submitted: 16 August, 2019

Revised: --

Accepted: 25 November, 2019

Address for Correspondence:

Nadeem Ahmed Sheikh, Assistant Professor, Classified ENT Specialist, Department of ENT, Combined Military Hospital, Quetta-Pakistan

Cell: +92 300 970 3507

Email: nadeem_ent75@yahoo.com