

## Original Research Article

# A comparative study of CO<sub>2</sub> laser tonsillectomy versus conventional tonsillectomy in our experience

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## ABSTRACT

**Background:** Tonsillectomy is one of the major surgical procedure in terms of volume in the oto-rhino-laryngological practice. It is an age old surgical procedure, referred in history of medicine. There have been various changes in the indications and surgical procedures since 4 to 5 decades.

**Methods:** A comparative study between the CO<sub>2</sub> laser and conventional method (dissection Hospital set up, by the same surgeon, using two different techniques. The main objective of the study is to compare the intra-operative events (blood loss, time taken for surgery). This study was done in 40 patients undergoing tonsillectomy with or without adenoid hypertrophy removal over a period of 1 year (June 2015– May 2016). The patients (20 cases) in the first half of this period underwent conventional tonsillectomy whereas the rest (20 cases) underwent CO<sub>2</sub> laser tonsillectomy. The gathered data were analysed by SPSS software (Ver-25) and using necessary tests. The differences between studied groups less than 0.5 (p<0.05) considered significant statically.

**Results:** Among 40 patients, 20 cases underwent tonsillectomy by CO<sub>2</sub> laser and 20 cases by conventional method. 20 patients who underwent laser tonsillectomy had lesser bleeding (25 ml vs. 60 ml) intraoperatively, p<0.05 (significant) and total time consumed during surgery is less (4.5 minutes vs. 15 minutes) with laser when compared to conventional method p<0.05 (significant).

**Conclusions:** CO<sub>2</sub> laser tonsillectomy is associated with low intraoperative bleeding and less time consuming surgery when compared to conventional tonsillectomy.

**Keywords:** Tonsillectomy, CO<sub>2</sub> laser, Conventional method, Dissection and snare

## INTRODUCTION

Tonsillectomy is one of the major surgical procedure ENT practice. Chronic tonsillitis has significant impact on quality of life and tonsillectomy done to treat the condition is a major procedure which can lead to many intra operative and post-operative complications including bleeding, pain etc. resulting in absence from school/work and reduced quality of life. There has been a conceptual change in the indications and surgical technique in the last 40 years.<sup>1</sup> Tonsillar diseases are among the most commonly encountered health-related

problems in the general population. The choice of treatment is often tonsillectomy, which is still the most frequently performed surgical procedure in children and young adults.<sup>2</sup> The most common organism causing acute tonsillitis is group A beta hemolytic *Streptococcus*. Patients who met the Paradise's criteria for tonsillectomy were prepared for surgery.

The objective of this study was to compare CO<sub>2</sub> laser tonsillectomy with conventional tonsillectomy in terms of intra operative events like bleeding and duration of surgery.

## METHODS

**Source of data:** Patients attending the department of ENT of Thanjavur Government hospital from June 2017– May 2018 with history of recurrent throat pain.

**Sample size:** 40 patients presenting with chronic tonsillitis.

The study was carried out in Thanjavur Government hospital set up, by the same surgeon, using two different techniques. This study was done in 40 patients undergoing tonsillectomy with or without adenoid hypertrophy removal. The patients (20 cases) in the first half of this period underwent conventional tonsillectomy whereas the rest (20 cases) underwent CO<sub>2</sub> laser tonsillectomy.

**Operative procedure:** General anaesthesia was preferred in all patients. Boyle's Davis mouth gag was used in majority in Rose position. Tonsillectomy was done by dissection and snare method in 20 cases and by CO<sub>2</sub> laser in the rest 20 cases.

All selected patients for tonsillectomy had recurrent episodes of tonsillitis, meeting the Paradise criteria. Age of the patients ranged from 5 years to 35 years, the patients having bleeding diathesis, anemia and acute infections of the tonsils were excluded from this study. Detailed history taking, clinical examination was done in all the patients. Laboratory investigations including CBC, BT, CT, ASO titre, PT/INR, aPTT, serology (HIV/HBsAg) were done in all patients undergoing tonsillectomy. Throat swab from the surface of tonsils for gram stain and culture and sensitivity was done in necessary patients. Commensals were grown in most of the patients. Written informed consent was taken from all

the patients. Cotton balls were used intraop to control bleeding, fully soaked cotton ball is equivalent to around 5 ml of bleeding. Duration of surgery was noted in all cases.

The gathered data were analysed by SPSS software (Ver-25) and using necessary tests. The differences between studied groups less than 0.5 (p<0.05) considered significant statically.

## RESULTS

Among 40 patients with chronic tonsillitis, age of the patients ranged from 5 years to 35 years, majority belonging to 0-10 years age group 17 (42.5%).

Majority of the patients were females 23 (57.5%). 20 cases underwent tonsillectomy by CO<sub>2</sub> laser and 20 cases underwent by conventional method.

Number of fully soaked cotton balls in Laser tonsillectomy ranged from 3 to 8, average being 5. Approximate average blood loss being 25 ml. Number of fully soaked cotton balls in conventional technique ranged from 6 to 18, average being 12. Approximate average blood loss being 60 ml (p<0.05 significant).

**Table 1: Age distribution of the patients.**

Age (years)	Laser tonsillectomy number (%)	Conventional tonsillectomy number (%)	Total number (%)
0-10	8 (40)	9 (45)	17 (42.5)
11-20	7 (35)	6 (30)	13 (32.5)
21-30	3 (15)	3 (15)	6 (15)
31-40	2 (10)	2 (10)	4 (10)
<b>Total</b>	<b>20 (100)</b>	<b>20 (100)</b>	<b>40 (100)</b>

**Table 2: Sex distribution of the patients.**

Sex distribution	Laser tonsillectomy number (%)	Conventional tonsillectomy number (%)	Total (%)
<b>Males</b>	9 (45)	8 (40)	17 (42.5)
<b>Females</b>	11 (55)	12 (60)	23 (57.5)
<b>Total</b>	<b>20 (100)</b>	<b>20 (100)</b>	<b>40 (100)</b>

**Table 3: Comparing the intra operative events.**

Intraoperative events	Laser CO <sub>2</sub> (mean±SD) in ml	Conventional tonsillectomy (mean±SD) in ml	P value
<b>Bleeding (average number of cotton balls)</b>	5 (25 ml approx.) (22.5±6.17)	12 (60 ml approx.) (60±15.13)	<0.05
<b>Time duration for surgery (average)</b>	4.5 minutes (4.5±1.17)	15 minutes (15±5.19)	<0.05

Duration of surgery in laser tonsillectomy ranged from 2.5 minutes to 7 minutes, average being 4.5 minutes. Duration of surgery in conventional tonsillectomy ranged from 8 minutes to 30 minutes, average being 15 minutes. P<0.05 (significant).

Patients who underwent laser tonsillectomy had lesser bleeding intraoperatively and total time consumed during surgery is less with laser when compared to conventional method.

## DISCUSSION

Tonsillitis is caused by *Streptococcus* or viral agents (*Adenoviruses*, *Influenza*, *Epstein-Barr*, *Parainfluenza* and *Enteroviruses*). The main symptoms include throat pain, redness or yellow coating on the tonsils, tonsillar enlargement, difficulty in swallowing, swelling in the neck etc. There could be hoarseness, snoring, headache, loss of appetite, ear pain, fever, chills and halitosis. Symptoms may also include nausea, vomiting and abdominal pain in children.

Recently, American Academy of Otolaryngology-Head and Neck Surgery Foundation has published clinical practice guidelines: tonsillectomy in children.<sup>3</sup> The panel made a strong recommendation for: (1) watchful waiting for recurrent throat infection if there have been fewer than 7 episodes in the past year or fewer than 5 episodes per year in the past 2 years or fewer than 3 episodes per year in the past 3 years; (2) assessing the child with recurrent throat infection who does not meet criteria in statement 2 for modifying factors that may nonetheless favour tonsillectomy, which may include but are not limited to multiple antibiotic allergy/intolerance, periodic fever, aphthous stomatitis, pharyngitis and adenitis, or history of peritonsillar abscess; (3) asking caregivers of children with sleep-disordered breathing and tonsil hypertrophy about co-morbid conditions that might improve after tonsillectomy, including growth retardation, poor school performance, enuresis, and behavioral problems; (4) counselling caregivers about tonsillectomy as a means to improve health in children with abnormal polysomnography who also have tonsil hypertrophy and sleep-disordered breathing; (5) counselling caregivers that sleep-disordered breathing may persist or recur after tonsillectomy and may require further management; (6) advocating for pain management after tonsillectomy and educating caregivers about the importance of managing and reassessing pain; and (7) clinicians who perform tonsillectomy should determine their rate of primary and secondary post-tonsillectomy hemorrhage at least annually. The panel on clinical practice guideline on tonsillectomy in children also offered options to recommend tonsillectomy. These options include, recurrent throat infection with a frequency of at least 7 episodes in the past year or at least 5 episodes per year for 2 years or at least 3 episodes per year for 3 years with documentation in the medical record with additional temperature more than 38.3 degree Celsius, cervical adenopathy, tonsillar exudate or positive test for group A beta hemolytic *Streptococcus*. The degree of benefit in surgically treated children seemed sufficient to justify tonsillectomy in children with throat infection histories.<sup>4</sup>

In our study, patients with recurrent episodes of throat pain meeting the Paradise's criteria were included.

There are number of techniques of tonsillectomy and can be grouped as cold and hot. Cold methods (no heat is used) include dissection and snare, guillotine, partial

tonsillectomy with microdebrider, harmonic scalpel, plasma mediated ablation and cryosurgery. Hot methods include electrocautery, laser, coblation and radio-frequency.<sup>1</sup> CO<sub>2</sub> laser, an excellent cutter, has a valuable role in otolaryngological practice.<sup>5</sup> The most common complication of tonsillectomy is bleeding, during or after surgery. Despite the surgeon's most sophisticated efforts to prevent it, hemorrhage remains the most significant complication after tonsillectomy.<sup>6</sup>

Johnson described operative complications which include trauma to teeth, larynx, pharyngeal wall/soft palate, difficult intubation, laryngospasm, laryngeal edema, aspiration, respiratory compromise, endotracheal ignition and cardiac arrest.<sup>7</sup> Postoperative complications include nausea, vomiting, pain, dehydration, referred otalgia, pulmonary edema, velopharyngeal insufficiency and nasopharyngeal stenosis. Rare late complications may include vascular injury, subcutaneous emphysema, jugular vein thrombosis, atlantoaxial dislocation/subluxation, taste disorders and persistent neck pain (Eagleton syndrome or stylohyoid syndrome).<sup>8</sup> Complications were pain, nausea, and followed by bleeding.

Sattar et al concluded that laser and bipolar electrodissection tonsillectomy are popularized due to its relative less bleeding and quicker methods than that of cold dissection tonsillectomy.<sup>9</sup> Our study observed similar results with CO<sub>2</sub> laser technique resulting in lesser bleeding (25 ml vs. 60 ml) and lesser duration of surgery (4.5 minutes vs. 15 minutes) when compared to conventional tonsillectomy.

Gofman et al concluded that high clinical efficiency of the ablation of palatal tonsils using the CO<sub>2</sub> laser and its advantages in terms of reduced duration of the postoperative period, requirements for analgesic and antibacterial medications, recovery of the swallowing function and speech.<sup>10</sup> Our study also showed similar results of better hemostasis, reduced duration of surgery in CO<sub>2</sub> Laser group. We also observed lesser postoperative pain, early swallowing function, and resumption of daily activities in laser group.

Jiang et al concluded that CO<sub>2</sub> laser tonsillectomy is effective to relieve pain, inflammatory reaction and with less time, it's a safe, efficient and mini-trauma operation.<sup>11</sup> Similar results were obtained in our study, with lesser primary hemorrhage and duration of surgery, lesser post-operative complications in CO<sub>2</sub> laser group.

Thus, in our study, laser tonsillectomy has less bleeding intraoperatively and the time duration is less when compared to conventional tonsillectomy.

## CONCLUSION

We conclude that, in our experience, CO<sub>2</sub> laser tonsillectomy is associated with low intraoperative

bleeding and less time consuming surgery when compared to conventional tonsillectomy.

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