

## ORIGINAL ARTICLE

**Incidence of Post-Tonsillectomy Hemorrhage in Tonsillectomy with Bipolar Diathermy**Tayyab Hassan Raza<sup>1\*</sup>, Abdul Hakim<sup>1</sup>, Muhammad Ali<sup>1</sup>, Bushra Anjum<sup>2</sup>, Uzair Mushahid<sup>3</sup>**ABSTRACT**

**Objectives:** To study the frequency of post-operative hemorrhage and type of management employed following tonsillectomy performed with bipolar diathermy.

**Study Design:** Descriptive cross-sectional study.

**Place and Duration of Study:** The study was carried out at the Department of ENT of Combined Military Hospital, Rawalpindi, Pakistan from February 2021 to January 2022.

**Materials and Methods:** We studied 66 patients who were selected for tonsillectomy. Patients having a previous record of pharyngeal surgery and thrombotic disorders/ hemorrhagic diathesis were excluded. All participants underwent tonsillectomy with bipolar diathermy and were followed up 10 days for the development of post-tonsillectomy hemorrhage. Data were analyzed by SPSS 26.0.

**Results:** A total of 10 (15.2 %) patients developed post-tonsillectomy hemorrhage in our study. Of these, 8 (12.2 %) were managed conservatively while 2 (3.0%) required surgical management to control hemorrhage. Blood transfusion was required by 1 (1.5%) patient.

**Conclusion:** Post-tonsillectomy hemorrhage is comparatively a common complication occurring with bipolar diathermy. It is important for the surgeon to be vigilant of this fact for timely and appropriate management in this scenario.

**Keywords:** *Bipolar Electrocautery, Post-Tonsillectomy Hemorrhage.*

**How to cite this:** Raza TH, Hakim A, Ali M, Anjum B, Mushahid U. Incidence of Post-Tonsillectomy Hemorrhage in Tonsillectomy with Bipolar Diathermy. 2023; 4(2): 136-139. doi: <http://doi.org/10.37185/LnS.1.1.355>

This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International license.

(<https://creativecommons.org/licenses/by-nc/4.0/>). Non-commercial uses of the work are permitted, provided the original work is properly cited.

**Introduction**

Among the most regularly performed surgical procedures by otorhinolaryngologists, tonsillectomy shares a large percentage, and approximately 0.5 million cases are performed in the United States each year in the less than 15 year old age group.<sup>1</sup> The procedure is performed for a wide variety of indications which include recurrent tonsillitis, peritonsillar abscess, pediatric obstructive sleep-

disordered breathing, adult obstructive sleep apnea, suspected malignancies, malocclusion, disorders of swallowing and speech, recurrent acute otitis media leading to otitis media with effusion, aphthous ulcers, pharyngitis, and cervical lymphadenopathy (PFAPA).<sup>2</sup>

Some of the methods used to perform surgical dissection during tonsillectomy include cold steel, laser, coblation, monopolar/bipolar electrodissection, micro debridement, and radio frequency dissection.<sup>3</sup> The palatine tonsils not only serve an important function in the adaptive immune response by B- and T-cell lymphocytes but also take part in the employment of innate immunity.<sup>4</sup> Palatine tonsil is a very vascular organ richly supplied by branches originating from several large vessels including the ascending palatine artery, ascending pharyngeal artery, facial artery tonsillar branch, lesser palatine artery and the dorsal lingual artery, all of which take origin from the external carotid artery.

<sup>1\*</sup>Department of ENT

Combined Military Hospital (CMH), Rawalpindi, Pakistan

<sup>2</sup>Department of ENT

District Headquarter Hospital, Sheikhpura, Pakistan

<sup>3</sup>Department of ENT

Cantonment Board Hospital, Rawalpindi, Pakistan

Correspondence:

Dr. Tayyab Hassan Raza

Department of ENT

Combined Military Hospital (CMH), Rawalpindi, Pakistan

E-mail: [tayyabr33@gmail.com](mailto:tayyabr33@gmail.com)

Funding Source: NIL; Conflict of Interest: NIL

Received: Feb 04, 2023; Revised: Mar 27, 2023

Accepted: Apr 02, 2023

The drainage courses through the peritonsillar venous plexus into lingual and pharyngeal veins which ultimately find their way into the internal jugular vein.<sup>5</sup> Being such a vascular organ, surgery is associated with significant bleeding.<sup>6</sup>

Bipolar diathermy is an increasingly popular method for tonsillectomy.<sup>7</sup> Li et al reported a significant reduction in post-tonsillectomy hemorrhage when compared to coblation,  $p < 0.05$ .<sup>8</sup> Alam et al showed similar results with significantly less post-operative hemorrhage in patients who underwent dissection with bipolar diathermy.<sup>9</sup> Conversely, Karam et al reported coblation was superior to bipolar diathermy in terms of post-tonsillectomy haemorrhage.<sup>10</sup>

A wide range of indications makes tonsillectomy a frequently performed surgery. High vascularity makes post-surgery hemorrhage a common complication. Over the years, practice to dissect out the tonsil with minimum bleeding has evolved into many techniques. However, the international literature is somewhat conflicted on whether bipolar electrocautery is beneficial in reducing post-operative hemorrhage. We conducted this study with the aim of determining the frequency of post-bipolar diathermy tonsillectomy hemorrhage in an effort to augment the available information resource, sharing the ultimate goal of reducing post-surgical morbidity and financial costs.

### Materials and Methods

A descriptive cross-sectional study was conducted from Feb 2021 to Jan 2022 on 66 patients who gave consent to undergo tonsillectomy with bipolar diathermy in the Otorhinolaryngology Department. The patients were selected through non-probability consecutive sampling. The sample size was calculated by using the WHO sample size calculator maintaining a confidence level of  $(1-\alpha)$  of 96%, anticipated population proportion of 17.3%, and absolute precision of  $(d)$  of 0.096.<sup>11</sup> Included patients ranged among the ages of 3-18 years with a substrata of  $\leq 10$  years and  $> 10$  years of age, designated as ASA class I and II presenting with recurrent tonsillitis, obstructive sleep apnea and peri-tonsillar abscess (resolved). The exclusion was allotted to those having a history of previous pharyngeal surgery, bleeding/thrombotic disorder, and active infection. A questionnaire was assigned to all the patients

recording their identity, age, and gender, which was also used to record details related to the surgery as well as its outcomes such as total surgical time, post-tonsillectomy hemorrhage, intervention required to control hemorrhage, mean hemoglobin level before surgery and at ten days' post-surgery, duration of hospital admission and requirement for blood transfusion.

Post-tonsillectomy hemorrhage was classified as bleeding which occurred from the immediate post-operative interval, up to 10 days' post-surgery. A consultant ENT surgeon with a minimum of five years post fellowship experience performed all the surgeries. Dissection was conducted with bipolar diathermy in each case. Peritonsillar space was approached via submucosal incision in plica semilunaris / palatoglossal incision, and supra capsular dissection of tonsils was done through bipolar electrocautery and hemostasis secured concurrently. All patients were discharged one-day post-tonsillectomy with a standard treatment regimen of oral Paracetamol and Co-amoxiclav as per age and body weight. All patients were instructed to report any episode of oral bleeding occurring at home. Those reporting post-tonsillectomy hemorrhage were readmitted and managed as per protocol.

SPSS 26.0 version was used to analyze our data. For all the quantitative variables like total surgical time, mean hemoglobin level before surgery and at ten days' post-surgery, patient age and duration of hospital admission, SD and mean were calculated. Percentage and frequency were recorded for qualitative variables such as gender, development of post-tonsillectomy hemorrhage, intervention to control hemorrhage, and requirement for blood transfusion. For comparison with development of post-tonsillectomy hemorrhage we applied Chi-square test to all variables (quantitative variables were stratified). Significant consideration was given for  $p$ -value of  $\leq 0.05$ .

### Results

This sample constituted 66 patients who were studied. The female-to-male ratio was 1.06:1 with 32 (48.5%) males and 34 (51.5%) females. Our sample comprised mean age of  $10.13 \pm 4.1$  years. Data for patient results of the study is displayed in Table 1. All variables were compared to the development of

**Table 1: Patient Characteristics and Post-Tonsillectomy Results**

Variable	Male	Female	p value
Total	32 (48.5%)	45 (41.3%)	0.43
Age (years)	10.16 ± 3.38	10.10 ± 4.73	0.56
Total Surgery Time (mins)	16.06 ± 4.01	16.34 ± 4.28	0.15
Pre-Surgery Hemoglobin (g/dL)	14.79 ± 1.16	13.97 ± 1.11	0.33
Post-Surgery Hemoglobin (g/dL)	14.28 ± 1.68	13.95 ± 1.13	<0.001
Duration of Hospital Admission	1.50 ± 1.13	1.47 ± 1.33	<0.001
<b>Post-Operative Hemorrhage</b>			
Yes	6 (9.1 %)	4 (6.1 %)	-
No	26 (39.4 %)	30 (45.4 %)	-
Blood Transfusion Requirement	1 (1.5%)	0 (0 %)	0.017
<b>Intervention Required</b>			
None	26 (39.4 %)	30 (45.4 %)	-
Conservative	4 (6.1 %)	4 (6.1 %)	<0.001
Surgical	2 (3.0%)	0 (0 %)	<0.001

post-tonsillectomy hemorrhage for significance. Incidence of post-tonsillectomy hemorrhage was 15.2 % out of which 6 patients (9.12%) belonged to >10 years of age group and 4 patients (6.08%) ≤ 10 years of age. The total mean operation time was 16.21 ± 4.12 minutes. The mean pre-procedure hemoglobin level was 14.37 ± 1.20 g/dL in our study, which changed to 14.11 ± 1.42 g/dL post-surgery. The mean duration of hospital admission was 1.48 ± 1.23 days, ranging from 1 – 7 days.

Out of 10 (15.2 %) patients who developed post-tonsillectomy hemorrhage, 8 (12.2 %) were managed conservatively while 2 (3.0%) required surgical intervention. Only 1 (1.5%) patient required a blood transfusion.

**Discussion**

Post-tonsillectomy hemorrhage remains a common and significant adverse outcome of tonsillectomy which may require blood transfusion support and revision surgery under general anaesthesia.<sup>12</sup> Multiple methods of dissection have been devised to reduce the incidence of this common complication, which include cold dissection, molecular resonance, electrocautery, harmonic scalpel, coblation, laser, micro debridement and thermal welding, some of which reduce the incidence of hemorrhage post-surgery significantly, however, most of these techniques require highly specialized equipment and expertise which is not freely available.<sup>13</sup> Bipolar diathermy is a relatively cheap and readily available method which is increasingly employed for such cases.<sup>14</sup>

Pediatric and teenage groups remain the majority of our population who undergo this frequently performed ENT surgery. The mean age in our study

was 10.13 ± 4.1 years. Faramarzi et al. studied a similar population with a mean age of 15.48 (range 2-48) years,<sup>15</sup> which was identical to Binnetoglu et al. who had a mean age of 7 (range 4-14) years.<sup>16</sup> Tomkinson et al took note that patients who were more than 12 years of age carried a 300% increased chance to develop severe post-tonsillectomy bleeding; coincidentally in our study, 60% of the patients developing the hemorrhage were above 10 years of age. As per our study, 48.5% of patients were male while 41.3% were female. Binnetoglu et al also studied a similar population with 52% boys and 48% girls.<sup>17</sup> We conclude that increasing age can raise the risk of developing post-operative bleed, but gender does not have any effect on it.

In our study, 15.2 % patients developed post-operative hemorrhage after tonsillectomy. Al-Jabr et al. report a 3.6% rate of post-tonsillectomy hemorrhage, much lower than ours, most likely due to a difference in the definition of post-tonsillectomy hemorrhage, as they also reported a significant drop in hemoglobin levels after surgery, *p*<0.05, a finding that was not seen in our study.<sup>18</sup> This may be attributable to a more lax definition of hemorrhage in Al-Jabr et al. Lee et al. saw a cumulative post-tonsillectomy hemorrhage of 17.3 % with bipolar diathermy in their study, a figure that was comparable to our study.<sup>11</sup> Both Lee et al. and Al-Jabr et al. concluded that bipolar diathermy was inferior to cold dissection in terms of post-operative hemorrhage.<sup>11,18</sup> However, these findings were at odds with a number of studies seen in literature which conclude that diathermy is superior,<sup>19,20</sup> and a meta-analysis which claims no difference between the two methods.<sup>21</sup>

Bipolar diathermy is gaining popularity due to ease of employment and relatively less requirement for expertise. Its major complication, hemorrhage, is not very common and is easily managed, with minimal requirement for re-surgery and blood transfusions, as evidenced by a minimal drop in hemoglobin levels post-procedure. This translates into a shortened hospital stay which in turn cuts down financial costs and frees up resources for deployment elsewhere. However, whether this elucidates the superiority of bipolar diathermy over conventional methods like cold dissection is still the subject of controversy, especially in terms of post-operative hemorrhage.

Data from literature available lacks clarity as to the benefit of one method over the other and there is a great variability, especially with regards to hemorrhage frequency. Further, sufficiently powered research is required to elucidate on this important question. The lack of a control arm limited our study, and we only looked at short-term complications.

### Conclusion

Bipolar diathermy is a viable and safe method for tonsillectomy. The incidence of post-operative tonsillectomy hemorrhage is minimal when compared to other procedures and is associated with a minimal stay in the hospital in comparison as well. Most patients that do develop this complication can be safely managed conservatively, with minimal requirement for blood transfusions. Thus, bipolar diathermy electro-dissection should be employed as a first-line surgical technique wherever the requisite equipment and technical expertise are available.

### REFERENCES

- Bohr C, Shermetaro C. Tonsillectomy and Adenoidectomy. [Updated 2021 Jan 8]. In: Stat Pearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021.
- Randall DA. Current Indications for Tonsillectomy and Adenoidectomy. *Journal of the American Board of Family Medicine*. 2020; 33: 1025-30. doi: 10.3122/jabfm.2020.06.200038
- Verma R, Verma RR, Verma RR. Tonsillectomy-Comparative Study of Various Techniques and Changing Trend. *Journal of Otolaryngology and Head & Neck Surgery*. 2017; 69: 549-58. doi: 10.1007/s12070-017-1190-6.
- Weise JB, Meyer JE, Helmer H, Wittrock H, Maune S. A newly discovered function of palatine tonsils in immune defence: the expression of defensins. *Otolaryngologia Polska= The Polish Otolaryngology*. 2002; 56: 409-13.
- Meegalla N, Downs BW. Anatomy, Head and Neck, Palatine Tonsil (Faucial Tonsils) [Updated 2020 Aug 10]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021.
- Collison PJ, Mettler B. Factors associated with post-tonsillectomy hemorrhage. *Ear, nose & throat journal*. 2000; 79: 640-2.
- Fakhrealizadeh F, Hoveidaei AH, Eslami J, Hashemi SB, Hoveidaei A, Kazemi T, et al. Bipolar loop device versus bipolar diathermy for tonsillectomy: A pilot randomized controlled trial. *International Journal of Pediatric Otorhinolaryngology*. 2021; 141: 110505. doi: 10.1016/j.ijporl.2020.110505
- Li Z, Zhang L, Fu Z, Tian X, Zhang L, Zhu Y. Bipolar diathermy-assisted coblation really affects post-tonsillectomy haemorrhage rate and white membrane in paediatric tonsillectomy. *B-ENT*. 2017; 13: 45-9.
- Alam MM, Atiq MT, Mamun AA, Islam MA. Comparison between bipolar diathermy tonsillectomy and cold dissection tonsillectomy. *Mymensingh Medical Journal: MMJ*. 2011; 20: 104-9.
- Karam M, Abul A, Althuwaini A, Almuhanha A, Alenezi T, Aljadi A, et al. Coblation versus bipolar diathermy hemostasis in pediatric tonsillectomy patients: Systematic review and meta-analysis. *Cureus*. 2022; 14: e23066. doi: 10.7759/cureus.23066
- Lee MS, Montague ML, Hussain SS. Post-tonsillectomy hemorrhage: cold versus hot dissection. *Otolaryngology-Head and Neck Surgery*. 2004; 131: 833-6. doi: 10.1016/j.otohns.2004.08.008
- Windfuhr JP, Verspohl BC, Chen YS, Dahm JD, Werner JA. Post-tonsillectomy hemorrhage--some facts will never change. *European Archives of Oto-Rhino-Laryngology*. 2015; 272: 1211-8. doi: 10.1007/s00405-014-3025-3
- Francis DO, Fannesbeck C, Sathe N, McPheeters M, Krishnaswami S, Chinnadurai S. Postoperative Bleeding and Associated Utilization following Tonsillectomy in Children. *Otolaryngology-Head and Neck Surgery*. 2017; 156: 442-55. doi: 10.1177/019459981668391
- Arbin L, Enlund M, Knutsson J. Post-tonsillectomy pain after using bipolar diathermy scissors or the harmonic scalpel: a randomised blinded study. *European Archives of Oto-Rhino-Laryngology*. 2017; 274: 2281-5. doi: 10.1007/s00405-017-4451-9
- Famarazi A, Heydari ST. Prevalence of Post-tonsillectomy Bleeding as Day-case Surgery with Combination Method; Cold Dissection Tonsillectomy and Bipolar Diathermy Hemostasis. *Iranian journal of pediatrics*. 2010; 20: 187-92.
- Binnetoglu A, Demir B, Yumusakhuylyu AC, Baglam T, Sari M. Use of a Gelatin-Thrombin Hemostatic Matrix for Secondary Bleeding After Pediatric Tonsillectomy. *JAMA Otolaryngology-Head & Neck Surgery*. 2016; 142: 954-8. doi: 10.1001/jamaoto.2016.1678
- Tomkinson A, Harrison W, Owens D, Harris S, McClure V, Temple M. Risk factors for postoperative hemorrhage following tonsillectomy. *The Laryngoscope*. 2011; 121: 279-88. doi: 10.1002/lary.21242
- Al-Jabr IK, Hassan FM, Al-Yahya KA. Post-tonsillectomy hemorrhage after bipolar diathermy vs. cold dissection surgical techniques in Alahsa region, Saudi Arabia. *Alexandria Journal of Medicine*. 2016; 52: 169-72. doi: 10.1016/j.ajme.2015.06.004
- Shah SA, Ghani R. Frequency of post-tonsillectomy haemorrhage following tonsillectomy with bipolar diathermy--an experience at Ayub Teaching Hospital, Abbottabad. *Journal of Ayub Medical College Abbottabad*. 2004; 16: 38-9.
- Gross JH, Lindburg M, Kallogjeri D, Molter M, Molter D, Lieu JEC. Predictors of Occurrence and Timing of Post-Tonsillectomy Hemorrhage: A Case-Control Study. *Annals of Otolaryngology & Laryngology*. 2021; 130: 825-32. doi: 10.1177/0003489420978010
- Pinder DK, Wilson H, Hilton MP. Dissection versus diathermy for tonsillectomy. *Cochrane Database Syst Rev*. 2011; 2011: CD002211. doi: 10.1002/14651858.CD002211.pub2