

## COMPARISON OF TONSILLECTOMY WITH HARMONIC SCALPEL AND CONVENTIONAL DISSECTION TONSILLECTOMY IN THE MANAGEMENT OF PATIENTS WITH CHRONIC TONSILLITIS

Neethu Sara George<sup>1</sup>, John Mathai<sup>2</sup>, N. Gopinathan Pillai<sup>3</sup>

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Corresponding Author:  
**Dr. N. Gopinathan Pillai,**  
Email: neethusara86@gmail.com  
ORCID: 0000-0001-8239-3765

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<sup>1</sup>Assistant Professor, Department of ENT, Kerala University of Health Sciences, Kerala, India  
<sup>2</sup>Professor, Department of ENT, Pushpagiri Institute of Medical Sciences & Research Centre, Kerala, India  
<sup>3</sup>Associate Professor, Department of ENT, Pushpagiri Institute of Medical Sciences & Research Centre, Kerala, India

### Abstract

**Background:** Tonsillectomy remains one of the most common childhood surgeries with an increase in several surgeries being done to treat OSA or sleep-disordered breathing. **Aim:** The study aims to compare the operating time, intraoperative blood loss, postoperative pain, the time needed to return to a normal diet, and activity in harmonic scalpel and dissection type of tonsillectomy. **Materials and Methods:** A prospective study was conducted at the ENT department of Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla, Kerala, for March 2015 to September 2016. A total of 44 patients were included in the study of which 18 patients underwent tonsillectomy with harmonic scalpel whereas the rest underwent cold dissection method. Before the procedure, a thorough history, ENT examination, and the necessary investigations were completed. Informed consent was obtained from all patients. **Result:** Out of 24 cases of dissection, 15 (62.5%) were males and 9 (37.5%) were females. Whereas in the case of a harmonic scalpel, both males and females were equal (10 each), and there is no significant difference. Only in the case of postoperative day 5 showed a significant difference in the pain when the methods were different. It had an average pain of 3.42 in the dissection method and 2.10 in the harmonic scalpel method. In all other cases the post-operative at 6 hours, day 1, day 3, and day 7, there were no significant differences in pain severity between the two methods. **Conclusion:** We conclude that harmonic scalpel tonsillectomy significantly reduces intraoperative bleeding and reduction in pain scores on POD 5 and overall pain scores and early return to normal activity.

## INTRODUCTION

The inner Waldayer's ring's major component is the palatine tonsils. Both sides of the oropharynx are bordered by this almond-shaped structure. A condensed capsule made of pharyngobasilar fascia along the outside of the tonsil. The tonsil's primary artery, the tonsillar branch of the facial artery, enters the tonsil towards its lower pole by cutting through the superior constrictor, which is located directly above the styloglossus muscle. Other arteries that supply the tonsil include the ascending palatine branch of the facial artery, the ascending pharyngeal vessels, the lingual artery, and its dorsal lingual branches.<sup>[1]</sup> Venous drainage occurs through the para tonsillar vein, and after penetrating the superior constrictor, the vessels continue to the pharyngeal

plexus or face vein. The buccopharyngeal fascia is penetrated by tonsil lymphatic veins that go to the upper deep cervical group of nodes, in particular the jugulodigastric group. The glossopharyngeal nerve supplies the tonsil with nerves.

Tonsils are crucial components of the immune system and defensive mechanisms. A crucial component of the mucosal defense system is secretory IgA. Tonsillectomy remains one of the most common childhood surgeries with an increase in several surgeries being done to treat OSA or sleep-disordered breathing. For the surgeon and the patient, three areas—*intraoperative blood loss, postoperative bleeding, and pain*—remain a significant problem despite technological advancements, breakthroughs in surgical technique, and instrumentation for tonsillectomy.<sup>[2]</sup>

Under general anesthesia, the palatine tonsil and capsule are surgically removed in a standard dissection and snare tonsillectomy. Blood vessels are then sealed (hemostasis) using ligatures (ties), sutures, or heat (diathermy).<sup>[3]</sup> The two most frequent side effects of tonsillectomy are pain and post-operative bleeding, although other issues with the procedure include airway blockage, weight loss, dehydration, nausea, and vomiting. As there is low thermal effect and collateral damage in harmonic scalpel compared to cautery – there is less chance of post-operative pain and enhances early recovery and return to normal diet and activities.

Whether harmonic scalpel tonsillectomy is superior to other tonsillectomy techniques or not is debatable based on conflicting information.<sup>[4]</sup> As controversy exists regarding which method is superior, studies have to be conducted to assess the superiority of one over the other. In this study, the effectiveness of the intraoperative procedure and postoperative morbidity are compared between harmonic scalpel and cold dissection tonsillectomy.

#### AIM

To compare the operating time, intraoperative blood loss, postoperative pain, the time needed to return to normal diet and activity in harmonic scalpel and dissection type of tonsillectomy.

### MATERIALS AND METHODS

A prospective study was conducted at the ENT department of Pushpagiri Institute of Medical Sciences and Research Centre, Thiruvalla, Kerala, for March 2015 to September 2016. A total of 44 patients were included in the study of which 18 patients underwent tonsillectomy with harmonic scalpel whereas the rest underwent cold dissection method. Before the procedure, a thorough history, ENT examination, and the necessary investigations were completed. Informed consent was obtained from all patients.

Inclusion criteria include patients of both sexes between the ages of 5 and 45 who have chronic tonsillitis with 7 or more episodes per year, 5 or more episodes per year for two years, or 3 or more episodes per year for three years. Age restrictions of 5 years and older, patients with a history of bleeding disorders, tonsillitis within three weeks of surgery, and NSAID contraindications are excluded.

Routine blood investigations including hemoglobin, total WBC count, differential count, ESR, platelet count, Renal function tests, coagulation profile like bleeding time, clotting time, prothrombin time, APTT, INR, blood grouping, ASO titer if suspecting streptococci with complications, serology like HIV, HBsAg, HCV. Chest X-ray and ECG were recorded. Preoperatively single doses of ceftriaxone injection were given to all the patients. The procedures were performed using a conventional approach, either a harmonic scalpel tonsillectomy or a cold dissection

tonsillectomy. Surgery was performed while completely unconscious. The patients are positioned in Rose's posture, and Boyle Davi's mouth gag is used to sufficiently expose the oropharynx.

Cold dissection tonsillectomies were done with cold steel instruments and hemostasis is secured by bipolar diathermy or with ligatures. Whereas harmonic scalpel tonsillectomy is performed with a harmonic scalpel curved blade by Ethicon Endo-Surgery (Johnson and Johnson, USA) extracapsular dissection. From the moment the Boyle-Davis mouthpiece was placed until the mouthpiece was removed and the complete hemostasis was achieved, the surgical time was calculated. The length of the procedure was measured in minutes. A harmonic scalpel was used to weigh the tonsil swab before and after tonsillectomy, and the volume of blood in the suction bottle during a traditional tonsillectomy was assessed to determine the intraoperative blood loss.

The Wong-Baker FACES pain scale and a series of questions modified from Chang and Myatt questionnaires were used in the postoperative evaluation to gauge the patient's degree of pain, return to regular food and activity, and other factors. The survey was given to the patient or parents. Parents are also questioned about how their child's rehabilitation program is affecting their everyday activities. The parents or patients were given five copies and were instructed to fill out the questionnaire on POD 0, 1, 3, 5, and 7.

Following surgery, all patients received povidone-iodine gargles, dosages of paracetamol depending on body weight, and an antibiotic (Ceftriaxone) given the following body weight. Patients received instructions on how to take their medications at home as well as advice on how to take care of themselves in general. Following surgery, all patients received follow-up care for 7 days. After a week, patients were all evaluated in the ENT OPD, and an oral cavity examination was done to determine if the tonsillar fossa was healed or covered with slough. The paired t-test and Chi-square test were used to compare the findings, and the p-value was determined.

### RESULTS

Out of 24 cases of dissection, 15 (62.5%) were males and 9 (37.5%) were females. Whereas in the case of a harmonic scalpel, both male and female were equal (10 each), and there is no significant difference ( $p=0.266$ ). Patients' ages ranged from 5 to 45 years old with a mean of 2.10 (SD 1.210) for Harmonic Scalpel and .897 (SD .270) for cold dissection type.

The intra-operative time for the harmonic scalpel were ranging from 10 to 40 minutes with an average of 19.35 (SD  $\pm$  8.881) minutes while it took about 13 to 40 minutes to complete dissection tonsillectomy with an average of 24.79 (SD  $\pm$  8.022) minutes, and there was no significant difference

( $p=0.648$ ). The range of blood loss in the harmonic scalpel method were ranging from 0 to 25 milliliter with an average of 8.20 (SD  $\pm$  6.771) milliliter while it was 30 to 90 milliliter with an average of 57.50 (SD  $\pm$  16.676) milliliter in dissection tonsillectomy, and there is a significant difference ( $p<0.0001$ ). The average time taken to return to a normal diet when a harmonic scalpel was used is 6.30 days

whereas in the case of the dissection method, it was 7.54 days, and the result showed no significant (0.143). The average time taken to return to normal activity in the case of the harmonic scalpel was 6.55 days whereas in the case of the dissection method, it was 8.54 days, and there is a significant difference ( $p=0.044$ ) [Table 1].

**Table 1: Demographic data of the study**

		Harmonic Scalpel	Dissection	P-value
Gender	Male	10 (50%)	15 (62.5%)	0.266
	Female	10 (50%)	9 (37.5%)	
Age	Up to 12	11 (55%)	15 (62.5%)	0.55
	13-18	1 (5%)	6 (25%)	
	Above 19	8 (40%)	3 (12.5%)	
		Mean and STD		P-value
Operation time		19.35 $\pm$ 8.881	24.79 $\pm$ 8.022	0.648
Intra-operative blood loss		8.20 $\pm$ 6.771	57.50 $\pm$ 16.676	<0.0001
Time taken to return to a normal diet		6.30 $\pm$ 1.174	7.54 $\pm$ 1.615	0.143
Time taken to return to normal activity		6.55 $\pm$ 0.945	8.54 $\pm$ 1.382	0.044

**Table 2. Comparison of postoperative pain between the two methods**

Post-operative pain	Harmonic Scalpel	Dissection	P-value
6 Hours	5.90 $\pm$ 1.021	8.42 $\pm$ 1.018	0.319
POD 1	4.80 $\pm$ 1.005	7.33 $\pm$ 0.963	0.395
POD 3	3.20 $\pm$ 1.196	5.50 $\pm$ 1.474	0.989
POD 5	2.10 $\pm$ 0.788	3.42 $\pm$ 1.381	<0.0001
POD 7	0.70 $\pm$ 0.979	1.00 $\pm$ 1.319	0.074

Only in the case of postoperative day 5 showed a significant difference in the pain when the methods were different. It had an average pain of 3.42 in the dissection method and 2.10 in the harmonic scalpel method. In all other cases the post-operative at 6 hours, day 1, day 3, and day 7, there were no significant differences in pain severity between the two methods [Table 2].

## DISCUSSION

In a study by Collison et al.<sup>5</sup> operating time was equal for both methods and estimated blood loss was less on the HS side with a mean of 0-50 ml with HS and 7-125 ml with CD. Lachanas et al.<sup>4</sup> observed less intraoperative time and blood loss in harmonic scalpel tonsillectomy compared to cold dissection tonsillectomy.

According to Wiatrak et al, operative time was higher for the harmonic scalpel (8 min 42 sec) compared to electrocautery (4 min 33 sec). With HST the mean intra-operative blood loss was 6.2 cc (95% CI 3.7–8.7 and  $P=0.05$ ); whereas with CST, the mean intra-operative blood loss was 49.4 cc (95% CI 46.0–52.8 and  $P<0.05$ ). In another study by Walker et al, there was equal blood loss in the harmonic scalpel and electrocautery groups.<sup>15-17</sup>

In our study, the average time taken for a harmonic scalpel is 19 minutes compared to 24 minutes for cold dissection which is not statistically significant. Blood loss with a harmonic scalpel is 8 ml on average compared to 57 ml in cold dissection which was statistically significant.

Lachanas et al. reported the pain scores in the HST groups were considerably lower ( $P 0.001$ ) than those in the CD group.<sup>4</sup> In the Wiatrak et al. study, there was a tendency for mean postoperative pain scores to be lower for HS individuals than for EC subjects.<sup>6</sup> According to Wiatrak et al. study there was a tendency for HS individuals to have lower mean postoperative pain levels than EC patients.<sup>8</sup> In our study, pain scores at 6 hours postoperatively and POD 1 and 3 are not statistically significant. But pain scores at postoperative day 5 were less with statistically significant HS. Overall pain scores show a reduction in mean pain values which improves postoperative morbidity.

There are variable results in post-tonsillectomy hemorrhage in comparison with a harmonic scalpel and cold dissection. Haegner et al.<sup>19</sup> reported there was more secondary bleeding in the HS group compared to CD. Whereas in another study conducted by Kamal et al,<sup>10</sup> there was more secondary bleeding with CD than with HS.

Walker et al,<sup>17</sup> reported in the EC group, only 75 patients (46.6%) reacted, compared to 97 (62.6%) in the HS group. The children's ages varied from one to nineteen. Return to usual diet in 24 hours was statistically significant when comparing HS and EC questionnaire respondents, 44.3 percent vs 22.7 percent, respectively; in 72 hours, HS (74.2 percent) and EC (74.2 percent) were both statistically significant (46.7 percent). Within 24 hours, 28 percent of HS questionnaire respondents and 12 percent of EC respondents returned to their regular activities. Both groups experienced the same amount of postoperative blood loss.

In a study by Collison et al,<sup>[5]</sup> on the eighth postoperative day, the rate of delayed bleeding was at its greatest. Two patients needed transfusions; both made a full recovery without any negative side effects. One factor that can be changed to prevent prolonged bleeding after tonsillectomy and adenoidectomy appears to be connected to specific aspects of the hemostatic technique.

In our study, there was no post-operative hemorrhage in either type. It shows that there is no relative increase in post-operative hemorrhage in harmonic scalpel compared to the dissection method. A study conducted by Walker et al,<sup>[7]</sup> concluded that the HS group has an earlier return to normal diet and activity.

According to Sood et al,<sup>[11]</sup> the operating time was quick, blood loss was limited, and early postoperative discomfort was minor. They feel that these findings are favorable and that the UHS may have a future role in tonsillectomy surgery. Parsons et al,<sup>[12]</sup> observed that patients having tonsillectomy using the Coblator device experienced less discomfort over 10 days than patients receiving tonsillectomy with electrocautery or the Ultrasonic Scalpel. Pain following tonsillectomy is always a key concern for our patients. The selection of surgical instruments looks to be one strategy to alleviate this pain.

In a study by Arena et al,<sup>[13]</sup> post-operative pain and otalgia increased in the second week which hampered the return to normal diet and activity. In our study, the average time taken to return to normal diet among the harmonic scalpel group is 6.3 days and in CD is 7.5 days which is not statistically significant but scores are better than dissection. But the average time taken to return to normal activity is statistically significant with a p-value of <0.05.

## CONCLUSION

A harmonic scalpel is costlier compared to cold dissection as the blade can be used for a maximum

of 10 patients. Our study showed that harmonic scalpel tonsillectomy significantly reduces intraoperative bleeding and reduction in pain scores on POD 5 and overall pain scores and early return to normal activity.

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