

# Newer Methods of Tonsillectomy as Compared to Conventional Dissection Method

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## Abstract

Tonsillectomy is old surgical procedure that has evolved to a more safe method that has lesser complications with little or no morbidity and mortality.

**Aim:** this was comparative study which compared the old dissection tonsillectomy method and the newer method of tonsillectomy (ultrasonic scalpel and Laser tonsillectomy method).

**Methodology:** Equal number of patients both in age and sexes had conventional dissection tonsillectomy method, ultrasonic scalpel method and laser methods of tonsillectomy. The surgical outcomes of these methods of tonsillectomy were compared base on intra and postoperative findings.

**Result:** Ultrasonic scalpel method had the least intraoperative blood loss; the scores showed that there was a statistically significant pain in laser tonsillectomy method and that the pain was least in ultrasonic scalpel tonsillectomy method with a P value of <0.001.

**Conclusion:** Conventional tonsillectomy method is the most preferred tonsillectomy method in developing world.

**Keywords:** Conventional dissection tonsillectomy; Ultrasonic scalpel tonsillectomy; Laser tonsillectomy

## Introduction

A new technique for tonsillectomy method should be comparable to or better than the existing techniques. An ideal tonsillectomy should have little or no morbidity, easily available and cost effective with little or no surgical complications. It should preferably if possible, be a painless surgery and allow a more early return to normal diet and daily activity.

Cornelius ceisus was the first to report removal of tonsils dated back to first century A.D. almost 2000 years ago [1,2]. He enucleated the tonsil with his fingernails [1]. He obtained haemostasis using a vinegar mouth wash and painting the tonsillar fossa with medication. Crowe et al. described the first meticulous surgical dissection technique using sharp instrumentation in 1917 [3]. Ochi et al. described the first use of ultrasonic scalpel in human tonsillectomy in 2000 [4].

Einstein postulated the theoretical foundation of laser action, stimulated emission of radiation, in 1917 [5]. Maiman built the first laser in 1960 with synthetic ruby crystals [6]. This produced electromagnetic radiation at a wavelength of 0.69 μm in the visible range of spectrum. In 1965 the CD's laser was developed, in 1968 Polanyl developed the articulated arm to deliver the infrared radiation from the CO<sub>2</sub> laser to remote targets [7].

## Various methods of tonsillectomy:

- 1) Guillotine method
- 2) Blunt dissection method
- 3) Cryo tonsillectomy
- 4) Laser tonsillectomy
- 5) Tonsillectomy by Electro cautery
- 6) Ultrasonic scalpel tonsillectomy
- 7) Tonsillectomy by Microdebrider
- 8) Tonsillectomy by Coblation technique

(Bipolar radiofrequency ablation)

9) Tonsillectomy by Monopolar radiofrequency ablation

**Aim:** To compare the outcome of intraoperative and postoperative methods of tonsillectomy in the newer methods (Laser and Ultrasonic scalpel tonsillectomy) of tonsillectomy and conventional dissection tonsillectomy method.

## Materials and Methods

This was a prospective and comparative study of conventional (dissection method) and newer methods (ultrasonic scalpel and laser) of tonsillectomy. Our institution being a research institute as at the time of the study has no separate review board for this very work but the study was supervised by the most senior consultant of the hospital. It was conducted at the KKR ENT Hospital and Research Institute and the Chinnammal ENT Hospital, Chennai from year 2005 to 2006 and updated in 2012. The KKR ENT Hospital and Research Institute is one of the well known ENT hospitals in south India. Here approximately 2 to 3 tonsillectomies are performed each day. The Chinnammal ENT Hospital is an allied hospital of the KKR ENT Hospital and Research Institute. Here approximately 5 to 6 tonsillectomies are performed in a week. The KKR ENT Hospital and Research Institute is equipped with Carl Zeiss Opmilas CO<sub>2</sub> 30 Laser and Ultrasonic cut 'N' Seal device, where as in the Chinnammal ENT Hospital only conventional method of tonsillectomy is performed. The study was conducted on every

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working day of the week. 50 cases of various ages and sexes were selected for each group. The study population was recruited from consecutive patients who were booked for adenotonsillectomy/tonsillectomy in KKR ENT Hospital and Research Institute and the Chinnammal ENT Hospital, Chennai within the study period. An interviewer administered questionnaire was given to the eligible participant after a detailed informed consent was obtained. The choice of the method of tonsillectomy was determined by patients' choice and financial capability because the cost of surgery for the different methods was not the same. Ultrasonic scalpel tonsillectomy was the most expensive followed by laser tonsillectomy; dissection tonsillectomy method was the least expensive.

**Inclusion criteria:** Tonsillectomy was done for recurrent tonsillitis, obstructive tonsillar hypertrophy with sleep apnoea and Patient's demand for surgery. **Exclusion criteria:** General contraindications for tonsillectomy. All the patients were given the same preoperative and postoperative antibiotics. Intravenous paracetamol was used during preoperative anaesthesia while oral paracetamol was used postoperatively at 15 mg/kg/dose every 4 hours daily for all the participants. All the cases were done under general anaesthesia using the same anaesthetics drugs and technique; no preoperative or postoperative local anaesthesia was used for any of the patients.

In blunt dissection series Boyle Davis mouth gag was applied, tonsil was retracted medially using Dennis Brown tonsil holding vassellum, incision was made by using Waugh's dissection forceps and tonsillectomy was performed by blunt dissection and tonsil was removed by Eve's snare and bleeding arrested with ligatures.

In ultrasonic scalpel tonsillectomy, Ultrasonic cut 'N Seal device was used which is an ultrasonically activated surgical device which can cut and coagulate the vessels or tissues at low temperature, this technology controls bleeding by coaptive coagulation at low temperature ranging between 50°C-100°C [8]. Coagulation occurs by means of protein denaturation when the blade vibrates at 55.5 kHz. This consists of a generator, a hand piece with a connecting cable, a blade system and a foot pedal. Boyle Davis mouth gag was applied, tonsil retracted medially and tonsillectomy was performed using ultrasonic dissection.

In laser tonsillectomy laser beam creates an intense coherent electromagnetic radiation that is frequency specific. CO<sub>2</sub> laser was used in this study. After necessary precautions Boyle Davis mouth gag was applied and tonsil retracted medially. Laser was used in continuous mode with 7-10 Watts and 0.2 mm -0.3 mm spot size. The CO<sub>2</sub> laser is a non contact laser and was used with a microscope and micro manipulators. The tonsil was dissected through the loose fibrous tissue of the capsule and vessels were photocoagulated. In cases requiring adenoidectomy, it was performed by conventional curettage technique.

Duration of surgical procedure was calculated from the time when anaesthetist handed over the patient to surgeon to the time of securing complete haemostasis, excluding the time for adenoidectomy procedure.

In the operating theatre, blood loss was measured by weighing the swabs after use and subtracting the dry weight. The resulting total obtained (1g-1ml) was added to the volume of blood collected in the suction bottle [9,10]. While performing adenoidectomy and securing its haemostasis, separate suction bottle was used. Postoperative bleeding in all the techniques was found to be minimal by adopting meticulous surgery for all the tonsillectomy methods in this study. Avoiding injury to surrounding tissue resulted in minimum slough formation and decrease in post operative complications.

A blinded team member reviewed the patient on the same day of surgery after 6 hrs and on the fifth post operative day. Postoperative pain was recorded using Wong Bakers FACES pain rating scale. The "FACES" pain scale is a visual analogue scale that uses faces rather than a line to identify the level of pain or discomfort that the patient is experiencing [11]. Questionnaires regarding pain, eating, and talking and ear pain were analyzed [12].

## Results

The study was conducted during the year 2005 and 2006 and updated in 2012. The intra operative and postoperative blood loss and operative pain for both newer method of tonsillectomy and the conventional dissection method were compared and analysed using statistical package for social sciences.

The age distribution of the selected cases in all the three techniques showed that the study population was between 4 years to 41 years and most of the cases were in the age group of 10-20 years (Table 1). The mean age was 15 ± 8 years. There was no significant difference in the sex distribution as the males were 77 while the females were 73 (Table 2).

Out of the total 150 patients, 65 patients (43.3%) underwent adenotonsillectomy surgery and 85 (56.6%) had tonsillectomy (Table 3). However, all the cases of adenoidectomy were done by conventional curettage technique and the operative time for the adenoidectomy and blood loss was excluded. There was more intra-operative blood loss in laser tonsillectomy method than the other two methods of the study (Figure 1).

	<10 years	10-20 years	21 -30 years	>30 years
Conventional	12	26	8	4
Ultrasonic scalpel	14	24	7	5
Laser	15	21	9	5

Table 1: Age Distribution.

	Male	Female
Conventional	23	27
Ultrasonic scalpel	28	22
Laser	26	24
Total	77	73

Table 2: Sex Distribution.

	Adenotonsillectomy	Tonsillectomy
Conventional	22	28
Ultrasonic scalpel	20	30
Laser	23	27
Total	65 (43.3%)	85 (56.7%)

Table 3: Surgery Performed.

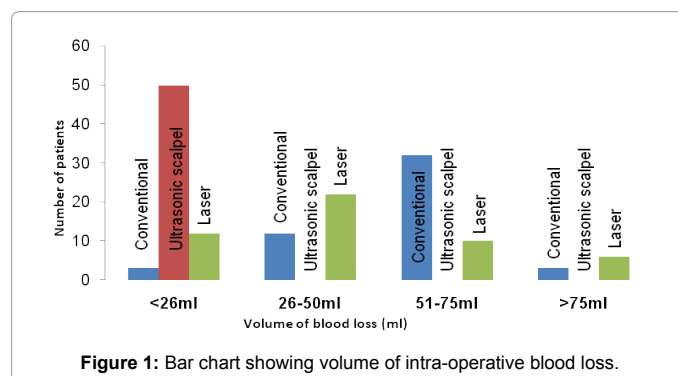


Figure 1: Bar chart showing volume of intra-operative blood loss.

Ultrasonic scalpel method had the least intraoperative blood loss. Post-operative haemorrhage (secondary haemorrhage) was only observed in one patient who had laser tonsillectomy (Table 4). Post operative pain on the day of surgery and the subsequent first-five days was analyzed using Pearson correlation for statistically significant difference in the pain observed in the methods of tonsillectomy. The scores showed statistically significant more pain in laser technique and it was least in ultrasonic scalpel technique with a p value of <0.001 (Figures 2 and 3).

## Discussion

In this our prospective comparative study of tonsillectomy methods, the ultrasonic scalpel tonsillectomy has been shown to dramatically reduce blood loss when compared with blunt dissection tonsillectomy. This was also reported by other studies [13-17]. In the study by Sood et al the average blood loss was about 7 ml and in the study by Michael [14], Oko et al. the average blood loss was about 3 ml in ultrasonic scalpel tonsillectomy and 30.1 ml for blunt dissection tonsillectomy [13]. In our study the mean ( $\pm$  SD) blood loss for conventional dissection method without the use of diathermy electrocautry was 56.3  $\pm$  20 ml while that of ultrasonic scalpel tonsillectomy was 7  $\pm$  3 ml. The amount

of blood loss in laser tonsillectomy was 41  $\pm$  28 ml and significantly less when compared to blunt dissection tonsillectomy and this was again documented by Ishlah et al. [18]. Recent studies documented similar volume of blood loss for conventional dissection method despite the use of diathermy [19,20]. Conventional dissection tonsillectomy has more intraoperative bleeding than the newer method especially when arterial ligation and gauze packing are applied as the haemostasis method. However it is the easiest available and affordable tonsillectomy method both in India and other developing countries. The significant more blood loss of 10-40 ml differences does not make appreciable change in altering the haemodynamic state of the body physiology. Also since both the ultrasonic scalpel tonsillectomy which seems to have the least amount of blood loss needs general anaesthesia like conventional dissection tonsillectomy to be carried out the availability and affordability of the conventional dissection tonsillectomy makes it economically better for health insurance companies and developing countries. Laser tonsillectomy has advantage as an office procedure over conventional dissection tonsillectomy and ultrasonic scalpel tonsillectomy but the cost implication and compliance in children when it is done as office procedure is yet to be reconciled. Moreover, complications of tonsillectomy include secondary hemorrhage. This bleeding following tonsillectomy can be severe and life threatening. Secondary hemorrhage occurs more than 24 hrs after surgery, sometimes as late as 14 days after surgery and is associated with the normal separation of eschar from tonsillar fossa [21]. There were no cases of secondary haemorrhage in our study both ultrasonic scalpel and conventional techniques except in one case of Laser tonsillectomy (Table 4).

	Present	Absent
Conventional	0	50
Ultrasonic scalpel	0	50
Laser	1	49
Total	65 (43.3%)	85 (56.7%)

Table 4: Showing cases Secondary Haemorrhage of seen in all the methods.

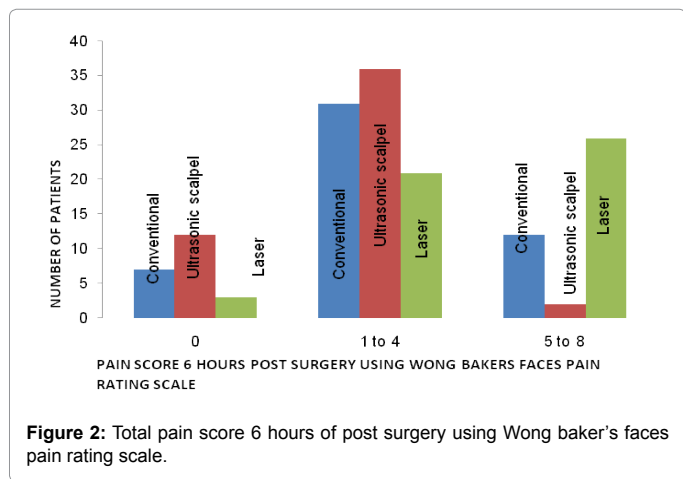


Figure 2: Total pain score 6 hours of post surgery using Wong baker's faces pain rating scale.

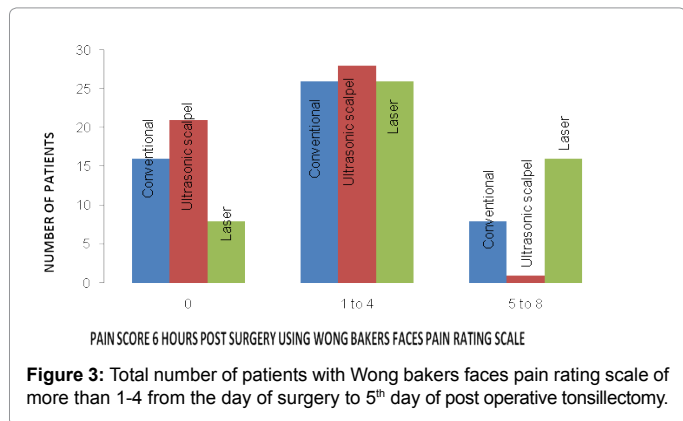


Figure 3: Total number of patients with Wong baker's faces pain rating scale of more than 1-4 from the day of surgery to 5th day of post operative tonsillectomy.

Tonsillectomy remains a painful operation often disruptive of family life for more than a week during convalescence [22,23]. Any technique that would improve recovery would be a significant accomplishment [24]. There is also likelihood that reduced pain and more rapid intake of food would reduce the chances of dehydration, infection and secondary haemorrhage [25,26]. Post operative pain was analyzed in this our study with the help of Wong Bakers pain rating scale and questionnaires. Pain was assessed indirectly by the ability to eat and talk. Pharyngeal pain and ear pain were also noted and total scores analyzed on the day of surgery and subsequent 5 days postoperatively. The scores showed statistically significant more pain in laser technique followed by blunt dissection tonsillectomy and it was least in ultrasonic scalpel technique with a p value of <0.001. This study demonstrates that ultrasonic scalpel tonsillectomy causes statistically significant less pain both on the same day of surgery through the fifth post operative day surgery. Similar results of less post operative pain in ultrasonic scalpel technique were found in other studies [14,16]. Laser tonsillectomy was associated with more post operative pain compared to blunt dissection method and ultrasonic scalpel technique. This was in contrast to the Malaysian study by Ishlah et al., where the total post operative pain was not significantly different between the two groups [19]. In children access to the plane of dissection was easy when compared to adults' tonsils because adult tonsils were more fibrotic. It has been known that fibrotic and the so called chronic tonsillitis which is common among adults bleeds more during tonsillectomy; however in this study we did not observed any significant difference in both the bleeding and the healing experiential in each group. This observation could be due to the fact that the participants in each method were matched for age and sex. The bleeding and time for adenoidectomy was subtracted from adenotonsillectomy time and bleeding to enable us has an unbiased data. There was no significant difference noticed in the postoperative pain found in adenotonsillectomy and tonsillectomy alone. This finding needs a further research to unveil why it was so.

Using post operative pain as a parameter, blunt dissection tonsillectomy also was found to be more beneficial to the patients than Laser tonsillectomy. However the superiority of ultrasonic scalpel tonsillectomy over other methods both in blood loss and postoperative pain and its availability, affordability, technicality and maintenance costs is a big issue of debate/research yet to be concluded. As a developing country; because of the paucity of information on the demographic data of each of these tonsillectomy methods the economic burden of each of these tonsillectomy methods on the country cannot be assessed.

## Conclusion

Conventional dissection Tonsillectomy still remains the safest and best tonsillectomy method in the developing countries.

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