



Original Research Article

Popular techniques in tonsillectomy: A randomised, controlled study

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ABSTRACT

Introduction: Tonsillectomy is one of the commonest operations performed by Otolaryngologists. Various methods of tonsillectomy have been practiced over the century aimed at reducing or eliminating intra-operative and postoperative morbidity.

Aim: To compare the mean operative time, mean blood loss, post operative pain and complications in tonsillectomy using bipolar cautery and diode laser, versus conventional cold steel dissection tonsillectomy.

Materials and Methods: A prospective, randomised controlled study of 90 patients to compare three tonsillectomy techniques: diode laser, bipolar cautery and classical cold dissection, from May 2016 to October 2019.

Results: The operative time, blood loss and pain were significantly lower with tonsillectomy using bipolar cautery and diode laser tonsillectomy than with cold dissection tonsillectomy. Bipolar dissection took the shortest time on an average, whereas blood loss was the least with Diode Laser tonsillectomy. Post operative pain increased in the Laser group by the 5th day.

Conclusion: Both bipolar and diode laser tonsillectomy are associated with significantly reduced blood loss, shorter operative times and less post operative pain compared with cold dissection tonsillectomy. But there was no significant difference seen regarding the postoperative pain when comparing both the surgical methods, by the end of one week.

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1. Introduction

The ideal tonsillectomy procedure should achieve efficient, safe and atraumatic tonsil removal with minimal blood loss and post-operative morbidity. The dissection technique has remained the standard procedure for tonsillectomy for many years till now.¹

However, a wide variety of surgical techniques for tonsillectomy and adenotonsillectomy are now available, and all are essentially safe and effective.^{2,3} Different instruments and technologies used to perform tonsillectomy include lasers, coblation, cryosurgery, bipolar cautery and intracapsular microdebrider. Choosing a technique involves a complex process conducted with the best interests of

our patients in mind. Probably the two most common new techniques are dissection with Laser and bipolar cautery.⁴⁻⁶

Post-tonsillectomy morbidities include pain, primary or reactionary haemorrhage (under 24 hours), and post-operative infection, which can result in secondary or delayed haemorrhage (at over 24 hours). Even though tonsillectomy is one of the most common of all operations performed by otolaryngologists, there is no consensus on the best method of performing it. Our study was done to compare the mean operative time, mean blood loss and post operative pain in conventional cold steel dissection tonsillectomy with diode laser tonsillectomy and bipolar cautery techniques.

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2. Materials and Methods

This was a prospective, randomised controlled study of 90 patients in the age range of 3 to 56 years undergoing tonsillectomy or adenotonsillectomy, performed to compare three tonsillectomy techniques: diode laser, bipolar cautery and classical cold dissection (which served as the control) by the authors in Indiana Hospital and Heart Institute, and Kanachur Institute of Medical Sciences, Mangalore from May 2016 to October 2019. These patients underwent tonsillectomy using various surgical instruments like cold knife dissection, bipolar cautery and Diode laser. Patients with chronic tonsillitis and chronic adenotonsillitis, with no known co-morbidities (such as Diabetes mellitus, bleeding disorders, or immunocompromised status) were included in the study. Those who underwent tonsillectomy for obstructive sleep apnoea were excluded.

After obtaining consent (from adult patients and from parents of paediatric patients), recruited patients were randomised to one of the three study groups depending upon the surgical dissection instrument like bipolar diathermy, laser and cold dissection.

Group 1- Patients undergoing bipolar dissection (n=30).

Group 2- Patients undergoing laser tonsillectomy (n=30).

Group 3- Patients undergoing cold knife dissection (n=30).

The operative time, blood loss, postoperative pain, fossae after one week and two weeks, and any complication was assessed for each method.

All procedures were performed by the first author. Procedures were performed under general anaesthesia with a cuffed oral RAE endotracheal tube. The patient was placed in supine position, with the table head at 20° below horizontal and a sand bag under the shoulders. The mouth was opened with a self retaining Boyle–Davis mouth gag.

Group 1- Bipolar dissection was carried out using the bipolar dissection forceps at a power setting of 15 - 20W for coagulation and cutting modes. The dissection was done along the tonsillar capsule. Control of bleeding was carried out using bipolar diathermy forceps to coagulate the bleeders.

Group 2- In the diode laser tonsillectomy group, the laser machine was set to 6.5W continuous beams for subcapsular dissection which coagulated and sealed off capillary and minor venous bleeders. However, bipolar diathermy was used for arterial bleeding points, especially near the lower pole. The laser beam was delivered via a 0.6 mm Endostat fibre. Routine precautions for the safety of theatre personnel were followed during the use of the laser.

Group 3 - In the control (cold dissection tonsillectomy) group, tonsils were bluntly dissected in the subcapsular plane between the tonsil and the constrictor muscle. After dissecting down to the lower poles, the tonsils were removed using Eve's tonsillar snare.

Haemostasis was achieved by bipolar diathermy at a setting of 15.

Surgical time was measured from the initial incision time to the final haemostasis and removal of mouth gag. Intra operative blood loss was measured by weighing the tonsil swab before and after use, and adding the total so obtained (1gram = 1 ml) to the amount in the suction bottle⁷.

After the procedure, all patients received standard post-operative care and were discharged on the second post operative day with medication sufficient for seven days comprising oral antibiotics, analgesic drugs and gargles. Their pain and discomfort was recorded on a standardised Wong–Baker FACES[®] pain scale. The scale comprises five drawings of faces ranging from happy and smiling with no pain (score 0) to frowning with tears and with severe pain (score 5). In paediatric cases (age > 6 years), this test was administered to the child and their parents by one of the nursing staff who was blinded to the surgical technique used. We had one child who was 3 years old, who was subjectively assessed by the intensity of cries and the refusal to eat.

Patients were mostly discharged on the second postoperative day and reviewed on the seventh or eighth postoperative day to assess the fossa, and they were asked about the pain scores on each side. Complications if any and the side were noted. A second review was done a week later. The cause of the complication, if any, was determined.

3. Results and Observation

Of the 90 patients recruited in this study, 30 patients each were in the bipolar cautery group, diode laser group and in the conventional dissection group.

Among the 90 patients, the minimum age of the patients was 3 years and the maximum was 56 years, 39(43.3%) patients underwent tonsillectomy and 51(56.6%) patients underwent adenotonsillectomy and there were 56(62.2%) males and 34(37.8%) females.

Table 1: Operative time in minutes (n= 90).

Time	Bipolar group	Laser group	Dissection group
Minimum	10	12	15
Maximum	23	35	55
Mean	12	15	25

3.1. Intraoperative time taken

1. Bipolar Group - The mean time for bipolar dissection took 12 minutes
2. Laser Group - The mean time for laser method was 15 minutes
3. Cold knife dissection Group - Mean time taken by cold knife dissection method was 25 minutes.

Table 2: Intra operative blood loss in ml (n= 90)

Blood loss	Bipolar group	Laser group	Dissection group
Minimum	10	5	30
Maximum	50	30	100
Mean	20	10	60

3.2. Intraoperative blood loss

1. Bipolar Group - The mean blood loss for bipolar dissection was 20 ml
2. Laser Group - The mean blood loss for laser method was 10 ml
3. Cold knife dissection Group - Mean blood loss in the cold knife dissection method was 60 ml.

Table 3: The pain scores (VAS) and duration of pain (POD = Post operative Day)

Pain / POD	Bipolar group	Laser group	Dissection group
Day 1 - 2	Mild/ Moderate	Mild	Moderate / Severe
Day 3 - 4	Mild/ Moderate	Mild/ Moderate	Mild/ Moderate
Day 5 - 6	Mild	Mild/ Moderate	Mild/ Moderate
Day 7 - 8	Mild	Mild	Mild

3.3. Post operative pain

1. Bipolar Group - These patients had mild to moderate pain for the first few days, which became mild by the fifth day.
2. Laser Group - These patients reported significantly less pain on the first two days, however pain then increased, peaking by the 5th to 6th day, and then decreasing.
3. Cold knife dissection Group – These patients had moderately severe pain on the first few days which reduced gradually and consistently, till it was mild by the end of the first week.

All patients, irrespective of the technique, had no pain by the end of two weeks.

We did not encounter any complications with any of the techniques.

4. Discussion

Ideally tonsillectomy should be quick, painless and associated with minimum blood loss and post operative complications. To this end, a wide variety of techniques have been used, including lasers, coblation, ultrasonic scalpels, bipolar electro-surgical cautery and microdebriders.

There is still no consensus over what is the optimal technique for tonsillectomy with the lowest morbidity rates.⁶ Post-tonsillectomy morbidities include pain, primary or reactionary haemorrhage (at under 24 hours), and post-operative infection, which can result in secondary or delayed haemorrhage (at over 24 hours). Reducing those parameters improves patient recovery time, patient satisfaction, and patient safety, which is our ultimate goal. Many studies have been performed to compare new procedures with the conventional methods.⁴⁻⁶ Our study aims to compare three of the most commonly performed techniques in our setup.

Although the first clinical experience with laser tonsillectomy was reported in 1972, it is only recently that it has increased in popularity.^{5,6} Many different types of lasers were used for tonsillectomy each has its unique physical properties KTP, Nd YAG, CO₂ and Diode laser.^{6,7} The cutting action of diode laser is achieved by a red hot cautery effect, which allow delicate cutting and destruction of tissue with very limited lateral damage which seems very useful for tonsillectomy. The diode laser emits laser light at a wavelength of 810nm, which achieves a deep coagulation of up to 1 cm depth of tissue.⁸ The use of small fibers in contact mode in diode laser makes the dissection very gentle and is likely to reduce post-operative morbidity.⁹

The operative time needed for tonsillectomy by diode laser is significantly reduced in comparison with dissection method in our study, which goes with the results of Saito et al,¹⁰ and Auf et al.¹¹

Choy et al.¹² conducted a study and concluded that bipolar diathermy is equally as effective as ligation in control of haemorrhage, was not more painful postoperatively and did not cause more secondary haemorrhage. It is also easier, and takes less time than ligation, resulting in shorter operative and anaesthetic time.^{12,13}

In our study, we found that bipolar cautery assisted tonsillectomy took slightly less operative time than diode laser tonsillectomy. In turn, diode laser tonsillectomy was associated with slightly less blood loss compared with bipolar tonsillectomy.

However, both techniques were associated with significantly less operative time and less blood loss compared with cold dissection tonsillectomy (the control group).

There was significantly less pharyngeal pain in the Laser cases on the first postoperative day in our patients. This, however, was found to be a transient cause for jubilation as there was increased pharyngeal discomfort and otalgia, both in severity and duration, in the Laser cases by the 5th to 6th days, which may be due to thick slough formation and secondary opportunistic infection, due to the layer of thermal necrosis by laser.¹⁰ This started to reduce by the end of first week. There was no difference in the incidence

of secondary haemorrhage between the two techniques.

5. Conclusion

In conclusion, both laser tonsillectomy and bipolar dissection tonsillectomy have some advantages over conventional dissection method. They both have shorter operative and anaesthetic time, less bleeding (primary, reactionary, and secondary) and less post operative pain, compared to cold knife dissection. In the comparison of Laser and bipolar techniques, the difference in bleeding and operative time was slight. The significantly lesser pain in the Laser group on day 1 is offset by increased pain by 5th to 6th post operative days,

Therefore the final call on whether to use bipolar cautery or Laser for tonsillectomy depends on the individual preference of the surgeon, taking into account the personal preferences of the patient (patient party in paediatric cases), after a detailed discussion of the technicalities, advantages and disadvantages, and the cost factor.

6. Conflict of Interest

The authors declare no potential conflict of interests.

7. Source of Funding

No funding was utilized for the conduction of the study.

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