

Monopolar versus bipolar cautery in tonsillectomy: A comparative study

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ABSTRACT

Introduction: Tonsillectomy is the most commonly performed surgeries in otolaryngology. Despite the evolution in surgical and anaesthetic techniques, pain and bleeding are still the most important surgical complications. This study was done to compare the pain and bleeding following tonsillectomy using monopolar and bipolar cautery techniques in our population. **Methods:** It was a prospective, longitudinal study done over a period of one year at Gandaki Medical College, Pokhara, Nepal. Total 45 patients who underwent tonsillectomy by either monopolar or bipolar cautery were included in the study and assessed for postoperative pain and haemorrhage. The data was entered in Microsoft Excel and further analysis done by statistical package for the social sciences 16.0. The association of variables was tested by Chi square test and p-value of less than 0.05 was considered significant. Confidence interval was kept at 95%. **Results:** Out of the 45 patients who underwent tonsillectomy, 35.5% were males and 64.5% were females. The age of patients varied from 16 to 60 years. Mean age of the patients was 27.5 years. Forty percent of the total patients underwent tonsillectomy by monopolar cautery whereas 60% patients were operated by bipolar cautery. No statistically significant difference was found between the two groups regarding age, sex ratio, postoperative pain and bleeding. **Conclusions:** Both monopolar and bipolar cautery are equally effective methods of tonsillectomy in terms of postoperative pain and haemorrhage.

Keywords: Bipolar cautery, monopolar cautery, post-operative haemorrhage, post-operative pain, tonsillectomy.

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INTRODUCTION

Tonsillectomy is one of the most common surgical procedures in the world and also the most common in otolaryngology.^{1,2} The first description in literature mentions tonsillectomy performed by Aulus Cornelius Celsus, by using his fingernail.¹ Over the past decade, progress in surgical and anesthetic techniques for tonsillectomy has resulted in faster surgeries with fewer complications.³ Despite the evolution though, pain and bleeding after tonsillectomy remain important surgical complications.²⁻⁴

Control of hemorrhage during tonsillectomy, has always been the prime concern for the otorhinolaryngologist to minimize the morbidity and mortality.⁵ Monopolar and bipolar diathermy are both used to ensure hemostasis post tonsillectomy.⁶ Tonsillectomy with a monopolar cautery allows minimal blood loss and a short operating time because simultaneous bleeding control and tissue dissection are possible. However, it is reported to cause relatively more severe post-operative pain and delayed wound healing than conventional cold tonsillectomy. These complications are due to the thermal tissue damage caused by temperatures that reach 300°C. The bipolar cautery selectively cauterizes the area between the prongs thereby reducing the amount of tissue damage.⁷

Although very commonly performed, there is dearth of literature regarding these common complications following tonsillectomy in our population. This study was done to compare the postoperative pain and bleeding following tonsillectomy using monopolar and bipolar cautery techniques.

METHODS

This was a prospective, longitudinal conducted over a period of 12 months from April 2017 to March 2018 in the department of ENT & HNS at Gandaki Medical College, Pokhara, Nepal. Ethical clearance was taken from the institutional review committee before initiating the study. Sample size was calculated by convenient sampling technique keeping the minimum sample size as 30. All the patients above the age of 15 years with recurrent attacks of tonsillitis fulfilling the paradise criteria⁸ were included in the study. Patients with acute attacks of tonsillitis, bleeding disorders, quinsy, tonsillar hypertrophy causing obstructive sleep apnoea symptoms and tonsillar mass were excluded. All the surgeries were done under general anaesthesia using either monopolar or bipolar cautery techniques based on surgeons' preference. Altogether 45 patients who fulfilled the above criteria were enrolled. Patients were divided into two groups based on the surgical technique used. All the patients were kept on the same antibiotics (I/V amoxicillin-clavulanic acid in appropriate dosage) and analgesics (I/V ketorolac) postoperatively. Patients were explained about the surgical procedure and their enrollment in the study and informed consent taken. Parent's consent was taken for patients less than 18 years of age. All the patients were assessed for two complications: pain on the first postoperative day (24 hours after surgery) and bleeding (reactionary and secondary). Pain was assessed 24 hours after surgery using a graduated scale from 1 to 10 with mild pain considered as 1 to 4, moderate pain as 5 to 7 and severe pain as 8 to 10. Reactionary bleeding was defined as any bleeding that occurred within 24 hours after surgery and secondary hemorrhage as any bleeding that occurred after 24 hours of surgery. Patient's demographic details, pain score after 24 hours of surgery and presence or absence of bleeding were noted in a proforma. The data thus obtained was entered in Microsoft Excel and further analysis done by SPSS 16.0. The association of variables was tested by Chi square test and p-value <0.05 was considered significant. Confidence interval was kept at 95%.

RESULTS

Out of the 45 patients (n) who underwent tonsillectomy, 16 (35.5%) were males and 29 (64.5) were females as

shown in table 1.

Table 1: Summary of results (n=45)

	Monopolar Cautery	Bipolar Cautery	Total (n)	p-value
Number of patients	18 (40%)	27 (60%)	45 (100%)	
Age (Years)				
Range	16-60	16-54		
Mean	29.94±10.07	25.96±9.21		0.519*
Age Group (Years)				
16-20	2	4	6 (13%)	
21-40	15	21	36 (80%)	
41-60	1	2	3 (7%)	
Sex				
Male	6 (38%)	10 (62%)	16 (36%)	0.528§
Female	12 (41%)	17 (59%)	29 (64%)	
Ratio	0.5	0.58		
Pain Scale				
Mild (1-3)	0	5	5 (11%)	0.153§
Moderate (4-6)	10	12	22 (49%)	
Severe (7-10)	8	10	18 (40%)	

* Independent t-test § Chi-square test

The age of patients varied from 16 to 60 years; 6 (13%) patients were in the age group of 16 to 20 years, 36 (80%) patients were in the age group of 21 to 40 years and three patients (7%) were in the age group of 41 to 60 years. Mean age was 27.5 years. Around 18 patients (40%) underwent tonsillectomy by monopolar cautery whereas 27 patients (60%) were operated by bipolar cautery.

Out of the 45 patients, 5 (11%) complained of mild pain, 22 (49%) had moderate pain and 18 (40%) had severe pain on the first postoperative day. In patients operated by monopolar cautery, 10 (55%) had moderate pain and 8 (44%) had severe pain whereas in patients operated through bipolar cautery, 5 (19%) had mild pain, 12 (44%) had moderate pain and 10 (37%) had severe pain.

One patient had reactionary bleeding (bipolar group) and was managed in ward by applying pressure with adrenaline-soaked gauge in the tonsillar fossa. Similarly, one patient had secondary hemorrhage (bipolar group) on the 5th postoperative day and had to be taken to the operation theatre and bleeder on the inferior pole of the right tonsillar fossa was cauterized. There were no cases of postoperative bleeding in the monopolar cautery group. No statistically significant difference was found between the two groups regarding age, sex distribution and pain.

DISCUSSION

The two most common post-operative complications following tonsillectomy are haemorrhage and pain hence most of the studies tend to focus on these issues.⁹⁻¹⁰

In our study, the mean age group in the monopolar dissection group was 25.96 ± 9.21 years and 29.94 ± 10.07 years in the bipolar diathermy group. Both the groups had the maximum number of patients in the age group of 21 to 40 years. Although the number of females were more in both the groups, no statistically significant difference was found in any of these parameters.

This study didn't include the pediatric age group as the pain scores would be less reliable. The mean age group and gender distribution is in concordance with the study by Baek et al.¹¹ where the mean age group was 24.4 years, and the number of female patients was more than the males (female: male = 50:42).

To the patient, post-operative pain is the most significant subjective symptom. If associated with oral stasis, this will predispose to infection with further increase in pain and an enhanced risk of secondary haemorrhage.¹² In a study by Akiellah et al.¹³, it was found that the adjacent constrictor muscle appeared remarkably undamaged during tonsillectomy by monopolar cautery when compared to the side where the tonsillectomy was performed by bipolar method. The reduced tissue damage also correlated with the postoperative pain scores as well as the reduction in degree of eschar formation. On the contrary, Khan et al.¹⁴ reported less pain in the bipolar diathermy group in their study. In this study, similar findings were noted in both the groups with respect to post-operative pain. This could be due to the use of VAS (Visual Analogue Score) system, which although statistically meaningful, is a subjective tool. Hence, owing to the pain threshold which may vary with every individual, we found similarities in both the groups. Probably a larger study size and various other pain scores may help in better evaluation of the degree of pain in future studies. However, all diathermy-based techniques inevitably damage adjacent normal soft tissues. Monopolar dissection using a fine diathermy needle allows sharp dissection and reduces collateral tissue damage. The use of bipolar diathermy excision has also become popular because it reduces intra-operative blood loss. In one study, it was found that the use of a monopolar cautery was not associated with additional risk of reactionary or secondary hemorrhage.¹² Another study found that the advantage with bipolar cautery over monopolar is that bipolar cautery selectively cauterizes the bleeding tissue as the impact size of the burn is 0.5 mm as compared to 5 mm impact area of monopolar diathermy.¹⁵ In this study, there was no post-operative bleeding in the monopolar cautery group. In the bipolar cautery group, one patient had reactionary hemorrhage and one patient developed secondary hemorrhage on the 5th post-operative day. The

difference between the two groups was not statistically significant.

The limitation of this study apart from the small sample size is that this study didn't take into consideration factors such as surgical time which can cause increased postoperative pain due to exposure to electrocautery for a larger duration. Another limiting factor to be considered is the subjectivity of pain assessment. Surgery performed by different surgeons could also be a limitation of this study.

CONCLUSIONS

The pain scores as well as postoperative bleeding were comparable in both monopolar and bipolar cautery group with no statistically significant difference found. Therefore, both the techniques seem to be equally effective for tonsillectomy in terms of post-operative pain and hemorrhage.

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CONFLICT OF INTEREST:

None declared

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REFERENCES

- Lee SW, Jeon SS, Lee JD, Lee JY, Kim SC, Koh YW. A comparison of post-operative pain and complications in tonsillectomy using BiClamp forceps and electrocautery tonsillectomy. *Otolaryngol Head Neck Surg.* 2008;139(2):228-34. DOI: 10.1016/j.jotohns.2008.04.004 PMID: 18656720.
- Lee MS, Montague ML, Hussain SS. Post-tonsillectomy hemorrhage: cold versus hot dissection. *Otolaryngol Head Neck Surg.* 2004;131(6):833-6. DOI: 10.1016/j.jotohns.2004.08.008 PMID: 15577776.
- Blomgren K, Qvarnberg YH, Valtonen HJ. A prospective study on pros and cons of electrodisection tonsillectomy. *Laryngoscope.* 2001;111(3):478-82. DOI: 10.1097/00005537-200103000-00018v PMID:11224779.
- Leinbach RF, Markwell SJ, Colliver JA, Lin SY. Hot versus cold tonsillectomy:a systematic review of the literature. *Otolaryngol Head Neck Surg.* 2003;129(4):360-4. DOI: 10.1016/S0194-5998(03)00729-0
- EK, Gourin C G. Adult tonsillectomy: Current indications and outcomes. *Otolaryngol Head Neck Surg.* 2009;140(1):19-22. DOI: 10.1016/j.jotohns.2008.09.023 PMID: 19130955.

6. Bukhari MA, Al-Ammar AY. Monopolar electrodissection versus cold dissection tonsillectomy among children. *Saudi Med J.* 2007;28(10):1525-28. PMID: 17914513.
7. Eredità R. Tonsillectomy in Children: A five-factor analysis among three techniques-reporting upon clinical results, anesthesia time, surgery time, bleeding, and cost. *Laryngoscope.* 2010;120(12):2502-7. DOI: 10.1002/lary.21128 PMID: 21108431.
8. Paradise JL, Bluestone CD, Bachman RZ, Colborn DK, Bernard BS, Taylor FH, et al. Efficacy of tonsillectomy for recurrent throat infection in severely affected children. Results of parallel randomized and nonrandomized clinical trials. *N Engl J Med.* 1984;310(11):674-83. DOI: 10.1056/NEJM198403153101102 PMID: 6700642.
9. Bluestone CD. Status of tonsillectomy and adenoidectomy. *Laryngoscope.* 1977;87(8):1233-43. DOI: 10.1288/00005537-197708000-00002 PMID: 881918.
10. Husband AD, Davis A. Pain after tonsillectomy. *Clinical Otolaryngology & Allied Sciences.* 1996;21(2):99-101. DOI: 10.1111/j.1365-2273.1996.tb01310.x PMID: 8735391.
11. Baek MK, Kim YS, Choi SH, Woo JH, Lee JH, Kim DY. A pilot randomized comparative study of two diathermy power settings for monopolar microdissection and bipolar hemostasis during tonsillectomy. *Korean Journal of Otorhinolaryngology-Head and Neck Surgery.* 2016;59(12):836-42. DOI: 10.3342/kjorhns.2016.59.12.836
12. Choy AT, Su AP. Bipolar diathermy or ligation for haemostasis in tonsillectomy? A prospective study on post-operative pain. *The Journal of Laryngology and Otology.* 1992;106(1):21-22. DOI: 10.1017/s0022215100118493 PMID: 1541883.
13. Akkielah A, Kalan A, Kenyon GS. Diathermy tonsillectomy: comparisons of morbidity following bipolar and monopolar microdissection needle excision. *J Laryngol Otol.* 1997;111(8):735-8. DOI: 10.1017/S0022215100138484 PMID: 9327011.
14. Khan A, Sheikh ZA, Hameed MK. Bipolar versus Unipolar Diathermy for Per-operative Haemorrhage Control during Tonsillectomy. *Journal of Islamabad Medical & Dental College.* 2013;2(4):69-71.
15. Walker RA, Syed ZA. Harmonic scalpel tonsillectomy versus electrocautery tonsillectomy: a comparative pilot study. *Otolaryngol Head Neck Surg.* 2001;125(5):449-55. DOI: 10.1067/mhn.2001.119325 PMID: 11700440.