



## Original Research Article

## A comparative study between CO2 laser tonsillectomy and conventional tonsillectomy

Radhakrishnan KR<sup>1</sup>, Sivasubramanian T<sup>2</sup>, Pandian DR<sup>2</sup>, Ranjani R<sup>3,\*</sup>, Balasubramanian C<sup>2</sup>

<sup>1</sup>Dept. of ENT, Government Sivagangai Medical College and Hospital, Chennai, Tamil Nadu, India

<sup>2</sup>Dept. of ENT, Thanjavur Medical College Hospital, Thanjavur, Tamil Nadu, India

<sup>3</sup>Dept. of ENT, Mettur Thermal Power Station Dispensary, Mettur, Tamil Nadu, India



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## ABSTRACT

**Introduction:** Tonsillectomy is one of the leading surgical operations of the ENT profession. Chronic tonsillitis has a massive effect on the quality of life and tonsillectomy used to treat the disease is a major procedure that can lead to multiple intraoperative and post-operative conditions, including bleeding, discomfort, etc., resulting in lack of school/work and impaired quality of life.

**Aim:** To study the outcome of surgical procedures between CO2 laser Tonsillectomy and conventional tonsillectomy.

**Materials and Methods:** In this study, 50 patients with chronic tonsillitis were included and randomized to underwent one tonsil removal by CO2 Laser method and the other side by Conventional dissection method. The outcome of the two procedures was measured using the duration of surgery, blood loss on each side. Post-operative bleeding, pain and tonsillar fossa healing were evaluated on the first, second and seventh day.

**Results:** The duration of surgery in the CO2 laser method was 11.8±3.65 minutes, and the conventional method was 16.4±4.66 minutes. (P <0.0001) The intraoperative blood loss in the CO2 laser method was 18.74±6.86ml and conventional method; it was 44.02±9.38ml. (P<0.0001) Post-operative day 7 pain score was lower in the CO2 laser method than the conventional method. In the first, second, and seventh post-operative days, the percentage of slough formation in the tonsillar fossa was 80 percent, 74 percent, and 45 percent in the CO2 laser method, respectively, while in the conventional method was 40 percent, 47 percent, and 17 percent.

**Conclusion:** CO2 Laser tonsillectomy is a simple procedure that results in substantially less intraoperative blood loss, post-operative discomfort, and a shorter surgery time.

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## 1. Introduction

Tonsils are lymphoid tissue aggregates at the entrance to the digestive and respiratory tracts that play an important role in our immune system. They function as the first line of defence, initiating an immune response to pathogens inhaled or ingested. The Waldeyer ring is made up of

palatine tonsils (faucial tonsils), adenoids (nasopharyngeal tonsils), lingual tonsils, and tubal tonsils circumferential ring of tonsils located in the oropharynx. When specialists talk about tonsils, they usually mean the palatine tonsils, located at the back of the throat between the two palatine arches (pillars). Tonsils, like other lymphoid tissues, play a role in the body's immune response and defence against diseases and foreign pathogens. The tonsils have a unique

\* Corresponding author.

E-mail address: [ranjumbbs3@gmail.com](mailto:ranjumbbs3@gmail.com) (Ranjani R).

immunological function.<sup>1</sup>

Tonsillotomy is attributed to less post-operative pain and bleeding and a quicker recovery time and higher patient satisfaction.<sup>2,3</sup> These facts explain why, in recent decades, the number of studies looking into the possible value of tonsillotomy in children with obstructive symptoms has increased.

Tonsillotomy has been performed using several surgical techniques, including carbon dioxide laser (CO<sub>2</sub> laser), radiofrequency, microdebrider, diode laser, coblation, scissors, bipolar coagulation scissors, and argon plasma coagulation, though tonsillar surgery is one of the most common surgical procedures performed by ENT surgeons. The technique of CO<sub>2</sub> laser tonsillotomy for the treatment of tonsillar hyperplasia has been the subject of numerous studies.<sup>4,5</sup>

We compare both the CO<sub>2</sub> laser and the traditional technique in a single patient in this study to eliminate individual variables and make each patient their own control.

## 2. Aim

To study the outcome of surgical procedures between CO<sub>2</sub> laser tonsillectomy and conventional tonsillectomy.

## 3. Materials and Methods

This prospective comparative study of CO<sub>2</sub> LASER versus conventional tonsillectomy was done in the Department of Otorhinolaryngology, Thanjavur Medical College Hospital, from October 2017 to September 2018. Fifty patients with chronic tonsillitis, tonsilloliths, cysts, or neoplasms who were candidates for tonsillectomy were enrolled in the study. They were randomly assigned to have one tonsil removed by CO<sub>2</sub> laser and the other by conventional dissection. To rule out patients with associated adenoid hypertrophy and secretory otitis media, as well as other systemic and associated diseases, a preoperative examination using X-ray nasopharynx, diagnostic nasal endoscopy, impedance audiogram, and CECT neck is performed.

### 3.1. Inclusion criteria

All patients with a diagnosis of chronic tonsillitis of different types, patients of tonsillar enlargement including cyst, neoplasm, lith, patients in the age group above 11 years

### 3.2. Exclusion criteria

Patients with systemic diseases, coagulation disorders, age of the patients below 11 years, patients with acute exacerbation of the disease.

All of the patients in the study were given a thorough history and evaluation of their ears, nose, and throat.

Clinical examination, pure tone audiometry (in select cases for exclusion criteria), impedance audiometry (in select cases for exclusion criteria), X-Ray skull soft tissue lateral view (in select cases for exclusion criteria), diagnostic nasal endoscopy (in select cases for exclusion criteria), and routine blood investigation were all performed on all patients included in the study.

Patients were evaluated before the surgery to undergo general anaesthesia. Following a thorough examination, patients were randomly assigned to have one tonsil removed with a CO<sub>2</sub> laser and the other with a conventional dissection procedure. Half of the patients in this study had their right tonsil removed with a CO<sub>2</sub> laser and their left tonsil removed by dissection. The left tonsil was removed with a CO<sub>2</sub> laser, and the right tonsil was removed by dissection in the other half of the patients. On the first, second, and seventh post-operative days, all patients were evaluated to evaluate post-operative morbidity and efficacy of both conventional and CO<sub>2</sub> laser methods.

## 4. Results

In this study, 50 patients equal in both gender were included, most of the patients were found in the age group of 16 to 25 years. The duration of surgery in the CO<sub>2</sub> laser method was 11.8±3.65 minutes and the conventional method was 16.4±4.66 minutes. (P <0.0001)

The intraoperative blood loss in the CO<sub>2</sub> laser method was 18.74±6.86ml and conventional method, it was 44.02±9.38ml. (P<0.0001)

The first-day post-operative pain score was 3.92±0.92 in the CO<sub>2</sub> laser method and 7.42±1.18 in conventional method patient. (P<0.0001) The second-day post-operative pain score was 3.64±0.8 in the CO<sub>2</sub> laser method and 6.2±0.96 in conventional method patient. (P<0.0001) The seventh-day post-operative pain score was 2.97±0.99 in the CO<sub>2</sub> laser method and 3.82±0.7 in conventional method patient. (P<0.0001)

The amount of slough covered in the tonsillar fossa was used to estimate post-operative tonsillar fossa healing. The first-day post-operative tonsillar fossa healing was 80.3±7.02 in the CO<sub>2</sub> laser method and 39.8±7.88 in the conventional method patient. (P<0.0001) The second-day post-operative tonsillar fossa healing was 73.6±20.7 in the CO<sub>2</sub> laser method and 47.2±5.16 in the conventional method patient. (P<0.0001) The seventh-day post-operative tonsillar fossa healing was 48.47±7.52 in the CO<sub>2</sub> laser method and 18.69±8.72 in the conventional method patient. (P<0.0001)

In the first, second, and seventh post-operative days, the percentage of slough formation in the tonsillar fossa was 80 percent, 74 percent, and 45 percent in the CO<sub>2</sub> laser method, respectively, while in the conventional method was 40 percent, 47 percent, and 17 percent.

There was no primary or secondary hemorrhage in our study. These results were analyzed and compared using chi-square testing, and it was found to be statistically significant.

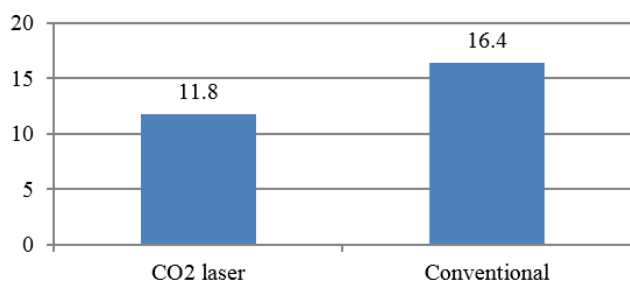


Fig. 1: Distribution of duration of surgery in minutes

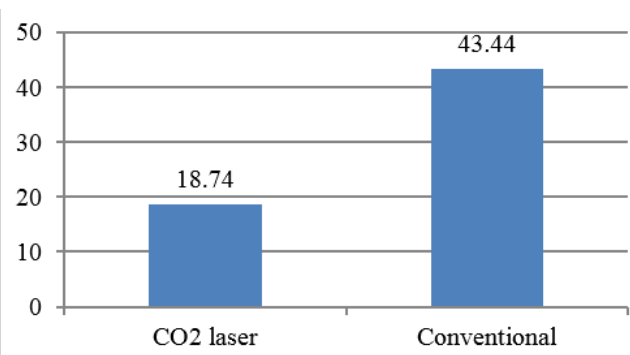


Fig. 2: Distribution of blood loss in ml

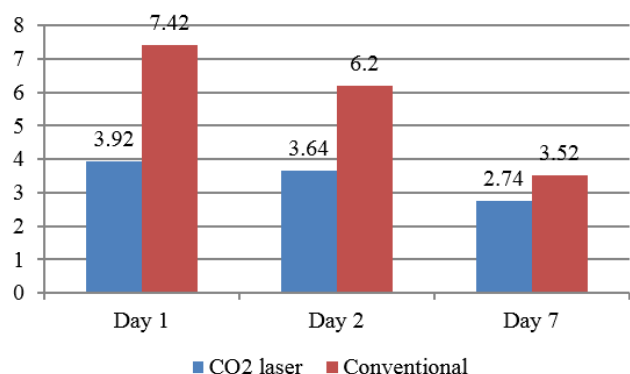


Fig. 3: Distribution of Post-operative pain score

### 5. Discussion

Tonsillectomy is a very common surgery performed by an ENT surgeon around the world. Most ENT surgeons still favour the dissection and snare method among the various tonsillectomy techniques available.

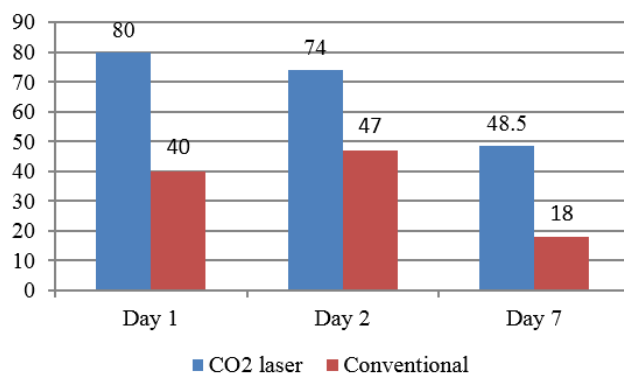


Fig. 4: Distribution of tonsillar fossa healing in percentage

In our sample, the average surgery time for the conventional method was 16.4 minutes (ranging from 11 to 25 minutes), while the average surgery time for the CO2 Laser method was 11.8 minutes (ranging from 7 to 18 minutes). In their studies, Wan Ishalh et al. identified the time of surgery and found that the CO2 Laser method took less time than the conventional method.<sup>6</sup>

Similar studies were identified by Mohammadi et al., who discovered that CO2 Laser has a shorter duration than the conventional process. The CO2 laser method takes less time in our sample, with a p-value of >0.05, which is statistically insignificant.<sup>7</sup>

The average intraoperative blood loss in the conventional method was 43.44ml, ranging from 15 to 60ml, while the CO2 Laser method was 18.74ml, ranging from 10 to 50ml, with a statistically significant p-value of 0.001. Conventional tonsillectomy, according to G.Mohammadi et al., is associated with more severe blood loss (5ml vs 15ml), which is statistically significant.<sup>7</sup>

Compared to the traditional approach, Hossain AT et al. found that CO2 laser caused less post-operative pain.<sup>8</sup> Similar study by Obasikene G et al. who discovered that CO2 laser causes more post-operative pain. The pain was significantly less in the CO2 laser system on the 1st, 2nd, and 7th POD pain, with p-values of 0.001, 0.001, and 0.002, respectively.<sup>9</sup>

The presence of slough in the tonsillar fossa on the 1st, 2nd, and 7th post-operative days delayed tonsillar fossa healing using the CO2 Laser approach in our study. Early slough formation and delayed healing are caused by the CO2 laser. Both have a similar impact on slough formation, according to G. Mohammadi et al.<sup>7</sup>

In a conventional method, Alharbi FA et al. identified two patients who had a reactionary haemorrhage.<sup>10</sup> There was no reactionary or secondary haemorrhage in any of the patients in our sample.

## 6. Conclusion

CO2 laser tonsillectomy is a relatively simple procedure to provide near-bloodless field and minimize damage to surrounding tissue. The operational time required for the completion of CO2 laser tonsillectomy would be less than the conventional techniques. Intraoperative blood loss was significantly lower on the CO2 laser technique than on the dissection side. Most notably, post-operative pain levels on the CO2 laser side were significantly lower on the first, second and seventh post-operative days. It allows patients to regain their daily routines early on.

## 7. Conflict of Interest

No conflict of interest.

## 8. Source of Funding

None.

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## Author biography

**Radhakrishnan KR**, Associate Professor

**Sivasubramanian T**, Associate Professor

**Pandian DR**, Associate Professor

**Ranjani R**, Medical Officer

**Balasubramanian C**, Professor

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