



Diode Laser Assisted Management of Gingival Recession Associated Dental Hypersensitivity: Case Series

[PP: 01-07]

Dr. Isha Sharma

Department of Periodontology, Surendera Dental College & Research Institute, Sriganganagar Rajasthan, India

Dr. Sanjeev Kumar Salaria

Department of Periodontology, Surendera Dental College & Research Institute, Sriganganagar Rajasthan, India

Dr. Satwant Kaur

Department of Periodontology, Surendera Dental College & Research Institute, Sriganganagar Rajasthan, India

Dr. Himanshu Kalia

Department of Orthodontics & Dentofacial Orthopedics, Surendera Dental College & Research Institute Sriganganagar, Rajasthan, India

Abstract:

Dentinal hypersensitivity associated pain is one of the important factor which elicit oral discomfort and restricts the patients to perform oral hygiene and or interfere with dietary intake; thereby may cause periodontal diseases, nutritional deficiency etc. Numerous treatment modalities are available (medicated dentifrices, oral rinse, restoration etc,) which required continuous usage as none is capable of constant delivery of the agent to the site, but are associated with certain limitations e.g. lack of patients compliance, poor taste, time consuming etc. Currently, different invitro studies reported the usage of laser in reducing/ occlusion of dentinal tubules but in vivo studies are scarce. Therefore, present study was planned to evaluate the efficacy of 940nm diode laser (DL) assisted irradiation for the management of gingival recession associated DH.

Methods: Seven patients were selected from the outpatient department of Periodontology with chief complaint of DH after fulfilling the inclusion and exclusion criterion and treated with DL irradiation for 10 seconds in non focused mode utilizing 300µm fiber optic followed by immediate and one month post operative evaluation of DH utilizing visual analogue scale.

Result: ANOVA and Post Hoc Tukey test evaluation of data acquired at baseline, immediate and 1 month post therapy showed statistically significant improvement in the management of DH against cold, tactile and air blast test.

Conclusion: 940nm DL assisted desensitization was highly effective for the management of DH, but further long term randomised controlled clinical trial on large number of patients are required before reaching the final conclusion.

Keywords: *Dentinal Hypersensitivity, Diode Laser, Pain, Recession, Verbal Analogue Scale*

ARTICLE INFO The paper received on: **12/08/2017** Accepted after review on: **30/09/2017** Published on: **30/11/2017**

Cite this article as:

Sharma, I., Salaria, S., Kaur, S. & Kalia, H. (2017). Diode Laser Assisted Management of Gingival Recession Associated Dental Hypersensitivity: Case Series. *Case Reports in Odontology*. 4(2), 01-07. Retrieved from www.casereportsinodontology.org

1. Introduction

Dentin hypersensitivity (DH) often referred to as the ‘common cold of dentistry’

a condition that affects many patients.¹ Dentinal exposure may occur via several means like; caries, attrition, abrasion or erosion and denudation of the root surface



due to gingival recession, chronic periodontal disease, post periodontal surgery etc. Buccal cervical area is the commonly affected site.² Desensitizing tooth pastes containing active agents are the most commonly used treatment for DH which fails to achieve an acceptable level of long-term desensitisation.^{3,4} Seeking a solution for this problem, laser therapy was proposed as an alternative treatment for management of dentin sensitivity^{5,6} but literature is scarce. Therefore, present in vivo case series were planned to evaluate the efficacy of single irradiation application of 940nm Diode laser (DL) for 10 seconds in non focused mode utilizing 300µm fibre-optic in the management of gingival recession associated dentinal hypersensitivity.

2. Materials and Methods:

The present pilot study was conducted in the Department of Periodontology and Oral Implantology of Surendera Dental College and Research Institute Sriganganagar on the patients reported with a chief complain of severe dentinal hypersensitivity in spite of usage of desensitizing dentifrice in the outpatient department and demanded the solution for the same. Seven patients fulfilled the inclusion and exclusions criterion and submitted their written informed consent for the treatment of the same after listening to the objective of study with its pros and cons in detail were selected and treated.

Inclusion Criteria:

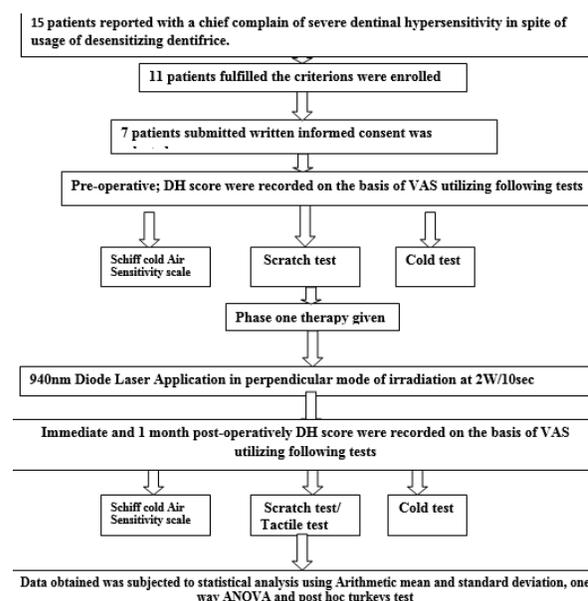
1. Periodontally healthy with labial or buccal reduced periodontium associated DH among both the sexes. .
2. Minimal 2 number of teeth exclusively with dentinal hypersensitivity Visual analogue score ≥ 5 along with history of no relief from the desensitizing dentifrices.

Exclusion Criteria: Caries teeth, teeth with developmental anomalies, restored teeth, fractured, eroded or cracked teeth, hypoplastic teeth, bleached teeth, fluorosed teeth, cervical abrasions.

3. Methodology:

All the selected patients underwent for phase-I therapy followed by pre-operative evaluation of DH score by means of VAS of air blast, tactile and cold tests which was served as baseline values. Immediately after phase-I therapy exposed dentinal surfaces were isolated utilizing dry gauze and areas were irradiated utilizing 940nm diode laser at 2Watt continuous mode twice for 5sec utilizing 300µm fiber optic kept perpendicular to the surface at a distance of 1mm to prevent contamination from dentine under high power vacuumed suction: followed by immediate as well as 1 month post laser irradiation therapy evaluation of DH score by means of VAS of air blast, tactile and cold tests.

4. Study Design





5. Results

The mean and standard deviation values of VAS for cold; tactile; airblast; at baseline, immediate and 1 month post DL irradiation were reported to be 7.25 ± 1.28174 , 1.875 ± 1.356203 & 0.875 ± 1.125992 ; 5.125 ± 2.748376 , 0.875 ± 0.834523 & 0.625 ± 0.916125 respectively as shown in Table 1,2,3.

Intragroup comparison of effect of DL irradiation on the intensity of cold sensation, tactile and airblast induced DH experienced by patient between baseline, immediate and one month post operatively showed significant improvement ($p < .05$) utilizing one way Anova test whereas only statistically significant pair analysis were observed between baseline versus immediate as well as baseline versus 1 month post operatively utilizing post hoc tuckey test (Table 1,2,3)

On intergroup comparison among different test at baseline, immediate and 1 month post operatively including significant pair analysis showed non significant changes utilizing one way Anova and post hoc tuckey test.

6. Discussion:

Dentin hypersensitivity (DH), is one of the most common unresolved dental problems that we encounter in clinical practice and demands for the management of DH are expected to increase as the adult population retains their teeth for life, and as population of all age groups engage in lifestyle and behaviours that promote dentin exposure through gingival recession or erosion of tooth surfaces,^[7-9] plus other factors also contributes in DH, therefore except the healthy periodontal tissue with reduced periodontium (gingival recession) affiliated reasons for DH all the remaining factors responsible were considered under exclusion criterions in the present study.

As cervical areas of the teeth are the most common affected sites of hypersensitivity.^[10] Therefore only, labial/buccal cervical areas were also considered in the inclusion criterion.

DH elicit pain and discomfort due to which patient usually refrains from all the oral hygiene habits, further contribute to the gingival and periodontal diseases progression. Therefore, management of DH is of utmost importance to enhance patient complians and to facilitate the oral hygiene by eliminating the pain sensation elicited from the DH.

The vast variety of treatment modalities are recommended in the literature for DH associated with periodontal reasons such as commercially available desensitizing dentifrices, mouth washes, gels, iontophoresis (ionic exchange gadgets)^[11,12] soft tissue grafting (FGG, SECTG), coronally advanced flap (CAF) etc.^[13,14]

An ideal DH treatment would mimic the natural desensitising process, including changes in dentin that lead to rapid and lasting occlusion of tubules.^[15,16] Occluding open dentin tubules is one of the means of treating dentine hypersensitivity. Majority of desensitizing dentifrices worked on the same principle; in this approach, fluid within the tubule is isolated from external stimuli, resulting in a significant reduction or elimination of fluid movement to eliminates or reduce the pain response; most commonly preferred mode of treatment by majority of the patients; but the associated negative effects such as poor taste and staining, discourage the sufferers of this distressing condition from achieving compliance to regular and sustained product use;^[17] whereas other soft tissue surgeries such as sub epithelial connective tissue graft (SCTG), CAF, FGG are technique sensitive and are invasive which requires expertise



but associated with fewer complications such as post operative pain, bleeding and discomfort etc.^[18]

With the advent of laser technology and its growing utilization in dentistry, an additional therapeutic option is available for the treatment of DH. Diode laser have been found to mainly work of photobiomodulating effect, which cause increase in cellular metabolic activity of odontoblast and intensifying tertiary dentine production, thus obliterating the dentinal tubules.^[3] There are few clinical studies in the literature that address the 980nm diode laser can seal dentinal tubules,^[19,20] but the effect of 940nm wavelength diode laser with its safety parameters in the management of DH is not clear. Therefore the present in-vivo pilot study was design to evaluate the effect of 940nm diode laser in management of DH utilizing 300µm fiber optic kept perpendicular to the surface at 2Watt continuous mode twice for 10sec in patients with facial gingival recession induced DH. The diode laser specifications utilized in the present study is in accordance with the report of Liu Y et al^[21] reported that 2.0 W/CW is considered safe and effective in sealing the dentin tubules (thereby reducing the DH) without adversely affecting the pulpal tissue^[21] that may be the reason for excellent outcome in the present pilot study. The parameters assessed in the present study VAS for tactile, cold and air blast test were identified for evaluation of the pain and sensitivity score throughout the study as cited in the reports of Clark GE et al, Ekowski C et al, Joyce CRB et al respectively.^[20,22,23]

The present study is the first report to the best of our knowledge which has utilised the 940nm diode laser for periodontal regions associated DH. The marked reduction in pain and discomfort was observed in all the cases which was in

accordance with the reports of Inder MS et al (2015)^[24], where treatment protocol was different; they utilized 980nm diode laser and iontophoresis with 1.23% APF Gel, Suri I et al (2016)^[25]; they checked the efficacy of 5% NaF varnish and 980nm diode laser and their combined application in treatment of DH.

The mechanism behind the reduction in the DH may be due to the dentin melting and narrowing of the dentinal tubules and their rapid sealing.^[4,26] The patients were highly pleased with the treatment outcome which is the ultimate goal of the therapy.

7. Conclusion:

On the basis of outcome achieved in the present case series it was concluded that single application of 940nm DL assisted desensitization for 10 second was highly effective for the management of DH but further long term randomised controlled clinical trial on large number of patients are required before reaching the final conclusion.

References:

1. Yip HK, Smales RJ, Kaidonis JA. Management of tooth tissue loss from erosion. *Quintessence Int.* 2002; 33(7):516-20.
2. Mantri V, Maria R, Alladwar N, Ghom S. Dentin Hypersensitivity: Recent Concepts in Management. *J Ind Acad Oral Med Radiol.* 2011;23(2):115-9.
3. Orchard R, Gilliam DG. Managing dentin hypersensitivity. *J Amer Dent Assoc.* 2006;137:990-8.
4. Schuurs AH. Dentist view on cervical hypersensitivity and their knowledge of it's treatment. *Endodontic and Dental Traumaology.* 1995;11:240-4.
5. Tillis TS, Keating JS. Dentin hypersensitivity. In: Wilkins EM. *Clinical Practice of the Dental Hygienist.* 9th ed. Baltimore, MD: Lippincott Williams & Wilkins; 2005.



6. Gillam D, Orchardson R. Advances in the treatment of root dentine sensitivity: mechanisms and treatment principles. *Endodontic Topics*. 2006; 13(1):13-33.
7. Strassler HE, Drisko CL, Alexander DC. Dentin Hypersensitivity: Its inter-relationship to gingival recession and acid erosion. *Inside Dent*. 2008;4(Spec ISS):1-9.
8. Zero DT, Lussi A. Etiology of enamel erosion/ – intrinsic and extrinsic factors. In: Addy M, Embery G, Edgar WM, Orchardson R, editors. *Tooth wear and sensitivity. Clinical advances in restorative dentistry*. London: Martin Dunitz; 2000. p. 121–39.
9. Zero DT, Lussi A. Erosion- chemical and biological actors important to the dental practitioner. *Int Dent J*. 2005;55(Suppl 1): 285-90.
10. Roberson T, Heymann H, Swift E. *Art and science of operative dentistry*. 8th ed. Mosby, New Delhi; 2006.:268-92.
11. Scherman A, Jacobsen PL. Managing dentine hypersensitivity: What treatment to recommended to patients. *J Am Dent Assoc*. 1992;123:57-61.
12. Martens LC, Surmont PA. Effect of anti-sensitizing toothpastes on opened dentinal tubules and on two dentin-bonded resins. *Clin Prev Dent*. 1991;13:23-8
13. Pini-Prato GP, Cairo F, Nieri M, Franceschi D, Rotundo R, Cortellini P. Coronally advanced flap versus connective tissue graft in the treatment of multiple gingival recessions: A split-mouth study with a 5-year follow-up. *J Clin Periodontol*. 2010;37:644-650.
14. Douglas de Oliveira DW, Marques DP, Aguiar Cantua ´ria IC, Flecha OD, Goncalves PF. Effect of surgical defect coverage on cervical dentin hypersensitivity and quality of life. *J Periodontol*. 2013; 84:768-775.
15. Cummins D. Dentin hypersensitivity. From diagnosis to a breakthrough therapy of everyday sensitivity relief. *J Clin Dent*. 2009;20(Spec Iss):1-9.
16. Markowitz K, Pashley DH. Discovering new treatments for sensitive teeth: the long path from biology to therapy. *J Oral Rehabil*. 2007;35:300-15.
17. T. Schiff et al. Clinical efficacy in reducing dentin hypersensitivity of dentifrice containing 8.0% arginine, calcium carbonate and 1450ppm fluoride compared to a dentifrice containing 8% strontium acetate and 1040 ppm fluoride under consumer usage conditions before and after switch-over. 2011;22(Spec Iss):28-138.
18. Goldstein M, Brayer L, Schwartz Z. A critical evaluation of method for root coverage. *Crit Rev Oral Biol Med*. 1996;7(1):87-98.
19. Mittal R, Singla MG, Sood A, Dua A, Sodhi PS. Clinical evaluation of middle power output 810nm GaAlAs diode laser for treating severe dentine hypersensitivity: A randomized clinical trial. *Int J Dent*. 2014;4(1):20-5.
20. Clark GE, Troullos ES. Designing hypersensitivity clinical trials. *Dent Clin North Am*. 1990;34:531-44.
21. Ying L, Gao Y, Shuaimi X U, Zhan X, Wu B. In vitro study of dentine hypersensitivity treated by 980-nm diode laser. *Laser Med Sci*. 2013;4(3):111-9.
22. Ekowski C, Hrubes V, Joyce CRB, Zutshi DW, Floor MK, Mason RM (1972) An experimental study of two methodological problems in clinical evaluation: different types of scale and the availability of patients previous judgments. *Psychopharmacologia* 26 (Suppl): 70
23. Joyce CRB, Zutshi DW, Hrubes V, Mason RM. Comparison of fixed interval and visual analog scales for rating chronic pain. *Eur J Clin Pharmacol*. 1975;8(3):415-420.
24. Indukar M S, Maurya A S. The clinical effect of diode laser versus iontophoresis with acidulated phosphate fluoride gel in the treatment of dentin hypersensitivity. *Ind J Applied Res*. 2015;5(7):33-5.
25. Suri I, Singh P, Shakir QJ, Shetty A, Bapat R, Thakur R. A comparative evaluation to assess the efficacy of 5% sodium fluoride



varnish and diode laser and their combined application in the treatment of dentin hypersensitivity. J Indian Soc Periodontol. 2016; 20(3):307-14.

26. Schoops U, Moritz A, Maleschitz P, Goharkhay K, Kluger W, Wernischf J, Sperr WD. The impact of ErYAG laser irradiation on root surfaces: An in vitro evaluation. J Oral Laser Appl. 2001;1(1):35-41

Legends:

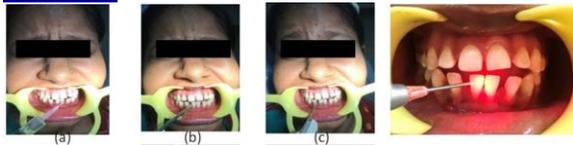


Figure: 1- a, b, c: pre-operative visual analogue scale (VAS) score recorded by (a) cold test, (b) air blast, (c) tactile test.

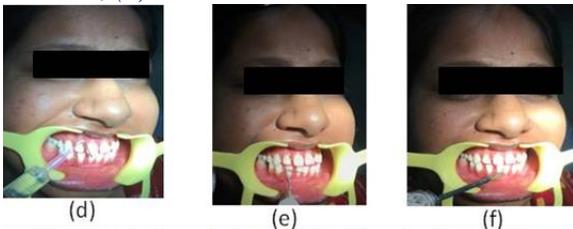


Figure: 1-d, e, f: VAS score immediate post-operative.

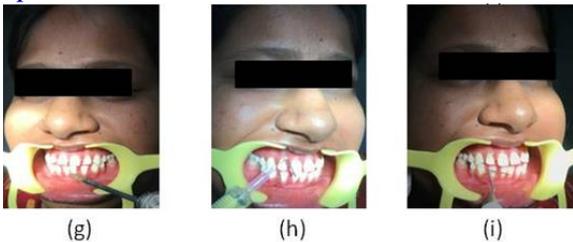


Figure: 1-g, h, i: VAS Score at month

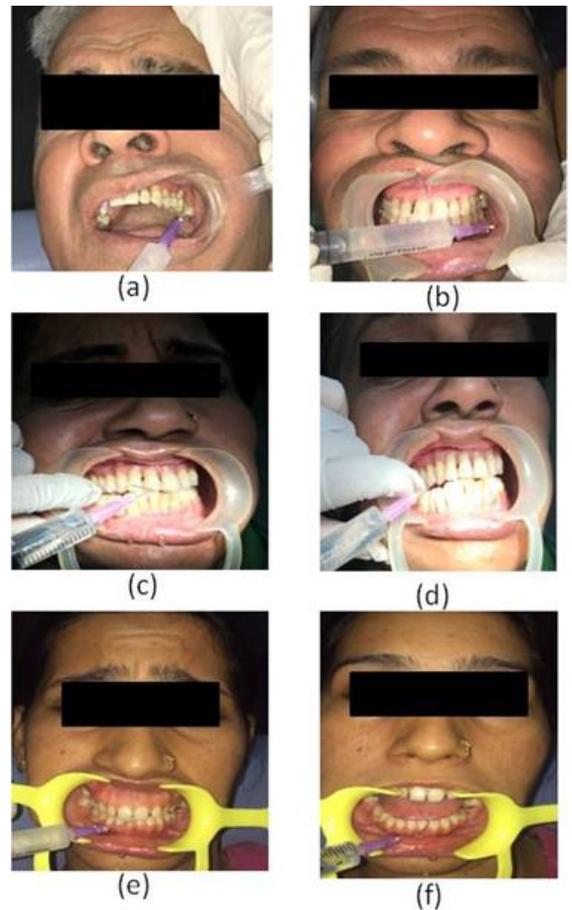


Figure: 2 Case-2(a & b), Case-3(c & d), Case-4(e & f) representing pre and post operative VAS score

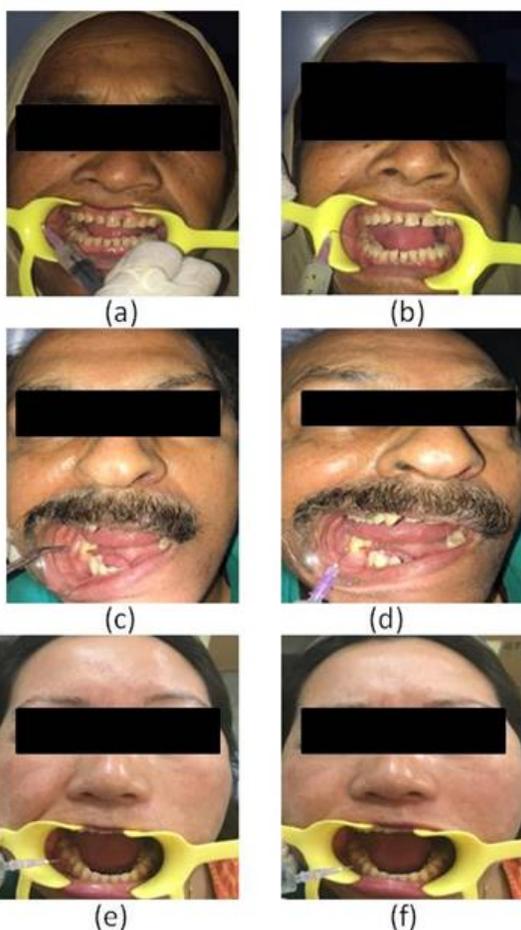


Figure: 3- Case-5(a & b), Case-6(c & d), Case-7(e & f) representing pre and post operative VAS score

Tables:

Table: 1 Subjects at different time intervals

	Pre-op	Immediate	1 month
Mean	7.25	1.875	0.875
Standard Deviation	1.28174	1.356203	1.125992
Minimum	5	1	0
Maximum	9	5	3
F value*	59.394		
p value	<0.01		
Significant Pairs#	pre op Vs immediate		
	pre op Vs 1 month		

*ANOVA test; # Post Hoc Tukey test

Table: 2 Descriptive and inferential statistics for VAS scores in relation to air blast test for subjects at different time intervals

	Pre-op	Immediate	1 month
Mean	6.875	1.25	0.375
Standard Deviation	1.246423	0.707107	0.744024
Minimum	5	0	0
Maximum	9	2	2
F value*	114.5411		
p value	<0.001		
Significant Pairs#	pre op Vs immediate		
	pre op Vs 1 month		

*ANOVA test; # Post Hoc Tukey test

Table 3: Descriptive and inferential statistics for VAS scores in relation to tactile test for subjects at different time intervals

	Pre-op	Immediate	1 month
Mean	5.125	0.875	0.625
Standard Deviation	2.748376	0.834523	0.916125
Minimum	1	0	0
Maximum	8	2	2
F value*	16.888		
p value	<0.001		
Significant Pairs#	pre op Vs immediate		
	pre op Vs 1 month		

*ANOVA test; # Post Hoc Tukey test