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Original Article

Comparative Study between Cold Dissection Technique and Bipolar Diathermy in Tonsillectomy in the Same Patient

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ABSTRACT

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Background: Tonsillectomy is one of the most frequent and oldest operations performed by otolaryngologists. Tonsillectomy postsurgical complications are uncommon, with post-tonsillectomy bleeding being one of the most significant complications.

Aim of the work: To compare the effects of cold dissection technique and hot bipolar diathermy for tonsillectomy on intraoperative blood loss, surgical time, postsurgical pain, hemorrhage, infection, and wound healing in the same patient.

Patients and methods: This randomized prospective trial was performed in the Department of Otorhinolaryngology [Faculty of Medicine, Al-Azhar University] from June 2021 to January 2022. The study enrolled 100 cases who had tonsillectomy with or without adenoidectomy to treat chronic tonsillitis. All of the participants signed their informed consent to take part in the study. Randomly, on one side of the same patient, cold dissection tonsillectomy was performed, while bipolar diathermy was performed on the other. We compared the two techniques regarding intraoperative blood loss, surgical time, postsurgical pain, postsurgical hemorrhage, postsurgical infection, and wound healing.

Results: As regard age and sex of the studied group, it was founded that the age group ranged between 3 to 19 years with mean age of 10.22 years. These patients were represented by 62 male [62%] and 38 females [38%] of the total number of patients [100]. According to age group distribution, there have been significant differences [p-value < 0.05] with the most frequent percentage in the 5–10-year group [55%]. Regarding the intraoperative data, bipolar dissection had a high significant low operative time [12.02±1.27 min] and blood loss [10.89±1.58 ml] than cold steel dissection with operative time [22.37±2.12 min] and blood loss [20.41±0.78 ml] with p-value < 0.001.

Conclusion: Between two tonsillectomy surgical approaches, the bipolar diathermy dissection approach took much less time and produced significantly less intra-operative blood loss than the cold dissection method.

Keywords: Tonsillectomy; Bipolar diathermy; Cold dissection technique



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INTRODUCTION

One of the most common surgical procedures done in an ear, nose, and throat practice is a tonsillectomy. It is commonly performed through cold dissection in both adult and pediatric age groups around the world, and technological advances have an effect on surgical methods. There is a continuous search for an efficient method that mainly decreases intraoperative bleeding and time, post-tonsillectomy hemorrhages, and post-operative pain [1]. Alternatives to cold dissection, a variety of hot dissection techniques are suggested. Electro-cautery [bipolar and/or monopolar], harmonic scalpel, radiofrequency, coblator, and thermal welding systems are all examples of this [1]. The cold steel dissection method was introduced in 19th century [2].

Monocautery use in tonsillectomy was defined first in the year of 1962. Then, Andrea defined the first surgical bipolar electrocautery procedure in 1993 [3]. There are an increased number of trails to estimate the different aspects of these various methods, a few of these studies donate that the electrocautery technique is linked with decreased intraoperative bleeding with no observed postoperative increase in morbidity parallel to the cold technique [4].

AIM OF THE WORK

The purpose of this work is to compare the intraoperative and postoperative clinical outcomes of bipolar and cold dissection tonsillectomy procedures in the same patient to eliminate the host of factors which may affect the comparative study regarding the morbidity of tonsillectomy.

PATIENTS AND METHODS

This randomized prospective research has been conducted at Al-Azhar University's Faculty of Medicine's Elhussein University Hospital. Between June 2021 and January 2022, 100 individuals underwent tonsillectomy, either with or without adenoidectomy, to treat chronic tonsillitis were enrolled in the study. All patients' parents signed out informed consent before the study, including a complete description of the details of the study and the follow-up visits.

We excluded the following: people with known coagulation diseases, those who are

taking anticoagulants, or those who have cardiovascular disorders; patients undergoing tonsillectomy as part of a palatoplasty for snoring, people who undergo unilateral tonsillectomy for biopsy to rule out malignancy; children under 3 years old; and children undergoing adenoidectomy only.

After achieving inclusion and exclusion criteria, all patients were submitted to full history taken [personal history, complaint and past history], examination [general and full ENT examination], laboratory investigations [CBC, ESR, INR, Bleeding time, coagulation time, prothrombin time, liver function and kidney function test], pediatric and anesthetic consultation to assess the fitness of children to surgery and written consent was taken from all patients. We compared both techniques of tonsillectomy [cold dissection & bipolar diathermy] as regard intraoperative operation time and blood loss also post-tonsillectomy pain, bleeding, healing, and infection.

All patients operated under general anesthesia have been put supine with oral intubation, the tube has been taped to the patient's chin in the middle; and the patient has been placed at the bed's edge with their heads extended with a small towel under their shoulders, while the surgeon sits at the table head. Before starting, surgeon select the type of technique randomly by using two up-side down cards contains a letter [A or B]; A for cold dissection and B for bipolar diathermy technique. As we always start by the right side with the first card choose blindly either cold technique or bipolar diathermy on right side while the other technique on the left side.

The time of the operation was separately estimated for each operated side; it was estimated from the actual operation beginning [mainly when the tonsils grasped by the tonsil holding forceps till the satisfactory hemostasis achievement on the operated side] in each side separately [in minutes and seconds]. The volume of blood collected in the suction bag was added to the number of cotton balls used in mopping the surgical field to measure intra-operative blood loss. The blood loss will be taken as 1ml if the cotton ball is fully soaked and 0.5 ml if partially soaked. This done to each side separately.

Post-tonsillectomy care and follow-up:
The patient was turned back to the anesthetist at

the end of the operation and for general anesthesia recovery. Unless otherwise indicated, all patients were admitted to the hospital on the day of surgery and discharged the following day.

On the next day after surgery patients were discharged. Parents of child patients were given a daily card to note severity of pain from the 1st to 10th post-tonsillectomy day, diet as well as

the side of the maximum pain. Post-tonsillectomy pain was graded by means of FLACC scoring system for young children up to 9 years of age. Children older than 9 years and adults were graded using the Numerical Rating Scale system. The FLACC scoring system is an abbreviation for five indicators, each of which is evaluated as a 0, 1, or 2 on a ten-point composite scale ranging from 0 [no pain] to 10 [worst pain] [2].

Table [1]: FLACC scoring system [2]

Score	0	1	2
Face	No expression	Occasional action	Frequent action
Legs	Normal	Restless/tense	Legs withdrawn, kicking
Activity	Quiet	Shifting/tense	Jerking, rigid, arched
Cry	None	Moan, whimper	Constant crying, screaming, or sobbing, as well as repeated complaints
Consolability	Content	Consolable	Inconsolable

Older children and adolescents are asked to assess their pain on a scale of 0 [no pain] to 10 [worst pain] using the Numerical Rating Scale [NRS] scoring system 2. All patients were followed up after 1-2 weeks from surgery and were evaluated on the first, second, seventh, and tenth day after the surgery for any history of any postoperative pain or bleeding at any time and were instructed if any bleeding occurred to come urgently to the hospital. A complete otolaryngologic examination is performed to look for signs of infection in the tonsillar bed, as well as getting a swab of the surgical bed for culture and sensitivity testing and detecting the degree of healing on each side.

Statistical Analysis

The recorded data was loaded onto a computer and analyzed with IBM SPSS software version 22. The mean \pm standard deviation [SD] has been employed to express quantitative data. Frequency and percentage have been employed to express qualitative data. Independent t test was used to compare variables. P value $<$ 0.05 is considered significant.

RESULTS

This was a prospective study that compared the cold dissection technique on one side with the bipolar diathermy technique on the other side in terms of time of operation by each technique; intraoperative blood loss by each technique; post-tonsillectomy pain, bleeding, infection and healing on each side separately.

As regard age and sex of the studied group, it was founded that the age group ranged between 3 to 19 years with mean age of 10.22 years. These patients were represented by 62 males, which represents 62%, and 38 females, which represents 38% of the total number of patients [100]. According to age group distribution, there have been significant differences [p-value $<$ 0.05] with the most frequent percentage in the 5-10-year group [55%] [Table 2].

Regarding the intraoperative data bipolar dissection had a high significant low operative time and blood loss than cold dissection technique [table 3].

Post- tonsillectomy pain using FLACC scoring system and Numerical Rating Scale [NRS] scoring system: of the included patients there was non-significant difference between both techniques with mean duration for recovery 13.23 \pm 8.52 days [table 4].

Post- tonsillectomy bleeding: of the included patients there was 4 episodes of post-operative bleeding using the bipolar cautery approach. In the cold steel dissection procedure, six episodes of reactionary hemorrhage were seen, one of which necessitated returning the patient to the operating room and re-ligating the vessels. The six occurrences of reactive bleeding were all caused by ligature slippage and this difference was founded of non-significant difference between both techniques [Table 5].

Post- tonsillectomy wound healing: of the included patients the wound healing was better and faster with cold dissection technique than bipolar technique but there was non-significant difference about wound healing in both groups. Wound healing was assessed in all groups after

two weeks of operation and there were no significant differences between both techniques [Table 5]. Regarding post-tonsillectomy infection, there was no cases in both groups had infection.

Table [2]: Demographic data of the including patients

Variables	Statistics [n=100]		
Age	Mean \pm SD	10.22 \pm 7.92	
	Min. – Max.	3- 19	
	Age group	3-5 years	34 [34.0%]
		5-10 years	55 [55.0%]
> 10 years		11 [11.0%]	
Gender	Male	62 [62%]	
	Female	38 [38%]	

Table [3]: Intraoperative data as regard operative time and blood loss

Intraoperative Data	Group A [Cold dissection]	Group B [Bipolar dissection]	P-value
Operative time	22.37 \pm 2.12	12.02 \pm 1.27	<0.001*
Blood loss	20.41 \pm 0.78	10.89 \pm 1.58	<0.001*

Table [4]: post- tonsillectomy pain score

Days postoperative	Group A [Cold dissection] N=100	Group B [Bipolar dissection] N=100	P-value
1	8.3	8.1	0.82
2	7.8	7.7	0.67
7	3.3	3.4	0.66
10	1.2	1.4	0.75

Table [5]: postoperative bleeding and wound healing among studied group

	Group A [Cold dissection] N=100	Group B [Bipolar dissection] N=100	P-value
Post- tonsillectomy bleeding	6	4	0.64
Complete healing	88 [88%]	83 [83%]	0.912
Partial healing	12 [12%]	17 [17%]	

DISCUSSION

Tonsillectomy is a frequent surgery with relatively low risks, and numerous procedures have been developed throughout time to prevent postoperative complications and morbidity such as discomfort, bleeding, and dysphagia. However, no approach has yet been proven to be superior to others, and the findings are still inconclusive [5]. Until now, the most prevalent procedure for tonsillectomy has been cold dissection [6].

We discovered that the cold dissection approach took longer time [22.37 \pm 2.12 minutes] while diathermy dissection approach has a less substantial reduction in intra-operative time

[12.02 \pm 1.27 minutes; P >0.001]. This has been collaborated by studies done by **Beriat et al.** [7] on 31 pediatric patients who underwent tonsillectomy with bipolar electrocautery; the mean duration was 11.8 \pm 1.25 min versus 45 children who underwent conventional cold dissection tonsillectomy; the mean duration was 21.26 \pm 2.11 min. Also, **Silveira et al.** [8] reported that the surgery duration was decreased significantly in the bipolar electro-dissection tonsillectomy [P<0.001]. **Kirazli et al.** [9] noted that the average surgery times were 15.2 \pm 8.5 min for the bipolar technique and 29.06 \pm 13.5 min for the cold technique [P < 0.05].

Regarding the intra-operative blood loss in our study, it shows that there is statistically

significant difference between cold and bipolar tonsillectomy in intra-operative blood loss, with more blood loss in cold technique [20.41±0.78 ml per side], intra-operative blood loss in electrocautery technique was minimal with average of 10.89±1.58 ml per side range [P>0.001].

According to **Raut et al.** [10], the bipolar diathermy approach resulted in 6 ml blood loss on average, while the cold steel dissection technique resulted in 86 ml blood loss [P<0.001],

Also, **Silveira et al.** [8] noted that loss of blood was significantly decreased in the bipolar electro-dissection tonsillectomy [P<0.001]. **Kirazli et al.** [9] noted that the blood loss in the bipolar technique and the cold technique was respectively 5.0±4.2 ml and 32.1±11.3 ml [P < 0.05].

On the other hand, **Tay** [11] found no difference in intra-operative blood loss when electro dissection and blunt dissection were performed on either side of the same patient.

Regarding postoperative bleeding, there was four episodes of post-operative bleeding in our study using the bipolar cautery approach. In the cold steel dissection procedure, six episodes of reactionary hemorrhage were seen; this variance was of non-significant statistical difference [P <0.05].

Both procedures had the same reactive hemorrhage incidence of 4%, according to **Shivkumar et al.** [12]. Between the two procedures, there are no significant differences in the rates of post-operative hemorrhage according to several researches [10, 13-15]. Across all the previous studies, very few patients had postoperative bleeding, and there were no apparent differences between the cold and cautery techniques, which agrees with our study.

As regard postoperative pain, for young children up to the age of nine, post-operative pain was rated using The FLACC scoring system rating method. The Numerical Rating Scale method [NRS] was used to grade children and people above the age of nine. Although the levels of post-operative pain became similar on the day of surgery in our research, by the next day, there was a perceptible difference between the two sides, with increasing pain on the side

done by bipolar diathermy than done by cold dissection technique [p > 0.005]. By days went the difference become more. This may be owing to heat-induced local inflammation more than cold dissection. The side where cold dissection had been performed saw a faster decrease in pain and a lower pain intensity. **Alkhalil et al.** [16] observed no difference in pain levels between the two procedures on the day of surgery and the day following surgery, bipolar diathermy revealed considerably elevated pain levels from the second day after surgery onward.

Raut et al. [10] noted that the difference was not significant in the scores of pain in the two techniques [P > 0.05] and **Silveira et al.** [8] noted that the pain intensity was slightly higher in the bipolar electro-dissection tonsillectomy compared with the cold dissection tonsillectomy group, and no differences in the duration of hospitalization were presented between the two techniques. On the other hand, **Shivkumar et al.** [12] discovered that the hot dissection approach resulted in much decreased post-operative discomfort.

Bukhari and Al-Ammar [17] also reported that pain was significantly higher in the diathermy tonsillectomy group than in the cold tonsillectomy group on the first postsurgical day [27% vs 12%] [p=0.0151]. Nevertheless, there were no significant differences in pain between the two procedures on the first day and from the second to the tenth postsurgical day.

As regards postoperative wound healing in our study, we found that the wound healing was slightly better and faster in the cold dissection technique [88% with complete healing and 12% with partial healing] than in the bipolar diathermy technique [83% with complete healing and 17% with partial healing]. But the difference was non-significant [P <0.05], which agrees with **Isaacson** [18].

The wound healing after a tonsillectomy has received little attention. A greater understanding of the wound healing process could help surgeons to possibly prevent, predict, and treat complications from operations that develop as part of the healing process [19]. Regarding postoperative infection of the included patients, there were no cases in both groups.

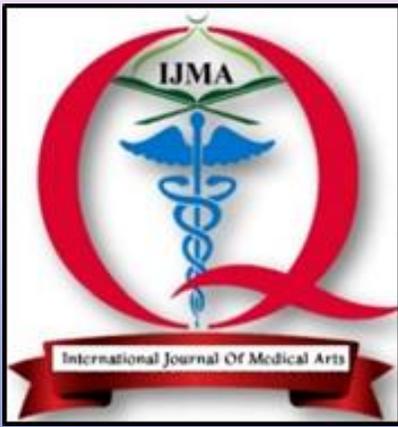
Conclusions: Between two tonsillectomy surgical approaches, the bipolar diathermy

dissection approach took much less time and produced significantly less intra-operative bleeding than the cold dissection method. The cold dissection approach shows a greater incidence of postoperative bleeding. However, when it came to postoperative hemorrhage, there were no significant differences between the two procedures. Although the degrees of postsurgical pain were similar on the day of surgery, by the next day, there was a perceptible difference between the two sides. The side where cold dissection was performed saw a faster decrease in pain and a lower pain intensity. There was no significant difference as regards the wound healing on both sides, with slightly faster healing in cold dissection than in bipolar diathermy. While the fact that wound healing after tonsillectomy has received little attention.

Conflict of interest: None to be declared.

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