

## **Original Article**

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# **Advantages of ultrasonic tonsillectomy by harmonic scalpel**

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### **Abstract:**

*Objective: To find out the advantages and disadvantages of ultrasonic tonsillectomy by harmonic scalpel.*

*Design and setting: A prospective study was conducted over a period of five years; from 01.07.2005 to 30.06.2010 in Comfort Nursing Home, 167B, Green Road, Dhaka, Bangladesh.*

*Results: Hospital admitted 540 cases of ultrasonic harmonic scalpel tonsillectomy were included and analyzed. 360 cases were male; whereas 180 cases were female in this study. 0-10 years (168 cases) were the commonest age group of study people. Complications were rare, only two cases 0.37% of secondary hemorrhage had happened and no cases of reactionary hemorrhage was reported.*

*Conclusion: The advantages are almost no bleeding, precise dissection of tonsils, less post operative pain, reduce postoperative discomfort, earlier return to normal activities, oral feeding immediately after operation and less operative time.*

**Key words:** *Ultrasonic tonsillectomy, Harmonic scalpel.*

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### **Introduction:**

Chronic tonsillitis is one of the common ENT problems and tonsillectomy is the most widely performed operation by the Otolaryngologists worldwide. Different methods are used in tonsillectomy for a long period and day by day newer methods are invented; in fact, the first description of tonsillectomy procedure is from the first century AD.<sup>1-3</sup> Every method has got its advantages and disadvantages. Ultrasonic harmonic scalpel tonsillectomy is now-a-days becoming popular and rewarding for its advantages over disadvantages. However in Bangladesh no study was done on ultrasonic harmonic scalpel tonsillectomy to identify the effectiveness of procedure and its advantages.

Significant postoperative pain and discomfort continues to be associated with tonsillectomy procedure. Various instruments have been used over the years, but an attempt to simplify the surgical procedure and minimize the postoperative morbidity; the ultrasonic harmonic scalpel uses high frequency piezoelectric technology to create intracellular pressure waves that lyses cellular connections while creating a protein coagulum that maintains hemostasis. High frequency ultrasound is an effective mechanism for cutting and coagulating tissue. Now-a-days it is used in tonsillectomy, laparoscopic and other surgeries and has many advantages. The harmonic scalpel is an ultrasonic dissector coagulator that utilizes ultrasonic vibration to cut and coagulate tissues. The coagulation mechanism occurs by transferring mechanical energy to the tissue. This breaks hydrogen bonds of protein and generates heat from tissue friction. The temperature is lower than electrocute (50-100°C). The advantages are almost no bleeding, precise dissection of tonsils, less post operative pain, reduce postoperative discomfort, earlier return to normal activities, oral feeding immediately after operation and less operative time.

The Ultrasonic harmonic scalpel is a new device that received an indication for otolaryngology procedure in 2000.<sup>1</sup> The components of the device includes a generator, a hand piece and a blade. A high-frequency power supply provides energy to hand piece. Piezoelectric technology in the hand piece vibrates the dissecting blade at a harmonic frequency of 55000 Hz.<sup>1</sup> The amplitude of the oscillation changes with a power setting from 1 to 5. The generator produces the maximum cutting effect when the generator is set on power level 5 and

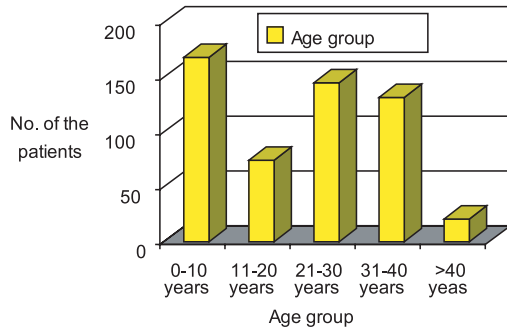
maximal haemostatic effect when it is set on power level 1.<sup>1,2</sup>. But the level 3 is ideal for tonsillectomy, due to less heat production and better cutting and haemostasis.

The blade oscillations dissect tissues by creating intracellular cavities as pressure waves are conducted through the tissues. The expansion and contraction of these cavities results in the lyses of cellular connections, resulting in tissue dissection. Hemostasis is achieved by the ultrasonic dissector, creating a coagulum that is able to seal blood vessels up to several millimeters in diameter. There is little heat generated by the harmonic scalpel, and there is no or very little smoke generated in its use.<sup>4,5</sup>

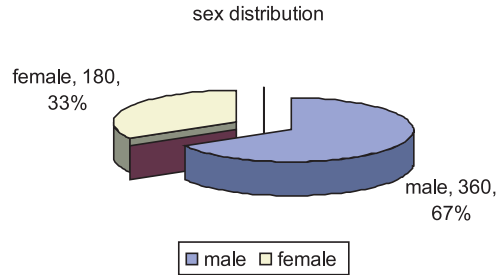
#### **Materials and methods:**

- **Objective of the study:**  
The objective of the study is to find out the advantages of ultrasonic tonsillectomy by harmonic scalpel.
- **Study design:**  
It is a prospective study.
- **Place of study:**  
This study was carried out in Comfort Nursing Home, 167B, Green Road, Dhaka, Bangladesh.
- **Duration of study:**  
From 01.07.2005 to 30.06.2010 for 05 years
- **Sample size:**  
540 patients who had undergone ultrasonic tonsillectomy by harmonic scalpel.
- **Data collection method:**  
Data was collected by interviewing the cases as per questionnaire from history, examinations, investigation reports, operation note & follow up.

**Results:**



**Fig.-1.** Age distribution of the patients (n=540).



**Fig.-2.** Sex distribution of the patients (n=540).

**Table - I**  
*Distribution of complications (n =540)*

Complications	No. of patient	Percentage (%)
Reactionary hemorrhage	00	00
Secondary hemorrhage	02	0.37
Total	02	0.37

**Table - II**  
*Overall results of Ultrasonic Tonsillectomy (n=540)*

Overall results	Median	Mean
Operation time	7 min, 50 sec	8 min, 10 sec
Intra operative blood loss	0.5ml	7ml
Time to first food take	1 hour	2 hours, 18 min
Return to normal diet	7 days	7.6 days
Analgesic prior to discharge	6 doses	5.8 doses
First post operative day pain score	4.0	4.7
Return to activity	10 days	07.9 days
Operating time (range)	3 min 45 sec	12 min 35 sec

**Discussion:**

In Bangladesh, ultrasonic tonsillectomy by harmonic scalpel is done only in this center regularly. A total 540 cases of harmonic scalpel tonsillectomy is included in this study. This study reveals, in respect of age group,

0-10 years of age are the most sufferer 31.11%(168 cases), then 21-30 years of age group 25.95%(145 cases), then as follows 31-40 years of age group 24.4%(132 cases), 11-20 years of age group 13.70% (74 cases), last of all above 40 years of age group 3.88%

(21 cases). In relation to sex, male patients are predominant 67 % ( 360 cases) and female patients are less 33 % (180 cases).

There is no undue primary bleeding in either age or sex group and the most important advantage is that there is no reactionary hemorrhage at all, which is consistent with other studies<sup>6-9</sup>. This study shows only 02 cases of secondary hemorrhage which is only 0.37% of the total patients, which correlates with other series<sup>10,11</sup>. So the ultrasonic scalpel has the potential to produce a bloodless tonsillectomy and less surrounding tissue damage. Mean operation time is 8 min, 10 sec.

The study shows that Intra operative blood loss is the lowest possible amount and mean per operative blood loss is 7ml only. The patients who have undergone this procedure of tonsillectomy less time to take first food and mean time to first food take is 2 hours, 18 min. The patients also take less time to return to their normal diet and mean time to return to their normal diet is 7.6 days. The study also reveals that the need of analgesic in the post operative period is less and patients take mean analgesic doses prior to discharge are 5.8 doses. The first post operative day mean pain score is 4.7 and the patients can return to normal activity earlier and mean time to return to activity is 07.9 days, the result is similar to another study.<sup>10</sup> Finally from this study, it is clear that the operating time is less and it is from 3 min 45 sec to 12 min 35 sec, which correlates with other studies.<sup>3,10,11</sup>

The decrease of post tonsillectomy morbidity is important, not only for patient and parents satisfaction, but also because reducing pain improves oral feeding, reducing the risk of dehydration, secondary infection, and post surgery hemorrhage. Electrosurgical instruments, cryosurgery, coblation, ultrasound and lasers all achieve cutting and

simultaneous hemostasis by sealing the blood vessel lumen by virtue of tissue heating. Some studies support the hypothesis that the extent of diathermy used in tonsillectomy has a direct influence on the delayed postoperative morbidity and healing of the mucosal wounds.<sup>12</sup> The degree of pain must be related to the degree of soft tissue damage, duration of infection with fibrosis and age of the patient.

#### **Conclusion:**

Every methods of surgery have got its own advantages and disadvantages. Here it is mentionable that harmonic scalpel is an expensive procedure and highly trained manpower is needed. From the above mentioned results and discussion it is clear that ultrasonic harmonic scalpel tonsillectomy is a safe, very effective with less time consuming, little per-operative bleeding, discomfort and early return to normal activities and diet.

#### **References:**

1. Paul WJ, Wiatrak J. Operative techniques in Otolaryngology - Head and Neck. Surgery 2002; 13: 65-67.
2. McAuliffe CJ. The history of tonsil and adenoid surgery. Otolaryngol Clin North Am 1987; 20: 415 – 19.
3. McGuire NJ. A method of guillotine tonsillectomy with an historical review. J Laryngol Otol 1967; 81: 187 – 95.
4. Weingarten C. Ultrasonic tonsillectomy: rationale and technique. Otolaryngol Head Neck Surg 1997; 116: 371 – 76.
5. Sood S, Corbridge R, Poweles J. Effectiveness of ultrasonic harmonic scalpel for tonsillectomy. Ear Nose Throat J 2001; 80: 514-516.
6. Ochi K, Ohashi T, Sugiura N. Tonsillectomy using an ultrasonically

- activated scalpel. *Laryngoscope* 2000; 110: 1237-1238.
7. Walker RA, Syed ZA. Harmonic scalpel tonsillectomy versus electrocute tonsillectomy: A comparison pilot study. *Otolaryngol Head Neck Surg* 2001; 125: 449-455.
  8. Szeremeta W, Novelly NJ, Benninger M. Postoperative bleeding in tonsillectomy patients. *Ear Nose Throat J* 1996; 75: 393-6.
  9. Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scales measures for chronic an experimental pain. *Pain* 1983; 17: 45 – 56.
  10. Fenton RS, Long J. Ultrasonic tonsillectomy. *J Otolaryngol* 2000; 29: 348-50.
  11. Leif B, Markku P, Jukka Y. Traditional tonsillectomy with bipolar radiofrequency thermal ablation tonsillectomy in adults. *Arch Otolaryngol Head Neck Surg* 2001; 127: 1106 – 12.
  12. Choy ATK, Su AP. Bipolar diathermy or ligation for hemostasis? a prospective study on post operative pain. *J Laryngol Otol* 1992; 106: 21 – 22.