

# CONVENTIONAL GINGIVECTOMY OR DIODE LASER GINGIVECTOMY - A COMPARATIVE EVALUATION

Dr. Parthasarathi Biswas\*, Dr. Parthasarathi Saha\*\*, Dr. Zenab Khan\*\*\*, Dr. Somen Bagchi\*\*\*\*, Dr. Ashit Kr. Pal\*\*\*\*\*, Dr. Tirthankar Debnath\*\*\*\*\*

## ABSTRACT

Pleasant smile is considered a symbol of beauty and well being which extensively deals with soft tissue harmony. Gingival fibromatosis is manifested as a benign enlargement of the gingiva involving both the arches, hence causing major aesthetic, phonetic and masticatory problems. Diode LASERS are used for the soft-tissue manipulations like gingivectomy, gingivoplasty, operculectomy or frenectomy because of its highly absorbable property by melanin and hemoglobin, accompanied by improved epithelization and wound healing, hence, overcoming bleeding, trauma, pain, postoperative edema and overall patient discomfort. In this case report, split mouth gingivectomy was done by 940 nm diode LASER and conventional scalpel method, for the management of gingival overgrowth and a comparative evaluation done with different parameters.

With all limitations, it can be concluded that, although both the techniques were equally effective for surgical removal of gingiva, but, initially post operative healing, aesthetics and patient satisfaction is more in gingivectomy by LASER along with less pain, than in traditional scalpel technique. Whereas, scalpel method shows better result in the long run.

## KEY WORDS

**Gingivectomy by diode LASER, conventional gingivectomy by scalpel, VAS-pain, VAS-PES, Healing index, Patient Satisfaction Index.**

## ABOUT THE AUTHORS

\*Final Year P.G.T, \*\*Second Year P.G.T\*\*\*1st Year PGT,  
\*\*\*\*Professor & H.O.D, \*\*\*\*\*Professor, \*\*\*\*\*Assistant  
Professor, Department of Periodontics  
Dr.R.Ahmed Dental College & Hospital.

## INTRODUCTION

Pleasant smile is considered a symbol of beauty and well being which extensively deals with soft tissue harmony. Gingival fibromatosis is manifested as a benign enlargement of the gingiva involving both the arches, hence causing major aesthetic, phonetic and masticatory problems.

Diode LASER(acronym for “light amplification by stimulated emission of radiation”<sup>1</sup>), used for soft-tissue manipulations like gingivectomy, gingivoplasty, operculectomy or frenectomy, because of its highly absorbable property by melanin and hemoglobin, accompanied by improved epithelization and wound healing. To overcome bleeding, trauma, pain, post operative edema and overall patient discomfort often associated with conventional methods of surgeries, diode LASER can be used to perform various periodontal surgical procedures. This paper will highlight a prospective, split mouth comparative evaluation of different outcomes of two therapeutical approaches like conventional gingivectomy by scalpel and the resection of gingiva by using diode LASER.

A female patient (Picture 1), aged about 18 years, reported with fibrotic gingival enlargement with a chief complaint of aesthetic problem. After consideration of all haematological, serological and radiographical evaluation, gingivectomy by diode LASER was done in first quadrant and gingivectomy by conventional scalpel method was done in second quadrant. Following excision, the tissues were sent for histopathological evaluation and H/P findings were suggestive of – Gingival fibromatosis.

## METHODS

Gingivectomy had been planned for all compliments of the teeth [Picture 2-5]. In order to compare the different post operative parameters, it was decided to treat second quadrant by conventional scalpel technique and first quadrant using a diode LASER. Pre-surgical preparation consisted of scaling and root planing, oral hygiene instructions<sup>2</sup>, dietary evaluation and blood investigations. A written informed consent including permission for publication was obtained from the patient and the study was approved by the institutional ethical committee of Dr. R.Ahmed Dental College & Hospital.

In the first quadrant the thickened gingival tissue (thickness 5-6 mm measured by horizontal trans-gingival probing) were lased under local anaesthesia with a 940nm diode LASER ; excision mode 3 W, pulsed contact mode, pulse interval and length 0.1 ms, scanning an area of about 1 cm<sup>2</sup> is used while holding the delivery tip perpendicular to the tissue surface (Picture 5A-11).

Following local infiltration of anaesthesia in the tissue, a conventional gingivectomy procedure by using a scalpel, was performed on second quadrant excising the soft tissue wall to the base of the pocket. After the procedure, surgical sites were covered with periodontal dressing (Coe-Pak). (Picture 12-17)

The periodontal dressings were replaced at 24 hour and day 7. Post-surgical antibiotics (Amoxicillin 500mg, 8 hourly for 5 days) and analgesics (Ibuprofen 400 mg, 8 hourly for 3 days) and proton pump inhibitor once daily (Pantoprazole 40 mg) were prescribed. The patient was advised to use chlorhexidine (0.2%) mouthwash 12 hourly for 2 weeks. Postoperative instructions were given and patient was asked to monitor the pain response.

The patient was asked to assess the overall pain experience and on either of the operated sites based on the McGills pain questionnaire reported more discomfort on the scalpel treated site as compared to the lased site initially.

Healing of periodontal tissue after surgical treatment has long been a subject of study and several techniques have been employed so far. Treatment using soft tissue LASERs has dramatically improved surgical technique and wound healing as has been demonstrated in several studies.<sup>3,4</sup> Therefore, in this clinical trial, post-gingivectomy wounds were assessed over a number of months to clarify whether LASER treatment would improve the healing process and postsurgical results. [Table 1].

During the surgical procedure profuse bleeding was observed in the scalpel treated site, whereas the LASER site was relatively blood-less. It has been observed that diode LASER provides sufficient hemostasis and precise incision margins. The coagulation properties are particularly beneficial during the removal of mild to moderate vascular areas in the gingival present in the first quadrant. The added postoperative advantages noted are lack of swelling, pain or scar tissue formation and eventually good wound healing which is in accordance to the study by Romanos et al.(1999) and Roberto Pippin (2017).<sup>5,6</sup>

There are certain limitations in the use of LASERs for gingivectomy like excessive heating of the tissue due to charring, cemental burns result when the LASER tip comes in contact with the tooth<sup>7</sup> which can be kept in mind; also LASER procurement is costlier when compared to other modalities. Surgeon, assistant(s) and patient's eye should be protected by protective glass.

During post operative 1 day,7 days,1 month ,3 months and 6 months follow up a copper net(after 1 mm x 1 mm / unit standardization) was adjusted over the cast in each time and after sterilization, it is dampened in violet solution (made by coping pencil dampened in doctors' spirit) to mark the gingiva as multiple segment. In each segment all the parameters assessed and reading taken by the 3 doctors (D1: Third year PGT; D2: second year PGT and D3: first year PGT) simultaneously, and the mean values of each area and each observer are taken for the evaluation of post operative parameters (Picture 21-26).

## RESULT AND ANALYSIS

According to VAS-PES, initially LASER method shows better result, but after 3 months, scalpel method has the better outcome. Similarly, in healing index Score, upto 1 month LASER method shows better result but after 1 month follow-up, scalpel method is found to be superior. Initially pain perception by VAS-pain was less in LASER method as compared to scalpel method but first month onwards it is reversed. Patient satisfaction Scale score was higher in LASER method initially but 1 month onward scalpel methods prove to be better. Whereas, ANOVA says that none of the difference is statistically significant ( $p < 0.005$ ).

## DISCUSSION

The wound healing is a slow process following gingivectomy and takes place by secondary intention; it takes a few weeks to establish the normal contour of the gingiva<sup>8</sup>. Owing to the slow wound healing, several methods such as topical application of medicaments, antibiotics, or amino acids have been tried to improve the healing by secondary intention.<sup>9</sup>

Furthermore, techniques that cause lesser tissue damage would allow the wound to heal quickly and uneventfully and restore biological compatibility with treatment protocols that have least morbid effects on the tissue. Unique noninvasive procedures like LASERs have been developed that offers infection control, precision surgical technique, improve surgical procedures, minimal patient discomfort and encouraging postoperative benefits.<sup>10</sup>

LASER therapy is a fast growing, simple and atraumatic technique, which has been used in dentistry since the 1990s. Improved infection control, reduced postoperative pain and sensitivity, reduced patient anxiety and minimizing the need for anesthesia are the other advantages of LASER.<sup>11</sup>

Therefore, the observation of the study can be correlated to the fact that LASER treatment causes destruction of epithelial and stromal cells but leaves much of the connective tissue matrix intact and the basement membrane resists LASER irradiation



18 YEARS /  
FEMALE

**PRE-OPERATIVE  
PHOTOGRAPHS**



GINGIVAL ENLARGEMENT  
IN ANTERIOR REGION



GINGIVAL ENLARGEMENT  
IN PALATAL REGION



GINGIVAL ENLARGEMENT  
IN LEFT BUCCAL REGION



GINGIVAL ENLARGEMENT  
IN RIGHT BUCCAL REGION

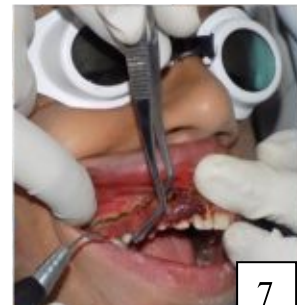
**GINGIVECTOMY BY LASER**



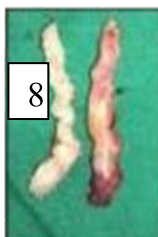
POCKET MARKING DONE



SURGERY WITH LASER  
IS GOING ON



GINGIVAL MASS REMOVAL  
IN PROGRESS



EXCISED  
TISSUE



IMMEDIATE POST-OPERATIVE  
PHOTOGRAPH



PERIODONTAL  
PACK GIVEN

**GINGIVECTOMY BY CONVENTIONAL SCALPEL METHOD:**



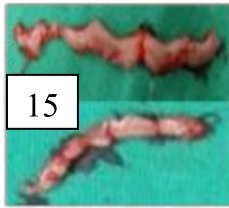
**ARMAMENTORIUM USED**



**BUCCAL GINGIVA EXCISED BY SCALPEL**



**PALATAL GINGIVA EXCISED BY SCALPEL**



**EXCISED TISSUE**



**PERIODONTAL PACK GIVEN**



**17**

**SCALPEL**

**LASER**



**18**



**19**

**Pre-operative photograph**

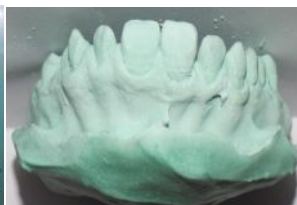
**Follow up 6 Month**



**20**



**21**



**IMPRESSION MADE, CAST FABRICATION DONE**



**22**

**COPPER NET ADAPTATION DONE**



**23**

**COPPER NET WITH VIOLET MARKER (LT. SIDE)**



**24**

**VIOLET UNITS PRODUCED OVER ATTACHED GINGIVA (RT. SIDE)**



**25**



**26**

**DIFFERENT AREAS ASSESSED AND READING TAKEN BY D1, D2 AND D3 INDIVIDUALLY IN EVERY FOLLOWUP AND MEAN VALUE TAKEN**

Table 1: Different parameter assessed in different time		Conventional gingivectomy	Diode LASER gingivectomy
<b>Follow up period</b>	Day 1		
	Day 7		
	1 Month		
	3 Month		
	6 Month		

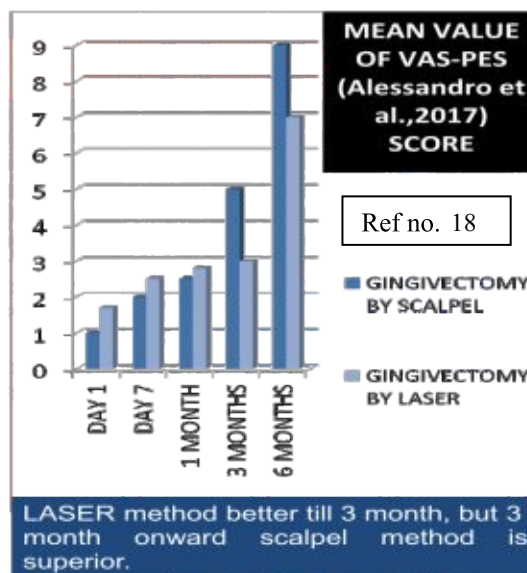
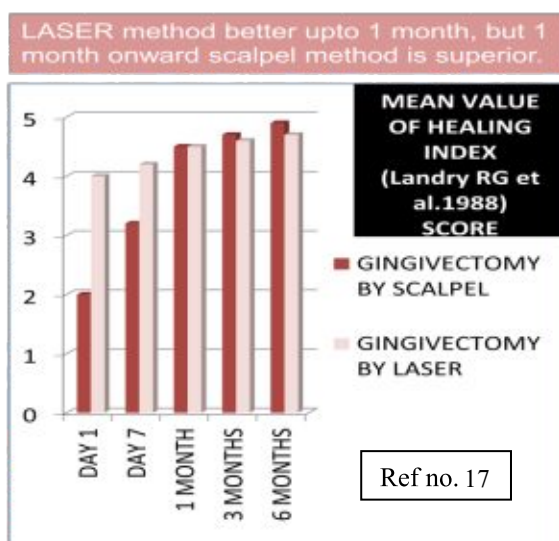
which is supported by the study of Meemawat et al. (2013) and Funde. S et al. (2015).<sup>8,12</sup> Lack of scarring and contraction observed in LASER-treated areas which can be presented in the light of the study of Luomanen et al. (1987).<sup>13</sup>

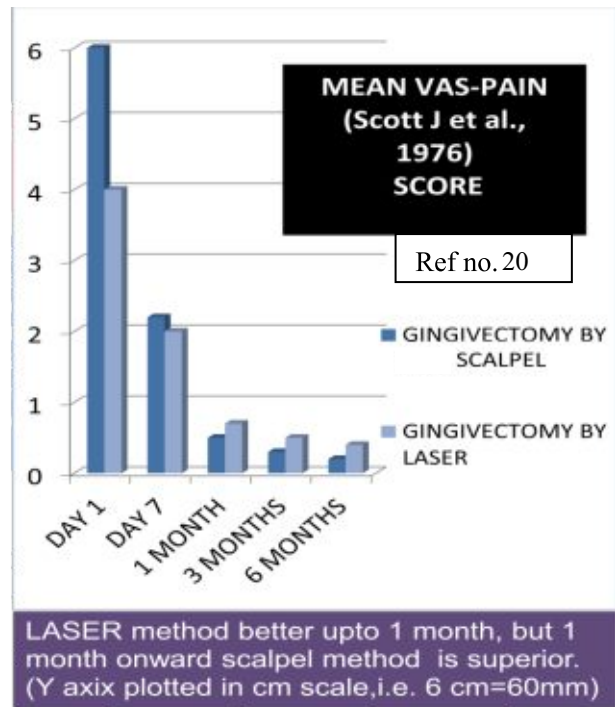
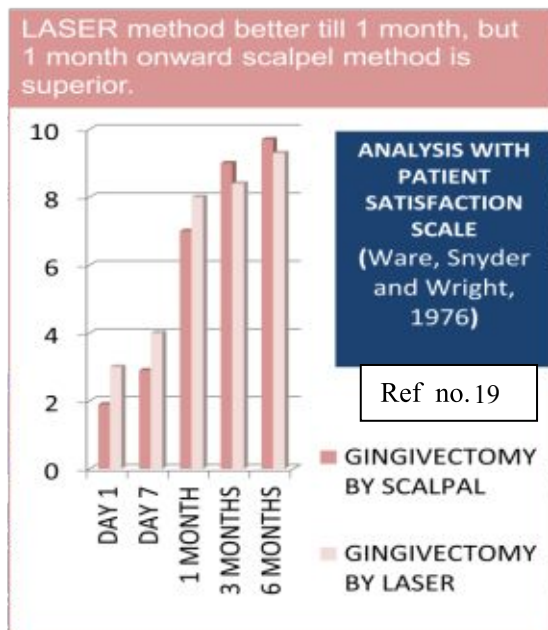
LASER-treated sites also have improved adenosine triphosphate synthesis, fibroblast

proliferation; collagen synthesis, phagocytosis of macrophages, and acceleration of the inflammatory phase of wound healing.<sup>14</sup> All these mechanisms can result in cellular proliferation and acceleration of the wound healing process stated by Saperia et al. (1986) and Karu in 1999 in separate studies.<sup>15,16</sup>

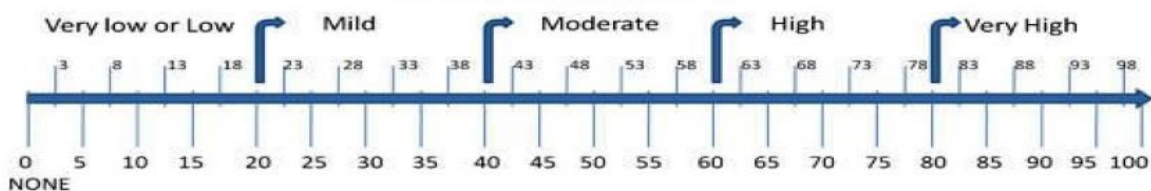
Comparative explanation of healing linking the sited case in respect of parameters used.

### STATISTICAL ANALYSIS:





## VISUAL ANALOUGE SCALE (in mm)



## CONCLUSION

To conclude, with proper adhesion to safeguards, both techniques can be used to remove gingival overgrowth with more or less equal efficiency and wound healing capacity. Although, both scalpel and laser techniques were equally effective, but, in this study it was observed that, initially, post operative healing, aesthetics and patient satisfaction is more and pain is less in gingivectomy by LASER than in traditional scalpel technique, however, scalpel method shows better result in the long run. Further split mouth studies are needed with larger sample size.

## REFERENCES

1. Kravitz N. D. & Kusnoto B. (2008). Soft-tissue lasers in orthodontics: An overview. American Journal of Orthodontics and Dentofacial Orthopedics, 133 (4, Supplement 1), S110-S114.
2. Mariotti A. Dental plaque-induced gingival diseases. Ann Periodontol 1999; 4:7-19.
3. Kumar R et al. The comparative evaluation of patients' satisfaction and comfort level by diode LASER and scalpel in the management of mucogingival abnormalities. Journal of Clinical and diagnostic research, 2015, vol-9(10); JC56-JC58.
4. Ramfjord SP, Ash MM Jr. Significance of occlusion in the etiology and treatment of early, moderate, and advanced periodontitis. J Periodontol 1981; 52:511-7.
5. Romanos G, Nentwig GH. Diode LASER (980 nm) in oral and maxillofacial surgical procedures: Clinical observations based on clinical applications. J Clin LASER Med Surg 1999; 17:193-7.
6. Roberto Pippin. Post surgical clinical monitoring of soft tissue wound healing in periodontal and implant surgery. Int J Med Sci. 2017; 14(8):721-728.
7. Upadhyay Y. Amlodipine-Induced Gingival Overgrowth: A Case Report. Journal of Dental

and Medical Sciences (JDMS) Volume 3, Issue 4 (Jan-Feb. 2013).

8. Meenawat A, Sunil C. Verma, Vivek Govila, Vivek Srivastava<sup>1</sup>, Karan Punn. Histological and clinical evaluation of gingival healing following gingivectomy using different treatment modalities. Journal of the International Clinical Dental Research Organization ; 2013: 5(1).

9. Değim Z, Celebi N, Sayan H, Babül A, Erdoğan D, Take G. An investigation on skin wound healing in mice with a taurine-chitosan gel formulation. Amino Acids 2002; 22:187-98.

10. Kimberly J Brodovicz, Kristin Mcnoughton, Naoto Uemura, Gary Meninjer. Reliability and feasibility of methods to quantitatively assess peripheral oedema. Clin. Med. Res. 2009 Jun; 7(1-2): 21-31.

11. Buchelt M, Kutschera HP, Katt erschafk a T, Kiss H, Lang S, Beer R, et al. Erb: YAG and Hol: YAG LASER osteotomy: The effect of LASER ablation on bone healing. LASERs Surg Med 1994; 15:373-81.

12. Funde. S et al. Comparison between LASER, Electrocautery and Scalpel in the Treatment of Drug - Induced Gingival Overgrowth. IJSS Case Reports & Reviews; 2015; Vol-I(10):27-30.

13. Luomanen M, Meurman JH, Lehto VP. Extracellular matrix in healing CO<sub>2</sub> LASER incision wound. J Oral Pathol 1987; 16:322-31.

14. Pourzarandian A, Watanabe H, Ruwanpura SM, Aoki A, Ishikawa I. Effect of low-level Er: YAG LASER irradiation on cultured human gingival fibroblasts. J Periodontol 2005; 76:187-93.

15. Saperia D, Glassberg E, Lyons RF, Abergel RP, Baneux P, Castel JC, Demonstration of elevated type I and type III procollagen mRNA levels in cutaneous wounds treated with helium-neon LASER. Proposed mechanism for enhanced wound healing. Biochem Biophys Res Commun 1986; 138:1123-8.

16. Karu T. Primary and secondary mechanisms of action of visible to near-IR radiation on cells. J Photochem Photobiol B 1999; 49:1-17.

17. Landry RG, Turnbull RS, Howley T. Effectiveness of benzydiamine HCL in the treatment of periodontal post surgical patients. Res Clinic Forums. 1988; 10:105-118.

18. Alessandro Lanza et al. Clinical application of the PES/WES Index on natural teeth: Case report and literature review. Case Rep Dent. 2017; 2017: 9659062.

19. Ware, Snyder, and Wright. Development and Validation of Scales to Measure Patient Satisfaction with Medical Care Services (1976). Vol I, Part A: PB 288-329.

20. Scott J et al. Graphic representation of pain. Pain. 1976 Jun; 2(2):175-84.