



Adenoidectomy with Bilateral Partial Tonsillectomy versus Adenoidectomy with Unilateral Complete Tonsillectomy in treatment of Children with Obstructive Sleep-Disordered Breathing: A Comparative Study

Christina Farag Zaki ¹, Ahmed Aboulwafa Abdel jaleel ¹, Reham Abd El Wakil ibrahim ², Ahmed Hamed Mohamed Monib ¹

1. Otorhinolaryngology Department. Faculty of medicine. Assuit university, Assuit, Egypt
2. Otorhinolaryngology Department, phoniatrics unit, Assuit university, Assuit, Egypt

Abstract:

Background: Obstructive sleep-disordered breathing (OSDB) is a wide range of diseases that can cause morbidity in children, such as growth failure, neurocognitive and behavioral abnormalities, and cardiovascular dysfunction. The study aimed to evaluate adenoidectomy with bilateral partial tonsillectomy compared with adenoidectomy with classical unilateral complete tonsillectomy for the management of pediatric OSDB.

Patients & Methods: A total of 50 children with obstructive sleep-disordered breathing secondary to adenoid enlargement with tonsillar enlargement were enrolled in randomized controlled trials. The study was conducted in the period between April 2018 and August 2020. Those patients were randomly subdivided into two groups; group A (included 25 patients who underwent adenoidectomy by microdebrider with bilateral partial tonsillectomy by using the coblation) and group B (included 25 patients who underwent adenoidectomy by microdebrider with classical unilateral tonsillectomy).

Results: Both groups showed insignificant differences as regard age, sex, postoperative hemorrhage, time to resume a normal diet, and tonsillar regrowth. Patients who underwent bilateral partial tonsillectomy had significantly lower intraoperative blood loss, CRIES scale and obstructive sleep apnea-18 quality of life (OSA-18). Tissue regrowth occurred in one (4%) patient from those children who underwent a bilateral partial tonsillectomy at the 6th month postoperatively. At the 12th month postoperatively, 2 (8%) patients who underwent bilateral partial tonsillectomy had tissue re-growth while no patient who underwent unilateral complete tonsillectomy developed tissue regrowth either at the 6th or 12th month postoperatively.

Conclusion: There are various post-operative advantages to partial tonsillectomy as less pain, better food intake, and a rapid return to a normal diet.

Key words: CRIES scale, Obstructive sleep-disordered breathing, partial tonsillectomy, Adenoidectomy

Introduction

The tonsillar tissue and tonsillar capsule are completely removed during a total tonsillectomy. Tonsillectomy has a number of disadvantages, including the possibility of severe postoperative

hemorrhage, postoperative pain, and challenges with feeding and drinking, and decreased immunity in the initial period of recovery (1).

Subtotal removal of tonsillar tissue with a margin of tissue remaining on the tonsillar capsule is referred to as a partial tonsillectomy (intracapsular tonsillectomy, subtotal tonsillectomy). Following the publication of a study on partial tonsillectomy by Koltai et al. in 2002, numerous studies demonstrating its benefits over traditional total tonsillectomy have been published (2).

Numerous studies have compared the results of the two procedures, but there is still debate about their effectiveness, drawbacks, and long-term effects. According to some studies, the regrowth of the remaining tonsillar tissue causes obstructive symptoms to return. Therefore, it's critical to thoroughly assess the effects of partial tonsillectomy, paying close attention to both short- and long-term outcomes (3, 5).

The goal of this research is to evaluate adenoidectomy with bilateral partial tonsillectomy compared with adenoidectomy with classical unilateral complete tonsillectomy for management of pediatric OSDB in terms of efficacy of the technique and reducing postoperative complications.

Patients and methods:

Study setting and design

This study was a randomized controlled study at ENT Department, Assiut university hospitals, between May 2018 and June 2020.

Inclusion criteria

A total of 200 patients who were listed for tonsillectomy only without adenoidectomy and their age were less than 18 years old of both gender.

Exclusion criteria:

- Patients age > 18 years old.
- Medical comorbidity requiring treatment with antibiotics e.g. rheumatic heart disease.
- Patients listed for; unilateral tonsillectomy, biopsy,

tonsillectomy in combination with palatal surgery, tonsillectomy for known carcinoma or hot tonsillectomy for tonsillar abscess.

Participants

Patients were divided into two groups:

Group (A) included 100 patients were underwent tonsillectomy by bipolar diathermy technique (BDT).

Group (B) included 100 patients were underwent tonsillectomy by cold dissection technique (CDT).

Also, each group was further divided randomly into two subgroups, the first was received antibiotics post-operatively and the second not (each subgroup included 50 patients).

Methodology

Each patient was subjected to the following:

- I. Preoperative assessment included; full history taking (personal history, complaint, history of present illness, with special concern on tonsillitis) and General examination with full ENT examination with special concern on oral cavity and tonsils.
- II. Preoperative investigations and assessment; coagulation profile, complete blood count, with preoperative fitness.
- III. Operative work up:
 - Tonsillectomy was done under general anesthesia, with monitoring peripheral arterial oxygen saturation, electrocardiography and non-invasive blood pressure.
 - Two methods of tonsillectomy were used (either cold dissection or bipolar diathermy). In cold dissection, classical method was used with scissors and tonsillar dissector. Bleeding was controlled with ligation of the bleeding vessel. Hemostasis was done by bipolar forceps in bipolar electro dissection. Operative time

measurement was started from the incision of the anterior pillar or starting of dissection until complete hemostasis of tonsillar bed was done.

IV. Postoperative Follow up

- Patients in both groups received Acetaminophen and ibuprofen in a rotating method (every 3 hours) at the first 3 days and then on as-needed basis. Oral acetaminophen was given at dose of 10 mg/kg every 6 hours and oral Ibuprofen at dose of 5 mg/kg every 6 hours.⁸
- Also, antibiotic in the form of amoxicillin/clavulanate was prescribed for some cases for 7 days at dose of 50 mg/kg/day in 3 divided doses.⁹
- All patients were discharged the next day after surgery. Patients were followed up after three days, week and 2 weeks of operation, with examination of the tonsillar fossa for detection of any signs of infection or blood clots.
- On discharge a questionnaire was given to the caregivers to mark on any morbidity occurred such as secondary hemorrhage, fever, occurrence of abdominal pain, nausea and vomiting.
- Follow up of pain post operatively assisted by Visual Analogue Scale VAS score 0-10, (VAS; 0 = no pain, 1-3 = mild pain, 4-6 = moderate pain, and 7-10 = severe pain). VAS assessment was performed at 1st, 3rd, 5th and 7th day postoperatively.¹⁰

Ethics approval and consent to participate: the study protocol was approved by the Ethics Review Board of Faculty of Medicine, Assiut University. Informed written consent was obtained from all participants according to the declaration of Helsinki. This study was

registered on *clinicaltrials.com* with NCT03491085.

Consent for publication: consent was taken from participants for publication.

Statistical analysis

Data was collected and analyzed by using SPSS (Statistical Package for the Social Science, version 20, IBM, and Armonk, New York). Quantitative data were expressed as mean \pm standard deviation (SD) and compared with Student t test.

Nominal data were given as number (n) and percentage (%). Chi2 test was implemented on such data. Level of confidence was kept at 95% and hence, P value was considered significant if < 0.05 .

Results

Personal data based on technique of operation (table 1):

In bipolar diathermy mean age of patients was 7.81 ± 3.73 years and (52%) were males while mean age of patients underwent cold dissection was 7.92 ± 3.89 years and (55%) were males. The two groups had insignificant differences regarding age ($p= 0.83$), sex ($p= 0.38$), diagnosis ($p= 0.39$) and operation ($p= 0.43$).

Intraoperative bleeding and operative time based on technique of operation (table 2):

Patients in bipolar diathermy group had significantly lower operative time (9.36 ± 2.44 vs. 22.53 ± 3.63 (minute); $p < 0.001$), intraoperative blood loss (5.73 ± 2.55 vs. 23.24 ± 2.45 (ml); $p < 0.001$) in comparison to those patients underwent cold dissection.

Postoperative data among patients based on performed techniques (table 3 and figure 1):

Fever, nausea/vomiting, abdominal pain and hemorrhage were frequently reported postoperatively in both groups, respectively both groups had insignificant differences ($p > 0.05$) except for secondary hemorrhage which was reported postoperatively in 8 (8%) from those underwent bipolar diathermy while this finding occurred in 2 (2%)

from this underwent cold dissection with significant difference between them ($p < 0.05$).

Patients with secondary bleeding were readmitted and treated conservatively and none of them required blood transfusion.

Table 1: Personal data based on technique of operation

	Bipolar diathermy (n: 100)	Cold dissection (n: 100)	P value
Age (years)	7.81 ± 3.73	7.92 ± 3.89	0.83
Sex			0.38
Male	52 (52%)	55 (55%)	
Female	48 (48%)	45 (45%)	

Data expressed as number and frequency (percentage), mean (SD). P value was significant if < 0.05

Table 2: Intraoperative blood loss and operative time based on technique of operation

	Bipolar diathermy (n= 100)	Cold dissection (n= 100)	P value
Operative time (minute)	9.36 ± 2.44	22.53 ± 3.63	< 0.001
Blood loss (ml)	5.73 ± 2.55	23.24 ± 2.45	< 0.001

Data expressed as mean (SD). P value was significant if < 0.05.

Table 3: Postoperative data among patients based on performed techniques

	Bipolar diathermy (n= 100)	Cold dissection (n= 100)	P value
Fever	24 (24%)	22 (22%)	0.43
Nausea/vomiting	37 (37%)	34 (34%)	0.38
Abdominal pain	14 (14%)	13 (13%)	0.50
2ry Hemorrhage	8 (8%)	2 (2%)	0.05

Data expressed as frequency (percentage). P value was significant if < 0.05.

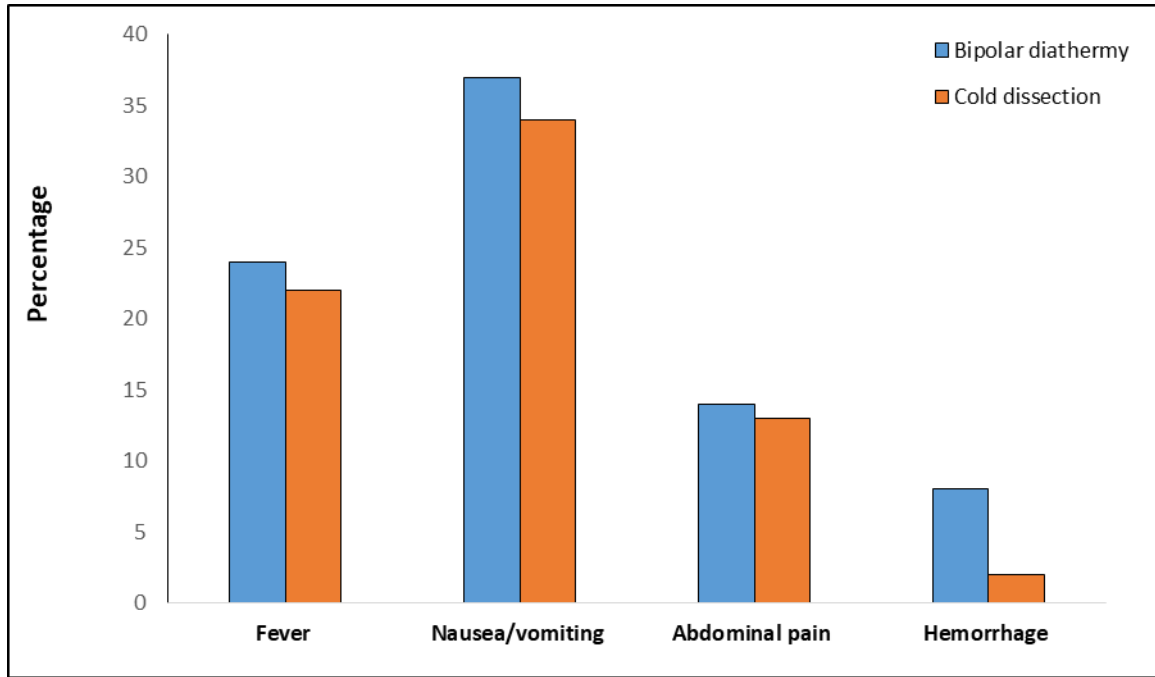


Figure 1: Postoperative data among patients based on performed techniques

Table 4: Time of resuming diet based on type of techniques

	Bipolar diathermy (n=100)	Cold dissection (n=100)	P value
Time to normal diet resuming	4.74 ± 0.86	4.08 ± 0.84	< 0.001

Data expressed as frequency (percentage), mean (SD). P value was significant if < 0.05.

Table 5: Postoperative pain score among patients based on performed techniques

Pain score	Bipolar diathermy (n=100)	Cold dissection (n=100)	P value
1 st day	4.68 ± 1.20	4.08 ± 0.84	< 0.001
3 rd day	3.94 ± 1.16	3.32 ± 1.26	< 0.001
5 th day	3.08 ± 1.22	2.78 ± 1.19	< 0.001
7 th day	2.38 ± 1.23	1.46 ± 1.21	< 0.001

Data expressed as frequency (percentage), mean (SD). P value was significant if < 0.05.

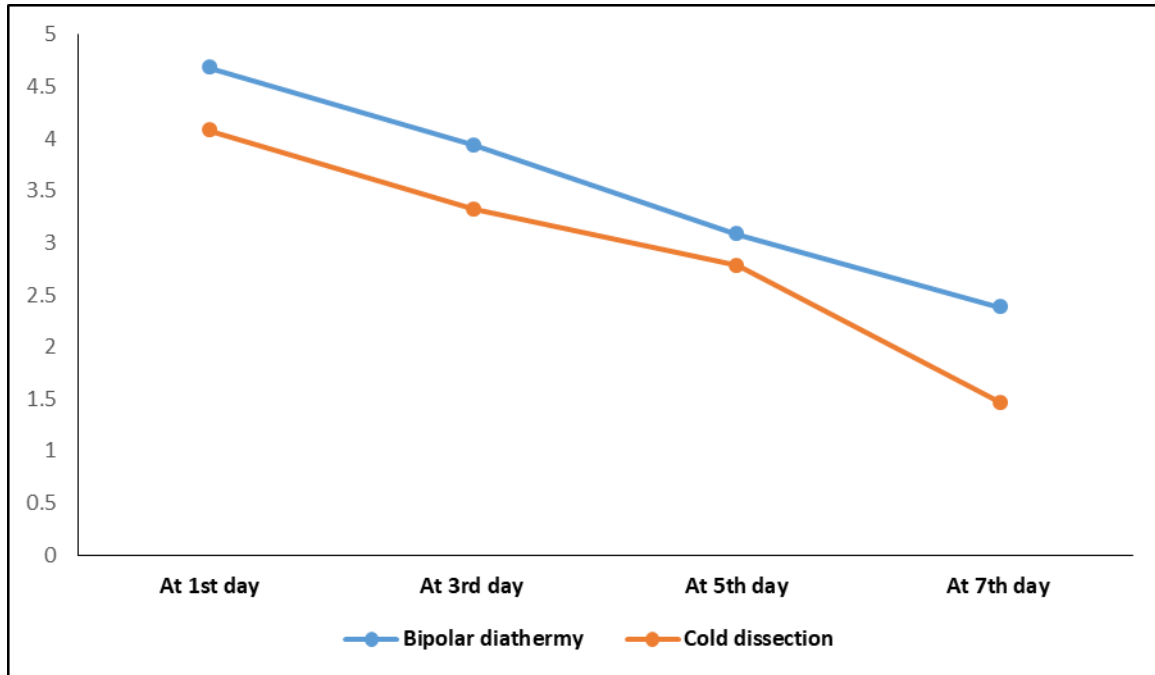


Figure 2: Postoperative pain score among patients based on performed techniques.

Table 6: Characteristics of patients in bipolar diathermy group based on antibiotic use

	Without antibiotic (n: 50)	With antibiotic (n: 50)	<i>P</i> value
Age (years)	7.63 ± 3.67	7.98 ± 3.83	0.65
Sex			0.15
Male	23 (46%)	29 (58%)	
Female	27 (54%)	21 (42%)	
Operative time (minute)	9.38 ± 1.57	9.34 ± 3.09	0.93
Blood loss (ml)	6.02 ± 2.04	5.42 ± 2.96	0.24
Postoperative data			
Fever	10 (20%)	14 (28%)	0.24
Nausea/vomiting	18 (36%)	19 (38%)	0.50
Abdominal pain	5 (10%)	9 (18%)	0.19
2ry Hemorrhage	4 (8%)	4 (8%)	0.64
Post-operative social support	45 (90%)	45 (90%)	0.63
Time to normal diet resuming	4.74 ± 0.87	4.74 ± 0.85	1.00
Post-operative pain score			
1 st day	4.82 ± 1.17	4.54 ± 1.23	0.24
3 rd day	4.08 ± 1.16	3.80 ± 1.16	0.23
5 th day	3.20 ± 1.16	2.96 ± 1.27	0.32
7 th day	2.46 ± 1.23	2.30 ± 1.24	0.52

Data expressed as frequency (percentage), mean (SD). *P* value was significant if < 0.05.

Table 7: Characteristics of patients in cold dissection group based on antibiotic use

	Without antibiotic (n: 50)	With antibiotic (n: 50)	<i>P</i> value
Age (years)	7.42 ± 3.98	8.42 ± 3.76	0.20
Sex			0.20
Male	28 (56%)	27 (54%)	
Female	22 (44%)	23 (46%)	
Operative time (minute)	22.58 ± 2.68	22.48 ± 4.41	0.89
Blood loss (ml)	23.62 ± 1.60	22.76 ± 3.04	0.12

Postoperative data			
Fever	15 (30%)	7 (14%)	0.05*
Nausea/vomiting	17 (34%)	17 (34%)	0.64
Abdominal pain	5 (10%)	8 (16%)	0.27
2ry Hemorrhage	1 (2%)	1 (2%)	0.75
Post-operative social support	41 (82%)	47 (94%)	0.06
Time to normal diet resuming	4.14 ± 0.83	4.02 ± 0.85	0.47
Post-operative pain score			
1 st day	3.26 ± 1.16	3.38 ± 1.37	0.63
3 rd day	2.80 ± 1.19	2.76 ± 1.19	0.86
5 th day	1.90 ± 1.23	1.94 ± 1.30	0.87
7 th day	1.68 ± 1.22	1.25 ± 1.17	0.06

Data expressed as frequency (percentage), mean (SD). P value was significant if < 0.05.

Discussion :

A total of 200 patients who were listed for tonsillectomy without adenoidectomy, and their age are less than 18 years old of either gender were enrolled in study it was found that both groups based on used technique either CDT or BDT had no statistically significant difference as regarding baseline data with male predominance in both groups and Chronic tonsillitis was the primary indications for surgery.

Similarly, randomized controlled study was performed on 60 patients scheduled for tonsillectomy either by CDT or BDT; baseline data was comparable in both groups.¹¹

Also, In agreement with our study, **Mofatteh et al.** compared 356 patients were undergone BDT to 178 patients with the CDT and noticed insignificant difference as regards baseline data between the two groups. The chief indication for tonsillectomy was recurrent tonsillitis (34.3%).¹²

The current study documented that patients in bipolar diathermy group had significantly lower operative time, diminished time of surgery and faster recovery. Many previous studies agreed with our findings.¹³⁻¹⁴

Also, in the BDT group the blood loss intra-operatively was significantly low when compared with the CDT group which is Similar to other studies.^{12, 14-15}

Blood loss is a very important factor, especially in children's surgery, because they have a low blood volume where bleeding may cause disorders such as physical and mental fatigue and lead to harmful results.^{12,16}

In the present study, post-operatively findings were found in both groups as fever, nausea\vomiting, abdominal pain with insignificant difference except for secondary hemorrhage which is significantly greater in BDT group. Also, Patients who underwent cold dissection had significantly shorter time to resume normal diet.

This result is matching with other studies, the rate of bleeding after tonsillectomy has been reported 1.3% for CDT and 3.9% for BDT groups¹⁷ the rates for secondary hemorrhage have been 2.3% for BDT and 1% with CDT.¹⁸ In other studies, postoperative hemorrhage was low and insignificant.¹⁸⁻¹⁹

Nausea and/or vomiting are morbidities were measured in this study. Although it was greater in the BDT group than the CDT but with insignificant difference, similarly previous studies who compared post tonsillectomy morbidity between thermal cautery methods and cold dissection found the same result.^{12, 17}

In the present study, postoperative pain was significantly lower in the CDT at different times of assessment.

Matching with our study another study showing significant less postoperative pain associated with CDT group.¹¹

Also there were many previous studies reported similar findings as regard postoperative pain.^{13, 18} But some previous studies reported no significant difference between both groups.¹⁵⁻¹⁶

The differences of pain intensity in different studies was related to various factors such as duration of disease, volume and intensity of employed energy during surgery, the generated heat result in tissue damage, ability to tolerate pain, size of the cut area etc.¹²

In subgrouping of the studied patients based on postoperative antibiotics use, it was found that usage of antibiotics didn't greatly affect intra-operative blood loss and time and postoperative morbidity in form of hemorrhage, nausea/vomiting, pain, and return to normal diet. This was matching with preceding study found that antibiotics not decrease post-tonsillectomy morbidity even if the culture was positive.²⁰

Some authors found that postoperative infection lead to secondary hemorrhage; so, they suggested the routine usage of antibiotics post-tonsillectomy.^{5, 21} But, in accordance with our study, previous meta-analysis included 1397 patients reported that antibiotics had no significant role in decreasing post tonsillectomy secondary hemorrhage.²²

Our results found that antibiotics had no more benefits as regard this point either with BET or CDT groups. Similarly, Abdelhamid et al. demonstrated that the usage of antibiotics has no effect on the time taken to resume normal diet.²²

In our study, we found that antibiotic use didn't greatly affect the occurrence of postoperative pain. Consistently, other authors demonstrated that the usage of post-operative antibiotic had no effect on post-operative pain.²²⁻²³

We found that (patients in the BDT group), both subgroups as regard usage of antibiotics had no beneficial value as regard postoperative fever. Similarly, previous meta-analysis concluded the same findings.²²

We Also found at patients who underwent cold dissection that antibiotic significantly decreased the number of patients manifesting fever. Also, **Muthuswamy Dhiwakar et al** found that antibiotics significantly decreased the number of patients manifesting fever.²⁴ But **Tshifularo et al.** found that post-operative antibiotic not decrease postoperative fever.²⁰

Conclusion:

- Antibiotics not significantly decrease post-tonsillectomy morbidity and its use should be compared with the emergence adverse effects so routinely use of it should be decreased, recommended to be used on a patient-by-patient bases as in rheumatic heart disease patients.
- More studies with larger sample size are needed to confirm the results of the present study.

Reference:

1. Salonen A, Kokki H, Nuutinen J. Recovery after tonsillectomy in adults: a three week follow up study. *The Laryngoscope* 2002;112:94-98.
2. Patel A, Foden N, Rachmanidou A. Is weekend surgery a risk factor for post-tonsillectomy haemorrhage? *The Journal of Laryngology & Otology* 2016;130:763-767.
3. Telian SA, Handler SD, Fleisher GR, Baranak CC, Wetmore RF, Potsic WP. The effect of antibiotic therapy on recovery after tonsillectomy in children: a controlled study. *Archives of Otolaryngology-Head & Neck Surgery* 1986;112:610-615.
4. Kay DJ, Mehta V, Goldsmith AJ. Perioperative adenotonsillectomy management in children: current

- practices. *The Laryngoscope* 2003;113:592-597.
5. Iyer S, DeFoor W, Grocela J, Kamholz K, Varughese A, Kenna M. The use of perioperative antibiotics in tonsillectomy: does it decrease morbidity? *International journal of pediatric otorhinolaryngology* 2006;70:853-861.
 6. Baugh RF, Archer SM, Mitchell RB, Rosenfeld RM, Amin R, Burns JJ, Darrow DH, et al. Clinical practice guideline: tonsillectomy in children. *Otolaryngology–head and neck surgery* 2011;144:S1-S30.
 7. Patel PN, Jayawardena AD, Walden RL, Penn EB, Francis DO. Evidence-based use of perioperative antibiotics in otolaryngology. *Otolaryngology–Head and Neck Surgery* 2018;158:783-800.
 8. Liu C, Ulualp SO. Outcomes of an alternating ibuprofen and acetaminophen regimen for pain relief after tonsillectomy in children. *Annals of otology, rhinology & laryngology*. 2015;124:777-781.
 9. Gil-Ascencio M, Castillo-Gómez CJ, del Carmen Palacios-Saucedo G. Antibiotic prophylaxis in tonsillectomy and its relationship with postoperative morbidity. *Acta Otorrinolaringologica (English Edition)*. 2013;64:273-278.
 10. Myles PS. The pain visual analog scale: linear or nonlinear. *Anesthesiology* 2004;100:744.
 11. Bhandari C, Sharma B, Pokharel A, Mayya NJ. Intraoperative Blood Loss, Surgical Duration and Postoperative Pain following Cold Dissection Tonsillectomy and Bipolar Electrocautery Tonsillectomy. *Journal of College of Medical Sciences-Nepal* 2021;17:341-346.
 12. Mofatteh MR, 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? *Brazilian Journal of Otorhinolaryngology* 2020;86:427-433.
 13. Silveira H, Soares JS, Lima HA. Tonsillectomy: cold dissection versus bipolar electrodissection. *International journal of pediatric otorhinolaryngology* 2003;67:345-351.
 14. Guragain R, Bhusal C, Adhikari P, Pokharel R. Intraoperative blood loss & operating time in tonsillectomy: is electrodissection better? *Nepalese Journal of ENT Head & Neck Surgery* 2010;1:6-7.
 15. Vithayathil A, Maruvala S, Vithayathil A. Comparison between cold dissection snare method and bipolar electrodissection method in tonsillectomy. *Res Otolaryngol* 2017;6:17-22.
 16. hashemi M, Salmani A, Abtahi M. Post tonsillectomy morbidities: bipolar electro-surgical scissor vs classic method. 2002: 324-327.
 17. Stavroulaki P, Skoulakis C, Theos E, Kokalis N, Valagianis D. Thermal welding versus cold dissection tonsillectomy: a prospective, randomized, single-blind study in adult patients. *Annals of Otolaryngology, Rhinology & Laryngology* 2007;116:565-570.
 18. Gendy S, O'Leary M, Colreavy M, Rowley H, O'Dwyer T, Blaney A. Tonsillectomy--cold dissection vs. hot dissection: a prospective study. *Irish medical journal* 2005;98:243-244.
 19. Manandhar S, Bhandary S, Chhetri S, Khanal B, Shah S, Sah BP, Paudel D. Bacteriological evaluation of tonsillar surface and tonsillar core micro flora in patients undergoing tonsillectomy. *Health Renaissance* 2014;12:149-153.
 20. Tshifularo M, Monama G. The role of antibiotics in post tonsillectomy morbidity: An experience at tertiary centre, Steve Biko Academic Hospital, University of Pretoria. *J Otolaryngol Res* 2018;1.
 21. Colreavy M, Nanan D, Benamer M, Donnelly M, Blaney A, O'Dwyer T, Cafferkey M. Antibiotic prophylaxis post-tonsillectomy: is it of benefit? *International journal of pediatric otorhinolaryngology* 1999;50:15-22.

-
22. Abdelhamid AO, Sobhy TS, El-Mehairy HM, Hamid O. Role of antibiotics in post-tonsillectomy morbidities; A systematic review. *International journal of pediatric otorhinolaryngology* 2019;118:192-200.
 23. Baloch MA, Akhtar S, Ikram M, Humayun HN. The rationality of prescribing antibiotics after tonsillectomy. *Journal of the Pakistan Medical Association*. 2012;62:445.
 24. Muthuswamy Dhiwakar, Chee Y. Eng, Sivasubramaniam Selvaraj, William S. McKerrow. Antibiotics to improve recovery following tonsillectomy: a systematic review *Archives of Otolaryngology–Head & Neck Surgery* 2006; 134:357-364.