



ORIGINAL ARTICLE

Harmonic Scalpel vs Diathermy Tonsillectomy.

Muhammad Zahid Rafiq Gill¹, Muhammad Asfand Rafiq Gill², Shaukat Javed³, Asma Hussain⁴

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ABSTRACT... Objective: To determine whether harmonic scalpel has any advantage over monopolar diathermy tonsillectomy or not in terms of blood loss, duration of surgery, pain scores and slough separation time. **Study Design:** Double Blind Cross Sectional study. **Setting:** Faisalabad Medical University and Affiliated Institutions. **Period:** April 2022 to September 2022. **Material & Methods:** Seventy patients were selected and divided by Random sampling into two groups to be operated either with Harmonic Scalpel or Monopolar Diathermy. The difference between the two groups was assessed in terms of pain scores, slough separation time, duration of surgery and blood loss between the two groups. **Results:** Patients results showed statistical significant difference in the two groups in terms of slough separation time and pain scores but there was no significant difference in terms of blood loss and duration of surgery. **Conclusion:** Harmonic scalpel does have an advantage over diathermy tonsillectomy as far as early healing is concerned and thus certainly helps in reducing the morbidity of the patients.

Key words: Diathermy, Harmonic Scalpel, Pain Scores, Slough Separation Time, Tonsillectomy.

INTRODUCTION

Despite the fact that number of tonsillectomies are declining¹ in the first world it is still one of the most commonly performed surgical procedure in the third world countries including Pakistan. Evolution of tonsillectomy has seen many modifications and advancements especially during 20th century. It has come a long way from crude dissection methods to recently introduced Enseal technology. Although Cold steel tonsillectomy is nearly obsolete now in the rest of the world it is still being practiced in Pakistan. Diathermy consoles are easily and commonly available in almost all teaching hospitals of Pakistan for the last many years. In big teaching institutions of Pakistan harmonic scalpel is fast gaining popularity among surgeons of all specialties because of its ultrasonic nature and considerably less effect on surrounding tissues.² It cuts and coagulates simultaneously at lower temperature than diathermy and lasers. There are number of studies on cold steel dissection

and diathermy tonsillectomies in Pakistan³⁻⁵ and internationally^{6,7} but recently introduced methods lack studies of conclusive nature in Pakistan. Only two studies^{8,9} have been carried out on harmonic scalpel tonsillectomy and one of them is a case control study. It may either be due to the cost of equipment or lack of surgical expertise. Due to fast changing disease scenario in recent times considerable sources are now being allocated for health sector. In order to raise the baseline and make cold steel tonsillectomy obsolete in Pakistan like the rest of the world I am undertaking this study to prove its effectiveness in reducing the morbidity of the patients. This study aims to evaluate a few variables in this context and determine whether harmonic scalpel has any advantage over monopolar diathermy tonsillectomy in terms of blood loss, duration of surgery, pain scores and slough separation time.

This was conducted to see whether the use of harmonic scalpel can reduce the morbidity of the

1. MBBS, MCPS, FCPS (ENT), Assistant Professor ENT, Faisalabad Medical University, Faisalabad.
2. Second Year MBBS Student, CMH Lahore Medical College IOD.
3. MBBS, FCPS (Med), Associate Professor Medicine, Niazi Medical College, Sargodha.
4. MBBS, M.Phil (Physiology), Assistant Professor Physiology, Independent Medical College, Faisalabad.

Correspondence Address:
Dr. Muhammad Zahid Rafiq Gill
Department of ENT
Faisalabad Medical University, Faisalabad.
mzrgil@gmail.com

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tonsillectomy patients or not.

Despite enormous advancement in otorhinolaryngology tonsillectomy is still the commonest surgical procedure in ENT. A number of tonsillectomy techniques have evolved since its inception. Every patient has its preference regarding the choice of technique. No single technique suits all patients. Despite several modifications in surgical technique of tonsillectomy very few in Pakistan has studied comparative effects of various tonsillectomy techniques in terms of blood loss, duration of surgery, slough separation time and pain scores. No significant data on comparative study of tonsillectomy techniques in Pakistan is available on Pak Medinet and Pubmed.

In this study an attempt has been made to compare harmonic scalpel and diathermy tonsillectomy in a way so that if one out of the two comes out to be better than further comparative studies of various tonsillectomy techniques can be conducted.

MATERIAL & METHODS

A cross sectional study of six months duration from April 2022 to September 2022 was conducted at Department of Otorhinolaryngology, Faisalabad Medical University, Faisalabad and its affiliated hospitals. Seventy patients belonging mostly to lower class and lower middle class between 7-15 years of age both males and females having history of five episodes of acute tonsillitis per year for at least last one year, three episodes of acute tonsillitis with acute otitis media or mesenteric adenitis or loss of seven school days per month for the last six months were included in the study.

All the patients were interviewed in detail and complete ENT examination was done. Exclusion criteria was Peritonsillar abscess, blood dyscrasias, concomitant adenoidal hypertrophy, DNS or nasal poly, known case of allergies, asthma, obstructive sleep apnea, obesity and anemia. The intervention technique and study variables are such that no special informed consent was needed. Seventy patients were randomized into two groups depending upon the day of day of surgery whether operated on

Tuesday, Wednesday or Friday, Saturday. In this study harmonic scalpel and diathermy will be used in Group I and Group II respectively. Both the surgeon and anesthetist will be unaware of the study design/existence. All the surgeries will be done by consultant surgeon. Duration of surgery will be calculated from the time when anterior pillar parallel incision is given to the time of removal of mouth gag. Time will be rounded to nearest whole number depending upon whether it is above or below 30 seconds. Blood loss will be calculated by measuring the fluid in the suction bottle. Pain scores will be calculated on 5th and 10th day postoperatively on Numeric pain scale of 0-10 where 0 means no pain, 1-3 mild pain, 4-6 moderate pain and 7-10 represents severe pain. The patients were asked to mark their pain on 5th and 10th day postoperatively on the scale and the results were calculated and recorded in centimeters.



Slough separation time will be calculated by serial direct examination of the patients throat in ENT OPD till the time complete epithelialization of the tonsillar fossae happens and counting starts by taking the 1st postoperative day as day one. All the patients were given amoxicillin and paracetamol for 14 days after tonsillectomy. The article was duly reviewed and approved by Ethical Review Committee of PHRC (Pakistan Health Research Council) (48.ERC/FMU/201-22/250).

Operative Procedure

Anterior pillar parallel incision from superior to inferior pole with either diathermy or harmonic scalpel will be used. Dissection either with diathermy or harmonic scalpel will be carried out in loose areolar tissue plane up to tonsillolinguval sulcus.

Data analysis was performed using a commercial statistics program (Statistical Package for Social

Sciences) computer program (SPSS, Version 26, Chicago IL). A $P < 0.05$ was considered statistically significant.

RESULTS

Seventy patients fulfilling the above criteria were operated for chronic tonsillitis. In group I 22.85 % were females and 77.14 % were males while in group II 34.28 % were females and 65.71 % were males. All of them were between 7- 15 years of age. Mean age of presentation was 11.05 years in Group I and 10.37 years in Group II. All of them belonged to lower and lower middle class socioeconomic status. 58.57% belonged to lower class and 41.42% belonged to lower middle class. In Group I 42.85 % had history of recurrent fever, 65.71 % had recurrent sore throats, 22.85 % had odynophagia, 17.14 % had otitis media and 5.71 % had mesenteric adenitis. In Group II 22.85 % had history of recurrent fever, 54.28% had recurrent sore throats, 31.42% had odynophagia, 17.14% had otitis media and 17.14% had mesenteric adenitis.

Mean duration of presenting complaints was 12.02 months in Group I and 12.77 months in Group II. On full ENT examination 51.42 % had hypertrophic tonsils and 48.58 % had atrophic tonsils. Patients were randomized into two groups depending upon on the day of surgery whether operated on Tuesday, Wednesday or Friday, Saturday. Both surgeon and anesthetist were unaware of the study design/existence. In Group I Monopolar diathermy was used for tonsillectomy and in Group II Harmonic scalpel was used. Results for blood loss and duration of surgery were recorded on the day of surgery. Mean blood loss in Group I was 0.28 ml and in Group II it was 0.17 ml. Mean time of surgery in Group I was 3.6 minutes and 3.91 in Group II. Slough separation time in Group I was 17.51 days and in Group II was 14.68 days. Mean Pain Scores were 5.8 cm and 6.91 cm in Group I on day 5 and 10 respectively and were 3 cm and 3.34 cm in Group II on day 5 and 10 respectively.

A significant difference at $P < 0.05$ and C.I 95% was thus observed between the two groups in terms of slough separation time ($P < .00001$) and

pain scores on day 5 ($P < 0.00001$) and 10 ($P < 0.00001$) but the difference was not significant at $P < 0.05$ in terms of blood loss (P is 0.25718) and duration of surgery (P is .18275).

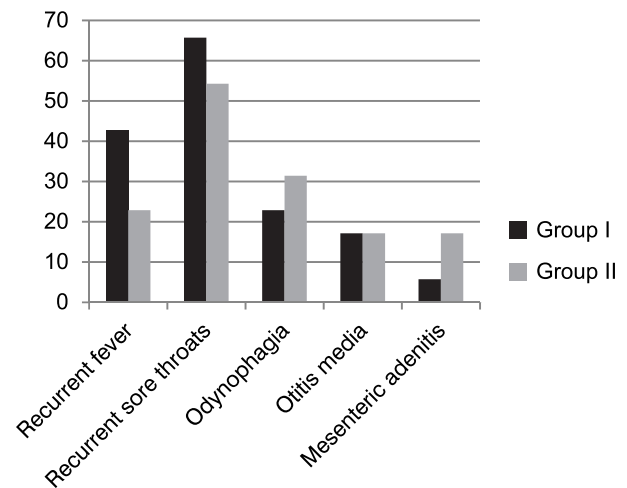


Figure-1. Comparative presenting complaints of the two groups

DISCUSSION

Tonsillectomy procedures are on the rise despite availability of better antibiotics as well better healthcare facilities. Conventional dissection tonsillectomy not only results in per op significant blood loss but also had lengthy duration of operation. Most common complaints encountered in post tonsillectomy days are usually pain, bleeding and wound healing issues. Diathermy was the first gadget developed to minimize per op bleeding and thus operation time but it didn't affect postoperative morbidity.^{10,11} Various new tonsillectomy techniques are being employed to minimize these problems.

Innovations in the tonsillectomy procedure have brought revolution in the patient management in the form of reduced hospital stay, reduced operation time, nearly no blood loss, better healing time and encouraging pain scores. Although a number of studies are present in literature internationally comparing various methods of tonsillectomy but lack of such studies in Pakistan compelled me to undertake this study wherein a comparison of harmonic with diathermy tonsillectomy can be made. Post tonsillectomy wound healing has been poorly

researched. Having a better understanding of the process of wound healing would allow surgeons to potentially prevent, anticipate and manage complications from the surgery that arise as part of the healing process.¹²

Disposable tonsillectomy instruments¹³ are commonly available and are being used now-a-days and the patients usually prefer disposable items.

Harmonic scalpel cuts and coagulates simultaneously. Ultrasonic energy is converted to mechanical movement of 55.5 kHz frequency (vibration of 55500 per second) at the active blade. The pressure by the blade collapses the blood vessels and the vibrating mechanically energy then forms a sticky coagulum that results in hemostatic seal. The HS controls bleeding by coaptive coagulation at low temperatures ranging from 50-100^o C¹⁴ Precise dissection, excellent hemostasis and less lateral thermal damage are its advantages.¹⁵ By contrast, electrocautery coagulate by burning (obliterative coagulation) at higher temperatures (150-400^o C).¹⁶

Rationale behind using harmonic scalpel and diathermy for tonsillectomy is that they are easily available, cost effective and already being used in most hospitals all over the world in various surgical specialties. Variables used to compare the two techniques are both subjective as well as objective which can accurately gauge the effectiveness of these techniques. 16 cm length diathermy pen was used in Group I for easy maneuverability and access. In Group II Harmonic scalpel (gun type) having 14 cm length, 110 grams weight and a rotation of 3600 was used. To avoid selection bias patients were randomized into two groups on the basis of day of surgery whether operated on Tuesday, Wednesday or Friday, Saturday. To avoid observer bias both surgeon and anesthetist were not aware of the study existence.

Our study showed no significant difference at $P < 0.05$ in terms of blood loss (P is 0.25718) and duration of surgery (P is .18275). This finding is totally in contrast to a previous study⁸ in terms of operation time but as far as blood loss is

concerned results are variable. While on one side J Paul Willging et al¹⁷ completely agree with our study results, on the other side Naeem Sultan Ali et al⁸ totally disagree. Interestingly in one of his previous studies J Paul Willging et al² reported similar results as ours in terms of blood loss too. One of the reasons for this difference may be the experience of the surgeon who was well versed in both these techniques and secondly handpiece selection and population selection might be the other reasons. In addition, paediatric population usually have well developed loose areolar tissue plain along tonsils which make dissection, hemostasis and maneuverability of the instruments easy.

Our study showed a significant difference ($P < .00001$) in terms of pain scores and slough separation time between the two groups. This finding was totally in agreement with previous studies.^{8,17} But the sample subjects were all adults in one of these studies⁸ and in the other whole of subject population was paediatric.¹⁷ Moreover, pain scores were calculated on different time intervals in both these studies than ours. Slough separation time in days by direct visual examination has never been estimated before in this region. Different scales and scores are described in literature but all are qualitative measurements rather than quantitative. So we can safely conclude that HS tonsillectomy is much safer and better than diathermy tonsillectomy. Further studies with larger sample size and same materials and methods may refine the results further.

CONCLUSION

We consider HS tonsillectomy much safer and better than diathermy tonsillectomy. Our study showed a significant difference in postoperative morbidity that is slough separation time and pain scores. Harmonic scalpel tonsillectomy group showed significant improvement in terms of slough separation time and pain scores at day 5 and 10. Intraoperative measuring variables, operation time and blood loss, however showed no difference. Furthermore, since both methods use disposable hand pieces, they provide significant safety and sterilization surety. Further




comparative studies of harmonic scalpel with other tonsillectomy techniques like Ligasure and Enseal system must be pursued to seek ways to reduce post op tonsillectomy morbidity.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	M. Zahid Rafiq Gill	Main author.	
2	M. Asfand Rafiq Gill	Drafting, Proof reading.	
3	Shaukat Javed	Medical fitness of the patients.	
4	Asma Hussain	Literature search.	