



A Comparative Study of Conventional Tonsillectomy versus Coblation Tonsillectomy

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Abstract

Aim: To compare and study the advantages of conventional (Dissection and snare method) Tonsillectomy versus coblational tonsillectomy with regards to Intraoperative time, Intraoperative blood loss, Post-operative pain and early return to normalcy.

Objective: Prospective study to systemically analyze the advantages of conventional (Dissection and snare method) Tonsillectomy versus coblation tonsillectomy with regards to intraoperative time, intraoperative blood Loss and Post-operative pain and outcomes.

Study Design: It is a prospective cohort study analyzing 50 patients who were divided into 2 groups each group comprising of 25 patients. Group-I were analysed with regards to conventional tonsillectomy with group-II who underwent coblational tonsillectomy based on peroperative bleeding, per operative time, postoperative pain, and return to normalcy. Every patients were tested on basic blood investigations including complete blood count, renal function test, bleeding time, clotting time, urine routine, X-ray soft tissue skull, Diagnostic nasal endoscopy to rule out adenoids, HIV, VDRL and With prior preoperative anesthetic assessment. Every patient on the day of operation was given preoperative antibiotics and underwent surgery under General anesthesia. On the table per operative time and amount of bleeding were noted. Postoperatively all patients were put under IV antibiotics on 1st day and oral antibiotics from next day for subsequent 3 days. Postoperative pain (visual analogue scale), early diet intake and return to normalcy were recorded into statistical data.

Conclusion: Cost effectiveness, surgical skills and microscopical settings were three main disadvantages with the coblation method. Coblation method was found to be superior to conventional method using systemic criteria based on this prospective analysis.

Keywords: Tonsillectomy, Coblational tonsillectomy, Radiofrequency.

Introduction

Tonsillectomy is one of the oldest and most commonly performed otolaryngological procedure in worldwide. With the advent of newer antimicrobial therapy and surgical techniques preoperative and postoperative complications were reduced to minimal. Two important methods of tonsillectomy were the hot and cold methods. Of which coblation has significant edge over the other surgical methods with regards to the intraoperative and postoperative complications, postoperative pain, early diet intake, reduced preoperative time and returning to normalcy. Of all the different types of tonsillectomies every procedure has got their own advantages and disadvantages, which may be discussed with regards to certain specified criteria.

Palatine tonsils are dense, compact bodies of lymphoid tissue located in the oropharynx. Tonsil presents varying appearance in different subjects or in the same subject at successive ages. The tonsillar pillars are formed from 2nd and 3rd branchial arches, through dorsal extension of mesenchyme forming soft palate. Tonsillar crypts are developed on 3-6 months of intrauterine life as a solid ingrowth from surface epithelium. They branch, rebranch and even regress after birth. Intra tonsillar cleft represent remaining of second pharyngeal pouch. Lymphocytes appear near the epithelium during 3rd month but organize to nodular form after 6th months. By 5th month, the tonsillar capsule is formed by mesenchyme.

Chronic inflammation of the tonsils which usually starts following acute inflammation. Crypts of inflamed tonsil are filled with organism and chronic inflammatory cells, exudates and debris. Lining epithelium gets denuded, minute abscess walled off by chronic inflammatory cells present in parenchyma. Reduction of barrier functions including production of immunoglobulin-A.

Materials and Methods

Inclusion criteria

Chronic tonsillitis, recurrent tonsillitis not responding to medical management and Patients in the age group of 12-50 years.

Exclusion Criteria

Acute infections, Aneurysm of carotid artery, Adenoid hypertrophy, Bleeding and clotting disorders, Cervical spine pathology, Chronic sinusitis, Diphtheritic tonsillitis, Patients on anticoagulant therapy.

Study Design

The Study is a prospective cohort study analyzing 50 patients who were divided into 2 groups each group comprising of 25 patients. Group-I were analysed with regards to conventional tonsillectomy with Group-II who underwent coblation tonsillectomy. Criteria's like preoperative bleeding, per operative time, postoperative pain and return to normalcy were documented. Every patients underwent basic blood investigations including complete blood count, renal function test, bleeding time, clotting time, urine routine, X-ray soft tissue skull, Diagnostic nasal endoscopy to rule out adenoids, HIV, VDRL and With prior preoperative anesthetic assessment. Every patient on the day of operation was given preoperative antibiotics and underwent surgery under general anesthesia.

On the table per operative time and amount of bleeding were noted. Post operatively all patients were put under IV antibiotics on 1st day and oral antibiotics from next day for subsequent 3 days. Postoperative pain (visual analogue scale), early diet intake and return to normalcy were recorded into statistical data.

Conventional Tonsillectomy Method by Dissection and Snare

Under General anaesthesia, with cuffed endotracheal tube into the trachea, using Boyle dav is mouth gag, mouth was opened, using tonsil holding vassellum, tonsil retracted medially. Using waugh's toothed forceps, incision made in anterior pillar and superior pole junction, through which tonsil was dissected from superior pole to inferior

pole using tonsillar dissector. In the inferior pedicle is snared using Eve's tonsillar snare, tonsil was crushed and removed. Bleeding sites were identified and ligated. The usage of evestonsillar snare was to crush the pedicle. During the

procedure the amount of blood loss was calculated from both the suction and previously weighed cotton balls. Time was noted from using Boyle davis mouth gag to removal of both tonsils until hemostasis is achieved (Fig. 1).

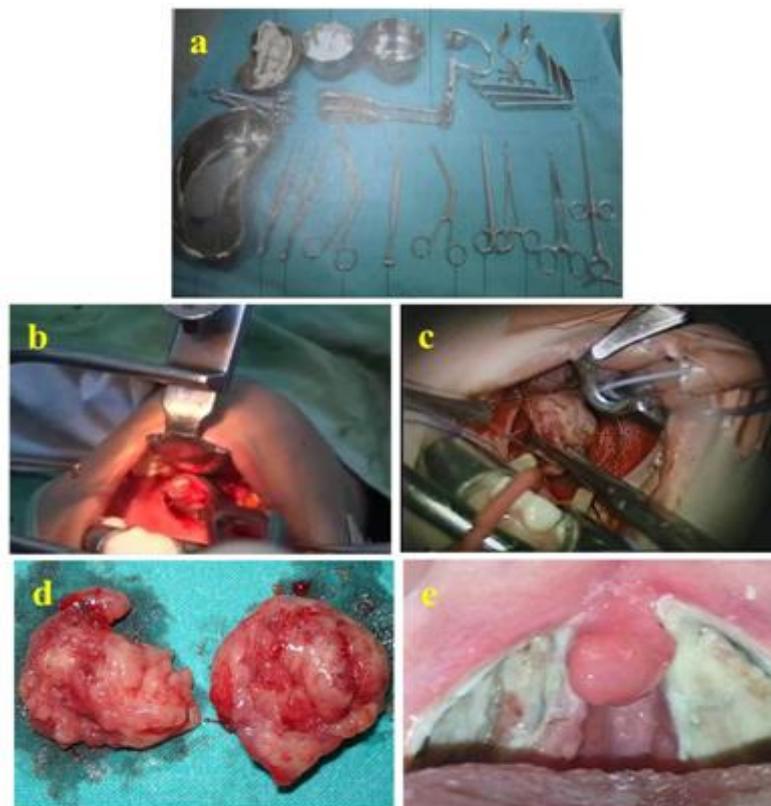


Fig. 1. Conventional Tonsillectomy Method. (a). Instruments used in Tonsillectomy (Boyle Davis mouth gag with tongue blade, Dennis Browne tonsil holding vassellum, Mollison's anterior pillar retractor and tonsil dissector, Eve's tonsillar snare, Yankauer's suction tube, Negus knot tier. (b). Conventional method of tonsillectomy by Dissection and snare method. (c). Using eves tonsillar snare the inferior pedicle was snared. (d). Specimen obtained using Conventional Tonsillectomy. (e). Postoperative day 2: Tonsil fossa – free, healthy slough covered fossa

Coblation Tonsillectomy Method

Surgical procedure done using microscope under general anaesthesia with controlled ablation of dissociating tissue using a plasma based radio frequency (RF) device with removal of defined volume of tissue (ablation) or passing high frequency of current with denaturation of tissue protein and collagen (tissue coagulation), breaks molecular bonds excising or dissolving soft tissues at relatively low temperature typically 40°C to 70°C thereby preserving the integrity of surrounding healthy tissue and subsequent

hemostasis using specialized coblation wands. (specification)

During the procedure the amount of blood loss was calculated from both the suction apparatus and previously weighed cotton balls with fully blood soaked cotton balls taking weight in to consideration. Each fully soaked cotton balls weighs 2 ml of approximated blood value. The amount of blood loss is calculated from blood soaked cotton balls X No. of cotton balls used. Coblation technology works with a Voltage of 150- 250 volts and a radio frequency excitation of

frequencies ranging from 100 to 500 KHz. Within the electric field current density exceeds the heat of vaporization of fluid and dissipates due to thermal conduction increasing the electrical field of around 300 volts fragmenting the water

molecules and plasma. In this manner target tissue is effectively dissolved or volatilized in a low temperature with a minimal or no damage to surrounding tissue (Fig. 2).

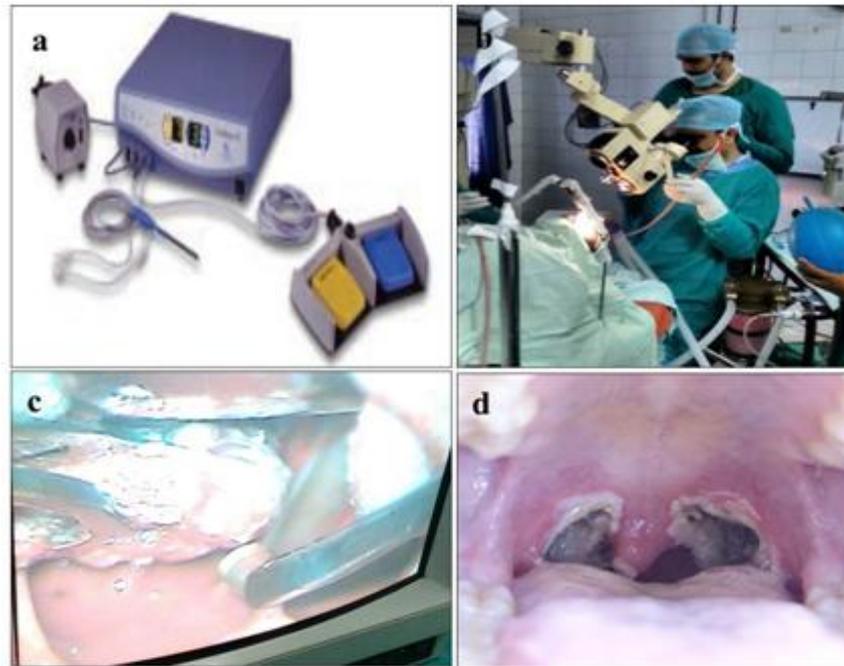


Fig. 2. Coblation Tonsillectomy Method. (a). **Coblation System** (Wand with Electrode Configuration (Wand – Evac - 70), Voltage Controller Setting, Impedance (Surface Area Controlling System), Coagulation Controlling System). (b). Coblation method of tonsillectomy using microscope under general anaesthesia with e- vac 70 tonsillar wand. (c). Under microscopy with TV monitor shows tonsil removed by controlled ablation method in our hospital. (d). Second Postoperative Day Following: Coblation tonsillectomy showing healthy tonsillar fossa.

Results

In this study 50 patients were selected and divided into two groups each group consisting of 25 patients arranged randomly using lot system. Group-I (Conventional) and Group-II (Coblation tonsillectomy). Tabulations were made under the following headings Age Group Distribution, Gender Wise Distribution, Study subjects distribution according to surgery, Age wise distribution according to surgery and Gender wise distribution according to surgery. Among the age distribution 35 patients were under 20 years of age contributing to 70% of total study group. The next highest age group was between 21to30 years contributing 24% of the total study group. Among the gender wise distribution of the 50 patients in

this study group, 33 were male contributing 66% and 17 were female contributing to 34% of the total study group. In this study age group between 31to40 had only one patient contributing to just 2% and between age group 41to50 had only 2 patients contributing to 4% of the total. The bulk of the patients belonged to age group 12to20 showing reduced incidence of chronic tonsillitis with the advancing age (Table. 1).

Specimens of post tonsillectomy were also sent for histopathological examination for all the cases. All the results with histopathological examination showed features of chronic tonsillitis only thereby avoiding bias in this study. Among the gender wise distribution of the total study group of 50 patients 33 patients were male and 17 patients

were female. The percentage wise distribution was 66% for males and only 34% were females. This gender wise distribution shows the common occurrence of chronic tonsillitis being more in males than females (Table. 1).

According to surgery wise distribution, 50% were under conventional group and 50% were under coblation group so that 25 cases were in group-I, under conventional Tonsillectomy and 25 cases were grouped in group-II under Coblation Tonsillectomy (Table. 1). Among the surgery wise distribution of the age group almost 72% were in the age group of 12to20 years in the conventional group and 68% were in the coblation group. In the age group 21to30, four patients were included in the study contributing to 16% in the group-I and 8 patients were included in the group-II contributing to 32% of the total. In the age group of 31to40, one patient was included in the group-I

contributing to 4% of the total and no patients were included in the group-II. In the group 41to50, two patients were included in the group-I contributing to 8% of the total and no patients were included in the group-II. So this age wise distribution with regards to surgery shows almost 70% were within the age group of 11to20 indicating the commonest occurrence of chronic tonsillitis between the above mentioned age group (Table. 1). The results shows almost 19 patients were male in the conventional group contributing to 76% and 6 were females contributing to 24% of the total patient. In the group-II 14 patients were male contributing to 56% and 11 were females contributing to 44% of the total. The results shows majority of the patients who underwent surgery were males both in group-I and group-II (Table. 1).

Table. 1. Age and gender wise distributions

Age Group Distribution		
Age (years)	Number	Percentage (%)
12 – 20	35	70
21 – 30	12	24
31 – 40	1	2
41 – 50	2	4
Total	50	100
Gender Wise Distribution		
Gender	Number	Percentage
Male	33	66
Female	17	34
Total	50	100
Study subjects distribution according to surgery		
Surgery	Number	Percentage (%)
Conventional	25	50
Coablation	25	50
Total	50	100
Age wise distribution according to surgery		
Age (Years)	Conventional method (%)	Coablation method (%)
11 – 20	18 (72)	17 (68)
21 – 30	4 (16)	8 (32)
31 – 40	1 (4)	-
41 – 50	2 (8)	-
Total	25 (100)	25 (100)
Gender wise distribution according to surgery		
Gender	Conventional method (%)	Coablation method (%)
Male	19 (76)	14 (56)
Female	6	11
Total	25 (100)	25 (100)

Among the intra operative time between conventional and coblation tonsillectomy the range was between 20to35 minutes in the group-I and 14to27 minutes in the group-II. Mean range was 27.52 (\pm 0.62) for conventional and 18.44 (\pm 0.70) for the coblation with the T stat of 9.694. The results shows the lesser range of time for coblation tonsillectomy with an even lesser mean value showing lesser intraoperative time and early return to normalcy with a lesser intraoperative anaesthetic complication with coblation tonsillectomy (Table. 2). Among the intra operative blood loss, for conventional tonsillectomy it was in the range of 35.5 to 62.5 with mean of 46.27 and for coblation tonsillectomy it was in the range of 20 to 39 with the mean of 27.17 (Table. 2).

Commonest complications encountered during the surgery were preoperative hemorrhage, including reactionary hemorrhage, postoperative pain, delay in swallowing, Postoperative fever, tonsillar remnants etc. In our study we encountered seven complications one patient in group-I had reactionary hemorrhage which was controlled with adequate care with ligation of bleeding point using bipolar cauterization under general anesthesia. Two patients had minimal tonsillar remnants both of them belong to group-I. Postoperative pain was the most common complication encountered in the study. In the group-I one patient had severe and persistent postoperative pain which was treated with intramuscular and oral analgesics. In the group-II 3 patients had persistent postoperative pain in the third day which was treated with intramuscular and oral analgesics. The postoperative pain in group-II was due to tissue fibrosis without scarring which may be one of the important problems that may be encountered with coblation tonsillectomy. The postoperative pain encountered during coblation tonsillectomy was readily treated

with intramuscular and oral analgesics only (Table. 2).

Severity of pain was assessed using visual analogue scale (VAS) and the results showed the following. The visual analogue score was an objective score using patients words categorizing in to mild (0-4), moderate(5-8) and severe (9,10). In the first post operative period nine patients in the group-II encountered mild pain and nil in group-I. 20 patients in group-I had moderate pain and 15 patients in group-II encountered moderate pain with chi square value of 12.38 with a P value of 0.0025 patients in group-I had severe pain and only one patient had severe pain on day one in the group-II. The table results showed lesser occurrence of severe pain on day 1 in group-II (Table. 2).

In the second postoperative day 18 patients had mild pain in the group-I and 23 patients had mild pain in the group-II. 7 patients had moderate pain in group-I and 2 patients had moderate pain in group-II on second postoperative day with chi square value 3.39 and P value of 0.69. No patient had severe pain in both the groups on the second postoperative day. The below results shows most of the patients had only mild pain during second postoperative pain and only nine of them encountered severe pain on the 2 postoperative day and none had severe pain (Table. 2).

In the 3 Postoperative day 25 patients encountered mild postoperative pain in the group-II and 4 patients encountered mild pain in the group-I. 20 patients in the group-I had moderate pain and one had severe pain in the 3 postoperative day with chi square value 36.21 and P value of 0.0001 (Table. 2). In the group-II none of patients had both mild and moderate pain. This below results shows moderate to severe pain in the group-II than with group-I indicating better tolerance and superiority of coblation over conventional method (Table. 3).

Table. 2. Conventional and cobalation tonsillectomy, Severity of pain in the postoperative period (1st and 3rd day), Severity of pain in the postoperative period (Group-I and Group-II)

Intraoperative time for conventional tonsillectomy versus cobalation tonsillectomy.				
Procedure	Range (mins)	Mean (SE)	T stat	P Value
Conventional	20 – 35	27.52 (± 0.62)	9.694	0.0001
Coablation	14 – 27	18.44 (± 0.70)		
Intraoperative estimated blood loss for conventional tonsillectomy versus cobalation tonsillectomy				
Procedure	Range (ml)	Mean (SE)	T stat	P Value
Conventional	35.5 – 62.5	46.27 (± 7.6)	10.653	0.0001
Coablation	20 – 39	27.17 (± 4.8)		
Severity of pain in the postoperative period among the study groups (1st Post operative day)				
Visual Analogue Scale (VAS)	Group-I	Group-II	Chi square	P value
Mild	0	9		
Moderate	20	15	12.38	0.002
Severe	5	1		
Severity of pain in the postoperative period among the study groups (2nd Postoperative day)				
Visual Analogue Scale (VAS)	Group-I	Group-II	Chi square	P value
Mild	18	23		
Moderate	7	2	3.39	0.069
Severe	-	-		
Severity of pain in the postoperative period among the study groups (3rd Postoperative day).				
Visual Analogue Scale (VAS)	Group-I	Group-II	Chi square	P value
Mild	4	25		
Moderate	20	0	36.21	0.0001
Severe	1	0		

Table.3. Severity of pain in postoperative days in Conventional and Coablation procedure between two groups

Change in severity of pain in postoperative days in Conventional procedure group				
Visual Analogue Scale (VAS)	1 st POD	3 rd POD	Chi square	P value
Mild	0	4		
Moderate	20	20	6.67	0.035
Severe	5	1		
Change in severity of pain in postoperative days in Coablation procedure group				
Visual Analogue Scale (VAS)	1 st POD	3 rd POD	Chi square	P value
Mild	9	25		
Moderate	15	0	23.53	0.0001
Severe	1	0		

Discussion

Coblation tonsillectomy is still considered to be one of the newer techniques among tonsillectomy procedures and noted to be the bridge between cold and hot methods. This study was performed to compare and study the advantages of conventional (Dissection and snare method) Tonsillectomy versus coblation tonsillectomy with regards to Intraoperative time, Intraoperative blood loss, Post-operative pain and early return to normalcy. Though the age group and gender

groups are almost similar in both groups the results compared with records to the following criteria showed variable yielding.

Among the complications compared, expect for the postoperative pain coblation method seem superior in all aspects with regards to per operative time, intra operative bleeding, early swallowing and lesser stay in the hospital and less complication. The only complication encountered in this study with coblation is postoperative pain in the 3rd and subsequent postoperative days the

reason for which may be due to surgical fibrosis with coblation method. But the mean average pain score was less in group-II in our study. With the other criteria's coblation definitely had an edge over conventional tonsillectomy.

In our study group-II (coblation) shows better tonsillar fossa healing, lesser operative time, less amount of preoperative bleeding, early return of normal activities. Comparative pain by visual analogue scale, coblation was superior to conventional method. But study variation depends on tolerance of the individual. With Postoperative early return of normal activities, coblation is superior to conventional method. In the study by Silvola et al., (2011) 80 patients were included and divided into equal groups for whom the average intraoperative time was 30 min for conventional and 15 min for coblation and postoperative bleeding was 14 ml for conventional and 11 ml for conventional in comparison with our study mean average time duration almost equal but the postoperative bleeding in both groups was found to be lesser.

Lee et al., (2004) reported that 48 patients were included in the study group the mean average intraoperative time was 25 min for the group-I and 17.9 for group-II which was almost comparable with our study the average intraoperative bleeding was 27 ml for group-I and 20 ml for group-II which was found to be lesser than our study. In the study Sezen et al., (2008) 125 patients were included in the group with a mean average intraoperative time of 36.4min for group-I and 21.5min for group-II which on comparison our study was found to be better average intraoperative bleeding was 32.4ml for group-I and 17.28ml for group II which was comparable with our study.

Divi and Benninger, (2005) reported that 81 patients were included with mean operative time of 22.67min in group-I vs 22.23min in group-II which is comparable with our study the mean intraoperative bleeding of 16ml in the conventional method and no measurable bleeding in group-II which was better than in our study.

Stavroulaki et al., (2007) stated that 32 patients were included with mean operative time of 21min in group-I and 14.5min in group-II which was comparable with our study the mean intraoperative bleeding of 58ml in group-I and 9.4ml in group-II which was better than in our study. So on comparing the above study with our study showed better per operative bleeding, intraoperative bleeding, return to normalcy and the average pain by visual analogue score (VAS) which is an objective score was found to be superior in coblation method than conventional method.

Preoperative time consumption and intra operative bleeding were very minimal with coblation method than with the conventional method. Post operatively early diet intake and lesser hospital stay were other advantages of coblation method over conventional method. Postoperative pain using symptomatic and visual analogue score were equal with the coblation and conventional method of tonsillectomy, but the average postoperative pain by visual analogue score was lesser in coblation method. Cost effectiveness, surgical skills and microscopical settings were three main disadvantages with the coblation method. Coblation method was found to be superior to conventional method using systemic criteria based on this prospective analysis.

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