

Comparison of Outcomes in

Diathermy versus Dissection Method

Diathermy VS
Dissection Method
Tonsillectomy

Tonsillectomy at a Tertiary Care Hospital in Karachi

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ABSTRACT

Objective: Over the years, various methods of tonsillectomy have been practiced to reduce or eliminate intra-operative and post-operative morbidity. The objective of this study is to compare outcomes in diathermy versus dissection tonsillectomy in a tertiary care hospital of Karachi.

Study Design: Comparative Randomized double blind study

Place and Duration of Study: This study was conducted at the Jinnah Medical College Hospital, an affiliated hospital of Jinnah Medical & Dental College, Karachi, Pakistan from August, 2019 to January, 2021.

Materials and Methods: The total number of patients enrolled in the study were 100 with ages ranging between 4 to 28 years old (mean age 11.2 ± 2.1 years). Patients were then randomly divided into two equal groups of 50 patients each; group A consisting of diathermy tonsillectomy while group B comprising of dissection tonsillectomy. During and after surgery different parameters were measured including post-operative earache, excessive thick slough formation in the tonsillar fossa, fever, duration of analgesic use, time of return to a regular diet, operating time, blood loss during surgery, post-operative hemorrhage and post-operative pain scores.

Results: The mean pain score of both the groups in immediate post-operative period (7.96 ± 0.9 vs 7.63 ± 0.8) and 24 hours period (6.78 ± 1.1 vs 6.12 ± 0.9) was almost the same while pain score at 7th post-operative is significantly high in diathermy group (5.47 ± 0.9 vs 2.55 ± 0.8). 4% of Diathermy patients suffered from secondary bleeding and none of the Cold Steel patients had such complaint (p- value 0.056). Mean operating time was shorter in diathermy group (21.7 ± 2.1 vs 28.4 ± 2.4 minutes) and intra-operative blood loss was also less in diathermy group (15.5 ± 3.1 vs 98.1 ± 9.4 ml).

Conclusion: We conclude that cold steel tonsillectomy has better patient outcomes as compared to diathermy, however diathermy method has less operating time and less intra-operative bleeding.

Key Words: tonsillectomy, diathermy tonsillectomy, cold Steel tonsillectomy, post-operative complications

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INTRODUCTION

Tonsillectomy is one of the most commonly performed surgical operation in ENT practice and nearly 530,000 children younger than 15 years are operated annually in United States of America.¹

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Over the years, various methods of tonsillectomy have been practiced and oriented around reducing or eliminating both intra-operative and post-operative morbidity in the patients.² These methods include blunt dissection, laser, electro-cauterization, electrosurgical scissors, ultrasonic dissection and coblation. Tonsillectomy is a day-care surgical procedure hence requiring efficient pain and bleeding control postoperatively.³ The two most commonly used methods include; bipolar diathermy scissors and harmonic scalpel. The bipolar diathermy method is unique in this technique of coagulating and cutting the tissue simultaneously by applying an electrical current in the scissor hands.⁴ Whereas in a harmonic scalpel, it vibrates at a frequency of 55.5Hz generation pressure that divides the tissue. In this method there is minimal damage to the tissue because the division is at the cellular level by degeneration of proteins.⁵ According to the study by East and Central African Journal of Surgery, the average time required to remove a tonsil by cold dissection was found to be longer than that for diathermy tonsillectomy.⁶

Regardless of the methods used however, intra-operative blood loss, postoperative hemorrhaging and postoperative pain remain a considerable challenge for both the surgeon and the patients. It has been studied that back in the nineteenth century, surgeons used chemicals such as tanno-gallic acid and silver nitrate or even icing was used.⁷ Bleeding has been one of the complications that is always greatly concerning, it may be intra-operative, or post-operatively which can be further divided into reactionary if within 24 hours or secondary if after the first 24 hours usually occurs between 5 to 10 days post-operatively.

Numerous comparative studies have been done on diathermy and dissection method that showed variable results.^{8,9} Common postoperative morbidity of tonsillectomy operations are pain and hemorrhage. Hemorrhage after tonsillectomy operation is potentially a lethal complication.^{10,11} This study was conducted with the aim to see differences in outcomes and post-operative pain and hemorrhage between the two groups of diathermy and dissection method tonsillectomy.

MATERIALS AND METHODS

This comparative randomized double blind study was conducted at Jinnah Medical College Hospital, an affiliated hospital of Jinnah Medical & Dental College, Karachi, Pakistan. The study commenced in January 2019 and proceeded till August of 2021. The data collection was done via questionnaires filled by the surgeon at the time of admission and post operatively on follow up visits in outpatient clinic. Approval from the hospital ethical review committee (ERC) was taken before the start of the study and informed written consent was taken from each patient. Inclusion criteria were all consecutive patients operated for tonsillectomy during this period in our hospital. Exclusion criteria were; patient with combined adenoidectomy and tonsillectomy, patients lost for follow-up, patients with any other systemic, hematologic or neurologic problem and patients not giving written consent for inclusion in this study.

The total sample size was 122 patients out of which 22 patients were lost to follow up with actual sample size of 100, who were to be operated for tonsillectomy exclusively. The patients with chronic or recurrent tonsillitis in spite of adequate medical therapy or tonsillar hypertrophy causing obstructive airway sleep apnea, odynophagia and speech abnormalities were selected. Detailed history and clinical examination was done followed by laboratory studies including complete blood count, coagulation profile (activated partial thromboplastin time, prothrombin time), and HBsAg and Anti HCV markers. Patients were then divided into two groups randomly; group A, consisting of 50 total patients operated with diathermy method and the group B, consisting of 50 patients operated with dissection/cold steel method.

During and after surgery different parameters were measured including post-operative earache, excessive thick slough formation in the tonsillar fossa, fever, duration of analgesic use, time of return to a regular diet, operating time, blood loss during surgery, post-operative hemorrhage and post-operative pain scores. The post-operative pain level was scored from 1 to 10 using the visual analog score (VAS). The data was analyzed on SPSS 20.1 using non-parametric tests such as chi-square and T-tests and p-value of <0.05 was considered significant.

RESULTS

Over the period of study, a total of 100 out of 122 patients were compliant and came for follow up, out of these 50 had undergone cold steel surgery and the rest 50 had diathermy removal of their tonsils. Mean age in diathermy and dissection tonsillectomy groups was 10.8 ± 2.1 years and 11.5 ± 1.9 years respectively. In cold steel group 52% of the patients were female whereas in diathermy group 58% were females [Table 1]. About 77% and 60% presented with recurrent infection in each group respectively however none of the patients suffered from any co morbidities. The use of ligature of the pedicle was applied in all of cold steel surgeries but in none of the diathermy procedure.

All the parameters and their values are shown in table 2. Cold steel procedure showed a higher mean operative time of 28.4 ± 2.4 minutes as compared to the 21.7 ± 2.1 minutes in diathermy tonsillectomy. Intra-operative mean blood loss was 15.5 ± 3.1 ml in diathermy group as compared to 98.1 ± 9.4 ml in dissection group. In comparison of post-operative complications in both the groups, 10% of patients who underwent cold steel complained of fever post operatively. Whereas only 8% patients of Diathermy group had this complaint. There was no report of reactionary bleeding post operatively in both groups. However, we see that 4% patients of diathermy group came with secondary hemorrhage post operatively in emergency department requiring admission for further management while none of the Cold Steel patients presented with such a complain (p-value 0.056).

One of the most important parameters regarding the patients' concern we considered while performing this study was the level of pain experienced post operatively. The pain level was scored from 1 to 10 using the visual analog scale (VAS), 1 being the lowest severity and 10 being the worst. We measured pain scores on three occasions; in immediate post-operative period, 24 hours after the surgery and on 7th post-operative day at OPD follow up. Our analysis showed that the mean pain scored of both the groups in immediate post-operative period and 24 hours period was almost the same, for Cold steel the mean scores were 7.63 ± 0.8 and 6.12 ± 0.9 in immediate post-operative period and 24 hour period respectively while

the mean scores were 7.96 ± 0.9 and 6.78 ± 1.1 in immediate post-operative period and 24 hour period for Diathermy group respectively (p value 0.366 and 0.212).

Table No.1: Demography of the groups

	Group A Diathermy Method	Group B Dissection Method
Total number of patients	50	50
Male patients	21 (42%)	24 (48%)
Female patients	29 (58%)	26 (52%)
Male to Female ratio	1:1.38	1:1.08
Minimum age (in years)	4	4
Maximum age (in years)	27	28
Mean Age (in years)	10.8 ± 2.1	11.5 ± 1.9

Table No.2: Measured Parameters in both groups with p-values

	Group A Diathermy Method	Group B Dissection Method	p- value
Earache	28 (56%)	16 (32%)	0.001
Excessive Thick Slough	32 (64%)	14 (28%)	0.021
Fever	4 (8%)	5 (10%)	0.412
Mean Duration for use of Analgesics (in days)	18.5 ± 2.1	13.2 ± 1.8	0.002
Mean Day of return to a regular diet (in days)	19.1 ± 1.9	13.5 ± 1.7	0.000
Mean Operating Time (in minutes)	21.7 ± 2.1	28.4 ± 2.4	0.005
Mean Blood Loss during surgery (in ml)	15.5 ± 3.1	98.1 ± 9.4	0.011
Reactionary hemorrhage	0 (0%)	0 (0%)	0.000
Secondary hemorrhage	2 (4%)	0 (0%)	0.056
Post-operative pain score after recovery	7.96 ± 0.9	7.63 ± 0.8	0.366
Pain score after 24 hours post operatively	6.78 ± 1.1	6.12 ± 0.9	0.212
Pain score after 7 days Post operatively	5.47 ± 0.9	2.55 ± 0.8	0.048

Whereas, the 7th day follow up pain scores showed significant difference in between the groups, cold steel

patients score being 2.55 ± 0.8 and diathermy group had a much higher mean of 5.47 ± 0.9 (p value 0.048). Post-operative earache and excessive thick slough formation in the tonsillar fossae were also higher in diathermy group as compared to dissection method group (table 2).

DISCUSSION

Over the years, tonsillectomy has been performed by cold dissection method, however, with the advent of newer technology surgeons started preferring electrosurgical methods such as diathermy use for dissection and hemostasis which gave better control of intra-operative hemorrhage. Traditionally, cold surgical dissections have been performed with the use of a scalpel under the use of general anesthesia during a procedure lasting approximately 45 minutes to an hour. However, in more recent decades, many new types of surgical procedures have been found to be both effective and undemanding. Some of these applied procedures are diathermy (electro-dissection or electro-cauterization), electrocautery, harmonic scalpel, laser ablation and much more.¹² Although many different methods have been studied for the removal of tonsils, the two most common techniques found are dissection with cold dissection and electro-cauterization. Regardless of the methods used however, intra-operative blood loss, postoperative hemorrhaging and postoperative pain remain a considerable challenge for both the surgeon and the patients.

Although, several techniques and attempts have been made by the use of electrocautery tools (which are developed as an alternative to traditional cold dissection), a significant reduction to postoperative pain has yet not been reported. Oko et al conducted a study that compared cold dissection tonsillectomy to ultrasonic scalpel tonsillectomy and according to their study cold dissection cause less pain during the initial days.¹³ Whereas, our study results demonstrated that the pain score levels during the early days after surgery were equal but later on pain score is significantly lower in dissection tonsillectomy. According to Pinder et al, and their detailed review and comparison, it was concluded that there isn't strong enough evidence to support one method of tonsillectomy over another when considering post operative bleeding.¹⁴ Their data concluded that there weren't any differences in hemorrhages in either primary or secondary hemorrhages in the different types of tonsillectomy methods. However in case of pain they did conclude that evidence favors monopolar diathermy dissection to result in more post-operative pain. Our study showed comparatively less rates of post operative hemorrhages when being compared to previous studies conducted. A report demonstrated a rate of 0.2-2.2% primary and 1% to 3.3% secondary hemorrhage after tonsillectomy.¹⁵ Another study demonstrates that despite the various

choices available, the rate of post tonsillectomy bleeding still remains in the range 0.28 to 20%.¹⁶ Hemorrhage after tonsillectomy remains a matter of concern as it may result in readmission of the patients and further management measures to control the bleeding.

The concept of electro-dissection was first described by Goycloea in 1982 using monopolar diathermy and 10 years later Pang reported the first electro-dissection tonsillectomy using the bipolar forceps.¹⁷ The surgical technique of bipolar diathermy or electro-cautery is similar to Coblation method or electro-dissociation. In both methods, an alternative current passes between the active electrodes on the tip of the device which causes the destruction of the target tissue adjacent to the electrodes.¹⁸ In bipolar diathermy, direct contact between electrodes and tissue produces local temperatures of 400°C to 600°C resulting in the heating of intracellular contents and subsequent vaporization of the cell.¹⁹

Intra-operative blood loss is an important parameter for surgeon as well as for patient's post-operative morbidity. The obvious advantage of diathermy over dissection method is less intra-operative bleeding. In our study also there is less mean intra-operative blood loss in group where diathermy method was used (mean blood loss of 15.5 ml vs 98.1 ml). This is much similar with a study conducted at Saudi Arabia showing mean intra-operative blood loss of 25.37 ml with diathermy method vs 88.45 ml with dissection tonsillectomy.²⁰ Similarly another advantage of diathermy tonsillectomy is the surgical operating time which is much shorter. In our study mean operating time for diathermy method is 21.7 minutes in contrast to 28.4 minutes in dissection method tonsillectomy. This finding is also much similar to other studies like in one local study from Faisalabad where mean operating time for diathermy method was 13.09 minutes versus 24.94 minutes in dissection method tonsillectomy.²¹

Although, there is obvious advantage of intra-operate blood loss and operating time with diathermy tonsillectomy but post-operative pain and increased incidence of secondary hemorrhage are marked limitations or disadvantages of diathermy tonsillectomy.²² In our study post-operative pain scores on 7th day are much higher in diathermy group than dissection group. Similarly incidence of secondary hemorrhage was around 4% in diathermy group versus 0% in dissection group. We also compared the mean time for return to a regular diet which is also much shorter in dissection group. Similarly duration for use of analgesics after surgery was also much shorter in dissection group than diathermy group. Post-operative earache and thick slough formation in the tonsillar fossa were also less in the dissection group. So these are the clear advantages of dissection method as compared to diathermy method.

CONCLUSION

We conclude that cold steel tonsillectomy has better patient outcomes as compared to diathermy, however diathermy method has less operating time and less intra-operative bleeding.

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