

Original Research

A comparative evaluation of laser-assisted and conventional open flap surgical procedures

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ABSTRACT:

Background: Diode laser with a wavelength of 810 nm or 910–980 nm, does not interact with dental hard tissues. The present study was conducted to evaluate clinically the treatment outcomes following laser-assisted and conventional open flap surgical procedures. **Materials & Methods:** 20 patients with chronic periodontitis were divided into 2 groups. Group I were treated with soft tissue diode (980nm) laser and group II patients were managed with conventional open flap debridement. Parameters such as gingival index (GI), plaque index (PI), and probing pocket depth (PPD) was recorded. **Results:** Gingival index at baseline was 3.20 and 3.34, at 3 months was 2.40 and 2.64 and at 6 months was 1.14 and 1.82 in group I and group II respectively. Plaque index at baseline was 1.18 and 1.26, at 3 months was 1.00 and 1.12 and at 6 months was 0.78 and 1.00 in group I and group II respectively. The difference was significant ($P < 0.05$). **Conclusion:** Laser assisted flap procedures showed better treatment outcomes as compared to the conventional open flap debridement.

Key words: Conventional open flap, Laser, Periodontitis

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INTRODUCTION

The goal of periodontal treatment is to remove the etiology, halt the inflammatory process, and restore connective tissue attachment and alveolar bone loss. Regeneration and new attachment gain has been technique-sensitive using guided tissue regeneration procedure. During periodontal treatment, scaling and root planing were often used to remove calculus, bacteria and infected root cementum.¹ However, with the advancement of laser periodontal therapy, lasers may become a viable and less invasive option for periodontal treatment of periodontitis. Lasers currently used in periodontal procedures include Erbium:yttrium-aluminum-garnet (Er:YAG), Neodymium:Yttrium-aluminum-garnet (Nd:YAG), Carbon dioxide (CO₂) lasers, and diode lasers.² The lasers have different properties, and can be used at varying wavelengths and exposures resulting in varying tissue penetration. Thus, further studies are needed to evaluate and calibrate the type of laser, the

optimal wavelength, and the best exposure protocol for the desired outcome in periodontal therapy. The Diode laser has shown a possible decrease in incidence of bacteremia when compared to scaling with ultrasonic instruments.³

Diode laser with a wavelength of 810 nm or 910–980 nm, does not interact with dental hard tissues and therefore, is an excellent soft tissue surgical laser, indicated for cutting and coagulating gingiva and oral mucosa, and for soft tissue curettage or sulcular debridement with an additional bactericidal effect.⁴ The principal goal of periodontal therapy is the elimination of bacterial plaque and also prevention of its accumulation. Conventional open flap surgery in conjunction with mechanical debridement has been shown to effectively achieve this goal.⁵ The present study was conducted to evaluate clinically the treatment outcomes following laser-assisted and conventional open flap surgical procedures.

MATERIALS & METHODS

The present study was conducted among 20 patients with chronic periodontitis of both genders. All were recruited after obtaining their written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I were treated with soft tissue diode (980nm) laser and group II patients were managed with conventional open flap debridement. Parameters such as gingival index (GI), plaque index (PI), and probing pocket depth (PPD) was recorded. These clinical parameters were recorded at baseline, 3 months & 6 months. Results

thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I Distribution of patients

Groups	Group I	Group II
Method	Diode (980nm) laser	Conventional open flap debridement
M:F	5:5	6:4

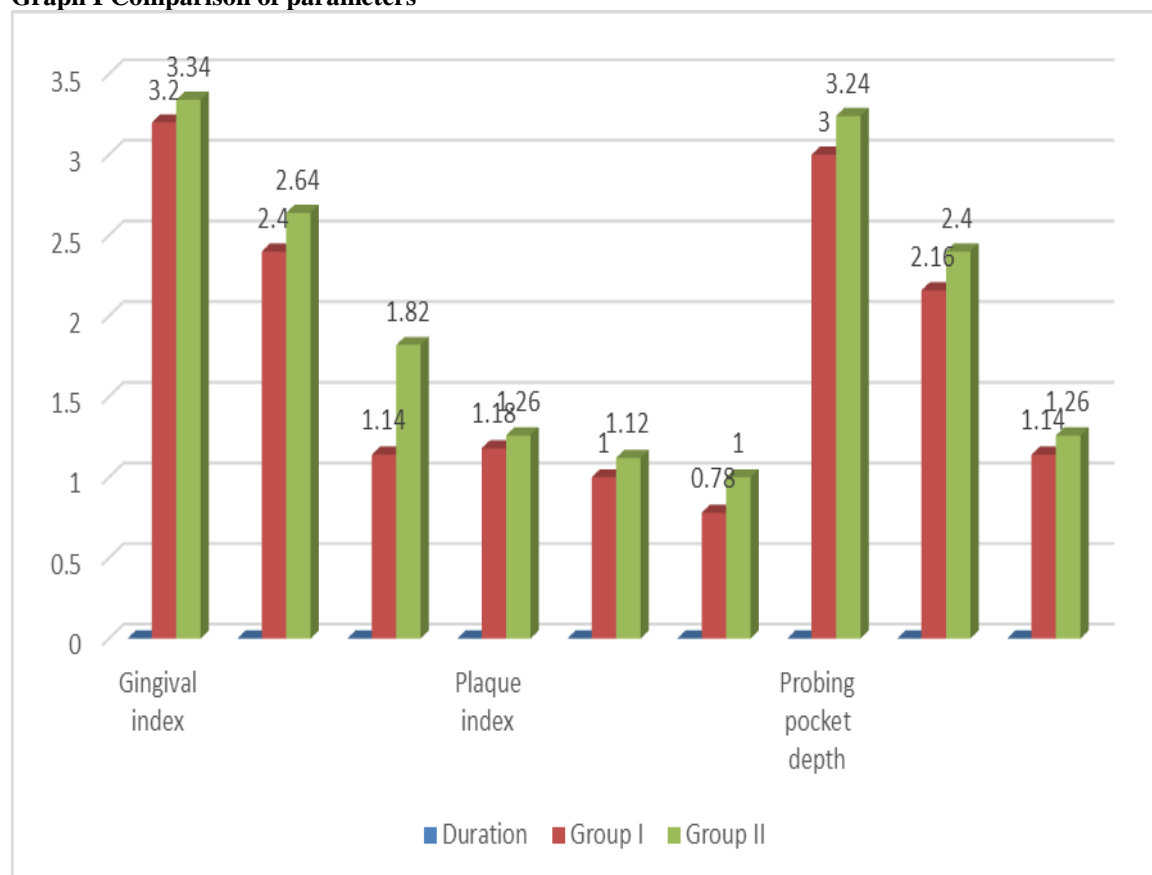
Table I shows that group I had 5 males and 5 females and group II had 6 males and 4 females.

Table II Comparison of parameters

Parameters	Duration	Group I	Group II	P value
Gingival index	Baseline	3.20	3.34	0.05
	3 months	2.40	2.64	
	6 months	1.14	1.82	
Plaque index	Baseline	1.18	1.26	0.04
	3 months	1.00	1.12	
	6 months	0.78	1.00	
Probing pocket depth	Baseline	3.00	3.24	0.01
	3 months	2.16	2.40	
	6 months	1.14	1.26	

Table II, graph I shows that gingival index at baseline was 3.20 and 3.34, at 3 months was 2.40 and 2.64 and at 6 months was 1.14 and 1.82 in group I and group II respectively. Plaque index at baseline was 1.18 and 1.26, at 3 months was 1.00 and 1.12 and at 6 months was 0.78 and 1.00 in group I and group II respectively. The difference was significant (P< 0.05).

Graph I Comparison of parameters



DISCUSSION

Periodontal therapy is directed at disease prevention, slowing or arresting disease progression, regeneration of lost periodontal tissues, and maintaining the achieved therapeutic objectives.⁶ Conventional periodontal surgeries result in reduced pocket depth due to apical repositioning of the gingival margin exposing the root surface to the oral cavity, thus resulting in possible clinical attachment loss, gingival cratering, and recession.⁷ The pain and discomfort associated with periodontal surgeries have urged a research interest into laser-assisted periodontal therapy. From the end of the twentieth century and until now, there has been continuous upsurge in the development of laser-based devices. "LASER" is an acronym for Light Amplification by Stimulated Emission of Radiation.⁸ The physical principle of laser was developed from Einstein's theories in the early 1900s. The first device was introduced in 1960 by Maiman. Laser-assisted periodontal therapy is based on the concept of subgingival curettage and/or reattachment and regeneration of the attachment apparatus and is commonly referred to as "nonsurgical." Higher patient comfort and acceptance have been reported with laser-assisted periodontal therapy.⁹ Laser-assisted periodontal therapy eliminates pockets with minimal recession or repositioning of the gingival margin.¹⁰ The present study was conducted to evaluate clinically the treatment outcomes following laser-assisted and conventional open flap surgical procedures.

In present study, group I had 5 males and 5 females and group II had 6 males and 4 females. Shetty et al¹¹ 30 sites in 15 patients (9 males and 6 females), age range (25-50 yrs) with chronic periodontitis having probing depth ≥ 5 mm after phase I therapy were randomly assigned to test group (laser-assisted flap debridement) & control group (conventional open flap debridement) in a split-mouth design. Clinical and microbial parameters were analyzed at baseline, 3 months, and 6 months. In addition, Soft tissue healing was also assessed using the healing index at 1 week, 2 weeks, 1 month, 3 months & 6 months. The change in clinical parameters in the test and control groups was not statistically significant at the various time intervals ($p < 0.05$). However, the microbiological analysis showed a significant reduction in the CFU counts of periodontal pathogens in the test sites when compared to the control sites at immediate post-op and 6 months ($p > 0.05$).

We found that gingival index at baseline was 3.20 and 3.34, at 3 months was 2.40 and 2.64 and at 6 months was 1.14 and 1.82 in group I and group II respectively. Plaque index at baseline was 1.18 and 1.26, at 3 months was 1.00 and 1.12 and at 6 months was 0.78 and 1.00 in group I and group II respectively. Deshmukh et al¹² conducted a study in which twenty patients in an age range of 20–54 years and with pocket depth of ≥ 5 mm and ≤ 7 mm were included in the study. The plaque index (PI), gingival

index (GI), probing depth (PD), clinical attachment level (CAL), and colony forming units (CFUs) of the periodontal pathogens namely Porphyromonas gingivalis, Fusobacterium nucleatum, Aggregatibacter actinomycetemcomitans, and streptococci were compared in patients undergoing closed pocket debridement with diode laser (Group I) against open flap debridement (Group II) at baseline and after 3 months of the procedure. There was a statistically significant difference between the PD reduction in Group I and Group II ($P = 0.02$), with Group II showing greater reduction in PD. Furthermore, the mean value of CFUs after 3 months of the procedures in Group I was significantly less as compared to Group II.

CONCLUSION

Authors found that laser assisted flap procedures showed better treatment outcomes as compared to the conventional open flap debridement.

REFERENCES

1. Marsh PD: Sugar, fluoride, pH and microbial homeostasis in dental plaque. Proc Finn Dent Soc 1991; 87: 515-25.
2. Latheef P, Sirajuddin S, Gundapaneni V, Mn K and Apine A: Iatrogenic damage to the periodontium caused by periodontal treatment procedures. Open Dent J. 2015; 9: 203-07.
3. Schenk G, Flemmig TF, Lob S, Ruckdeschel G and Hickel R: Lack of antimicrobial effect on periodontopathic bacteria by ultrasonic and sonic scalers in-vitro. J Clin Periodontol 2000; 27: 116-19.
4. Ji S, Choi YS and Choi Y: Bacterial invasion and persistence: critical events in the pathogenesis of periodontitis? J Periodont Res 2015; 50: 570-85.
5. Rao NR and More CB: "Application of lasers in periodontal therapy: A review of literature with International Journal of Current Research 2016; 8(09): 38985-94.
6. Jha A, Gupta V and Adinarayan R: LANAP, Periodontics and Beyond: A Review. J Lasers Med Sci 2018; 9(2): 76- 81.
7. Katuri KK, Bollepalli AC, Sunkireddy HKR, Chilakalapudi HCB, Kurapati S and Vinnakota NR: Clinical effectiveness of laser assisted new attachment procedure as an adjunct to nonsurgical periodontal treatment: a randomized clinical study. J Int Oral Health 2015; 7(11): 57-62.
8. Abdulsamee N: "Soft and Hard Dental Tissues Laser Er: YAG Laser: From Fundamentals to Clinical Applications. Review Article". EC Dental Science 2017; 11(4): 149-67.
9. Shah NK, Rai JJ, Dave DH and Patel JK: Deploying diode laser in periodontics: An evidence-based review. Adv Hum Biol 2018; 8: 64-9.
10. McCawley TK, McCawley MN and Rams TE: Immediate Effects of Laser-Assisted New Attachment Procedure (LANAP) on Human Periodontitis Microbiota. J Int Acad Periodontol. 2018; 20(4): 163-7.
11. Shetty S, Shetty K, Alghamdi S, Almeahdi N and Mukherjee T: A comparative evaluation of laser assisted & conventional open flap surgical debridement procedure in patients with chronic periodontitis – a clinical and microbiological study- a pilot project. Int J Pharm Sci & Res 2020; 11(10): 4957-65.
12. Deshmukh K, Shetty D, Shetty A, Jandrajupalli SB, Chandolu S, Bodduru R, Nayyar AS. Comparative evaluation of the efficacy of closed pocket debridement with diode laser and periodontal open flap debridement: A clinical and microbiologic study. J Clin Sci 2018;15:113-22.