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Comparative Study between Bipolar Diathermy and Cold Dissection Techniques of Tonsillectomy

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ABSTRACT

Introduction: Tonsillectomy is a commonly performed surgical procedure in the department of the Otorhinolaryngology. Among the different methods, bipolar diathermy and cold steel dissection techniques are most commonly used methods. This study aims to compare operation time, intraoperative bleeding and postoperative haemorrhage between bipolar diathermy tonsillectomy and cold dissection tonsillectomy.

Methods: This was an analytical cross-sectional study conducted in the Department of Otorhinolaryngology and Head and Neck surgery at Lumbini Medical College and Teaching Hospital over a period of fifteen month from 15 March 2020 to 15 June 2021. Total of 72 patients were enrolled for study. Patients were divided into two equal groups by computer randomization block: bipolar diathermy tonsillectomy (BDT) and cold steel dissection tonsillectomy (CDT).

Results: The mean age of presentation was 21.67 years (SD=12.16) in bipolar diathermy tonsillectomy and 22.61(SD=9.45) years in cold dissection tonsillectomy (CDT) method respectively. In the age group analysis, the most common age group involved was 21 – 30 years (40.3%). Most common indications for tonsillectomy were recurrent tonsillitis (59.7%) and chronic tonsillitis (27.7%) followed by tonsillar hypertrophy (5.6%) and tonsillar papilloma (2.8%). The mean intraoperative bleeding amount in bipolar diathermy was 17.19 ml (SD=6.45) whereas in the cold dissection method it was 24.64 ml (SD= 10.54) which was statistically significant ($p<0.05$). There was one case of postoperative primary haemorrhage (2.77%) in each method. The mean operating time was shorter in bipolar diathermy tonsillectomy (32.25 minutes, SD=11.22) than cold dissection tonsillectomy method (36.72 minutes, SD=11.51).

Conclusion: Bipolar diathermy is a safe technique of tonsillectomy. It reduces operative time and intraoperative blood loss without increasing postoperative morbidity when compared to conventional cold dissection techniques tonsillectomy.

Keywords: Bipolar diathermy; Cold dissection; Tonsillectomy

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INTRODUCTION

Tonsillectomy is a common surgery performed by Otorhinolaryngologists in which entire palatine tonsils are removed. The first tonsillectomy was performed by Cornelius Celsus using his fingernails. Worthington and Waugh described the technique of tonsillectomy by dissection methods. Goycolea described electrodissection method by using monopolar diathermy and Pang later on reported the first tonsillectomy by bipolar electrocautery.[1]

There are various methods of the tonsillectomy including blunt cold steel dissection, monopolar diathermy, bipolar diathermy, laser dissection, cryosurgery, coblation-assisted tonsillectomy, guillotine excision and ultrasonic scalpel tonsillectomy.[2] Bipolar diathermy and cold dissection methods are the most commonly used methods. Amongst the different methods, bleeding is always the main concern since post-operative haemorrhage is life threatening. The ideal tonsillectomy should be safe, fast, bloodless and associated with rapid recovery.[3] Even though there are various researches in the topic of evaluating and comparing bipolar diathermy and cold dissection with snare method of tonsillectomy, the superiority of one technique over the other is still questionable.[4]

Aim of the present study is to compare operation time, intraoperative blood loss and postoperative haemorrhage between bipolar diathermy tonsillectomy (BDT) and cold dissection tonsillectomy (CDT).

METHODS

This was an analytical cross-sectional study carried out in the Department of Otorhinolaryngology, Lumbini Medical College and Teaching Hospital (LMCTH) over a period of fifteen months from 15 March 2020 to 15 June 2021. A total of 72 patients were enrolled for study. Ethical approval from Institutional Review Committee of the institute was obtained prior to enrollment of the patients. Patients were divided into two equal groups (each group 36) by computer randomization block: bipolar diathermy tonsillectomy (BDT) and cold steel dissection tonsillectomy (CDT). Before surgery, the procedure of bilateral tonsillectomy was explained in detail to the patients or parents and consent was taken. A detailed history was taken, and a general examination of ear, nose, throat and neck was performed. Preoperatively complete blood count (CBC), hemoglobin (Hb), prothrombin time (PT), platelet count, blood grouping and serology were evaluated. For patients over 40 years of age, electrocardiography and chest X-ray were requested. The main surgeon performed surgeries. The study variables were operation time of surgery, amount of intraoperative blood loss and postoperative hemorrhage.

Inclusion criteria:

Age ≥ 3 years

All patients planned for elective tonsillectomy including

Recurrent tonsillitis

Chronic tonsillitis

Peritonsillar abscess (second attack)

Tonsillar hypertrophy

Tonsillar papilloma

Tonsillar cyst

Tonsillar keratosis

Exclusion criteria:

Age<3 years

Acute tonsillitis (≤ 6 weeks)

Use of anticoagulant drugs

History of bleeding disorder

Tonsillar hypertrophy related to neoplastic process

Tonsillectomy as other parts of surgery

Patients who do not want to participate in the study

Operative technique

All cases were done under general anesthesia. Patients were positioned on the operating table in Rose position. Patient's mouth was opened with Boyle-Davis mouth gag and supported by Draffin bipod stand. The palate and tonsils were palpated to ensure the absence of submucosal cleft of the palate and pulsation. The upper pole of the tonsil was pulled medially using Denis Browne holding forceps. The bulge of the tonsil was then identified and care should be taken to stay close to the tonsil within the capsular plane. BDT was done using the electrosurgical unit model Shalya- LX electrocautery (Made in India) set at

low power of 15 watts. In this method, a palatoglossal incision was given from superior pole to inferior pole of tonsil using the tip of a bipolar forceps. During dissection, encountered vessels were cauterized and then separated from the tonsil. After complete hemostasis of both tonsillar fossae, the gauzes were removed.

Tonsillectomy in the CDT group began by cutting the anterior pillar with 12 numbered surgical blade. After identifying the loose connective tissue beneath the tonsil, it was dissected from the superior pole toward the lower pole by a blunt dissector and removed completely by using Eve's wire snare. Following dissection, the tonsillar fossa was packed with gauze. The other tonsil was similarly removed. Persistent bleeding was controlled by point coagulation of blood vessel. Ligature was not needed for any cases. Finally, the gauzes were removed.

Operation time was measured from the start of the mucosal incision until completion of hemostasis in the dissected tonsil bed. Operative blood loss was measured by use of standard size gauze piece of 19 cm X 14 cm. The blood loss was 4 ml if gauze piece was fully soaked and 2.5 ml if gauze piece was partially soaked. [6-7]The total volume of blood aspirated in the suction bottle was also added.

Descriptive statistics were reported as number or percentage for categorical variables. The data was analyzed using the Independent samples *t* tests. All the statistical analyses were carried out in SPSS 20 software and P < 0.05 was considered statistically significant.

RESULTS

A total of 72 patients were enrolled for the study. Thirty-six patients were in bipolar diathermy tonsillectomy (BDT) method and the other thirty-six patients were in cold dissection tonsillectomy (CDT) method. The mean age of presentation was 21.67 years (SD=12.16) and 22.61(SD=9.45) years in bipolar diathermy tonsillectomy (BDT) and cold dissection tonsillectomy (CDT) methods respectively (range 6-63 years). There were 16 (44.4%) males and 20 (55.6%) females in diathermy group, and 14 (38.9%) males and 22 (61.1%) females in the cold dissection method tonsillectomy group. In the age group analysis, the most common age group involved was 21 – 30 years (40.3%). **(**Table 1 and 2)

Recurrent tonsillitis was the most common indication for tonsillectomy (59.7%) followed by chronic tonsillitis (27.7%), tonsillar hypertrophy (5.6%), tonsillar papilloma (2.8%) and one case each of tonsillar keratosis, tonsillar cyst and peritonsillar abscess (1.4%) respectively .(Table 3)

The mean intraoperative bleeding in bipolar diathermy was 17.19 ml (SD=6.45) whereas in the cold dissection method it was 24.64 ml (SD= 10.54) which was statistically significant (p<0.05). There was one case of primary postoperative haemorrhage in bipolar diathermy tonsillectomy and one case in cold dissection tonsillectomy (2.77%) respectively. (Table 4)

The mean operating time was shorter in bipolar diathermy tonsillectomy (32.25 minutes, SD=11.22) than cold dissection tonsillectomy method (36.72 minutes, SD=11.51), though it was statistically not significant (p>0.05). (Table 4)

Table 1. Age Distribution

Age group(years)	BDT	CDT	Total
≤10	6(16.7%)	2(5.6%)	8(11.1%)
10-20	14(38.9%)	12(33.3%)	26(36.1%)
21- 30	10(27.8%)	19(52.8%)	29(40.3%)
≥31	6(16.6%)	3(8.3%)	9(12.5%)
Mean ±SD	21.67±12.16	22.61±9.45	72(100%)

Table 2. Gender Distribution

	BDT	CDT	Total
Male	16(44.4%)	14(38.9%)	30(41.7%)
Female	20(55.6%)	22(61.1%)	42(58.3%)
Total	36	36	72

Table 3. Indications of Tonsillectomy

Indications	Number of cases (N)	Percentage (%)
Recurrent tonsillitis	43	59.7
Chronic tonsillitis	20	27.7
Tonsillar hypertrophy	4	5.6
Tonsillar papilloma	2	2.8
Tonsillar keratosis	1	1.4
Tonsillar cyst	1	1.4
Peritonsillar abscess	1	1.4
Total	72	

Table 4. Comparison between BDT and CDT group

	BDT(Mean± SD)	CDT(Mean ±SD)	
Blood loss(ml)	17.19(6.45)	24.64(10.54)	*t=3.61, df=70, P<0.05
Operative time(minute)	32.25(11.22)	36.72(11.51)	*t=1.66,df=70.93, p>0.05
Postoperative haemorrhage	1(2.77%)	1(2.77%)	Total 2.77%

***Independent - Samples Test**

DISCUSSION

Tonsillectomy is a commonly performed surgical procedure in the Department of the Otorhinolaryngology. Advances in various surgical techniques have developed with the aim of reducing intraoperative complications, postoperative haemorrhage and postoperative morbidity. Despite the various complications seen with each technique, post-tonsillectomy haemorrhage is the main concern and should be taken seriously before applying any new technique.[8] The technique of tonsillectomy depend on surgeon preference, experience and availability of instruments, so the surgeon should select the technique that has minimum morbidity.

Some studies believe that cold dissection tonsillectomy is safer and more effective and has a lower incidence of postoperative morbidity due to less tissue damage because it causes less injury to the tonsillar fossa fiber. Another group of otorhinolaryngologists suggest electrocautery method results in minimal tissue damage thus helping in safe and fast tonsillectomy with minimal morbidity.[9]

The mean age in our study was 21.67 ± 12.16 years in bipolar diathermy tonsillectomy and 22.61 ± 9.45 years in the cold dissection tonsillectomy group with maximum number of cases in 21 to 30 years group (40.3%). Females (58.3%) were more than males (41.7%) in our study out of which 16(44.4%) males and 20(55.6%) females were in the diathermy tonsillectomy method and 14(38.9%) males and 22(61.1%) females were in cold dissection tonsillectomy method. Similar

study done by Tay HL[10] showed higher cases of tonsillectomy in adult age (mean age 18.4 years) with female predominance (65.38%).

In cases of tonsillitis, patients have recurrent throat discomfort for which they have to take antibiotics several times but definitive treatment is surgery where both the tonsils are removed. This provides considerable symptoms relief and quality-of-life improvement. There are various indications of tonsillectomy but in our study, most common indication were recurrent tonsillitis (59.7%) and chronic tonsillitis (27.7%), followed by tonsillar hypertrophy (5.6%) and tonsillar papilloma (2.8%). Study done by Galindo Torres BP et al[11] also had similar results which showed recurrent tonsillitis as the most common indication (74.85%). The indications of tonsillectomy varied markedly with the age of the patients. Tonsil hypertrophy being the most common in children and after that infection being the common indication for tonsillectomy.

In our study, intraoperative blood loss in bipolar diathermy was less compared to cold dissection tonsillectomy method. Study done by MacGregor FB et al[12], Kousha et al[13] showed significantly less intraoperative blood loss with bipolar electrocautery tonsillectomy compared to cold steel dissection with ties. In another study done by Pang[14] there was significantly lower intraoperative blood loss using the bipolar diathermy technique compared to cold steel dissection and ties. Less intraoperative blood loss in bipolar diathermy technique could be due to the cauterization of the blood vessels at the same time of separation of tonsils from its fossa. The average duration of surgery in our study was shorter in bipolar dissection methods than cold dissection method, which was similar to study done by Guragain et al [6], Shah[15] and Özkiriş M et al[16]. This is the advantage of bipolar diathermy over cold dissection tonsillectomy.

There are two types of haemorrhage. Primary post-tonsillectomy haemorrhage is defined as bleeding within the first 24 hours after the procedure which is mainly due to surgical technique and the reopening of small blood vessels. Secondary haemorrhage occurs 24 hours after the procedure, usually between 5 and 10 days[17] and it is due to the infection of the tonsillar fossa. The overall incidence of post-tonsillectomy haemorrhage (PTH) varies between 2% to 22.2% in various studies.[3] The incidence of primary haemorrhage is between 0.2% and 2.2% and secondary haemorrhage is between 0.1% and 4.8%.[18-19] Most of these bleedings are primary. Secondary bleedings can occur at any time during the first two post-operative weeks.[20]

In our study, the incidence of postoperative haemorrhage was 2.77%. Primary post tonsillectomy haemorrhage was present in one case of bipolar diathermy (n=36, 2.77%) and one case of cold dissection method (n=36, 2.77%). The case was managed conservatively for cold dissection method however the case from bipolar diathermy method needed a transfer to the operation room and bleeding was controlled with bipolar electrocautery under general anesthesia. None of the cases had secondary haemorrhage. No significant difference was found between these two methods in terms of post-tonsillectomy haemorrhage. The technique used for the tonsillectomy did not influence the time of discharge of patients in our study. In a study done by Kirazli T et al[21] there was no postoperative haemorrhage and similarly another study done by Silveria et al[4] and Mofatteh MR[22] reported one case of postoperative haemorrhage in each group, which is similar to our study. This study shows that the bipolar diathermy tonsillectomy technique is a safe procedure and does not increase the postoperative morbidity.

LIMITATIONS: The limitation of this study was we did not compare the intraoperative bleeding and post-operative haemorrhage relative to the indication of tonsillectomy.

CONCLUSION

Bipolar diathermy is a safe technique of tonsillectomy. It reduces intra operative time and intraoperative blood loss without increasing postoperative morbidity when compared to conventional cold steel dissection tonsillectomy. As a result, we recommend bipolar diathermy dissection as the most suitable alternative method to cold dissection tonsillectomy in all patients.

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