

Comparative evaluation of cyanoacrylate, LASER and LASER with Cyanoacrylate in the treatment of Dentin hypersensitivity - A split mouth clinical trial.

¹Dr. Vivekananda MR., BDS, MDS, Professor. Sri Hasanamba Dental College and Hospital, Vidyanagar, Hassan, 573202, Karnataka.

²Dr. Shamna Mohammed Ali., BDS, MDS, Periodontist, Private practitioner Thiruvananthapuram, Kerala.

³Dr. Harsha MB., BDS, MDS, Professor & Head. Sri Hasanamba Dental College and Hospital, Vidyanagar, Hassan, 573202, Karnataka.

⁴Dr. Shivaprasad D., BDS, MDS, Reader. Sri Hasanamba Dental College and Hospital, Vidyanagar, Hassan, 573202, Karnataka.

Corresponding Author: Dr. Vivekananda MR., BDS, MDS, Professor. Sri Hasanamba Dental College and Hospital, Vidyanagar, Hassan, 573202, Karnataka.

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: To comparatively evaluate the efficacy of cyanoacrylate, LASER and LASER with cyanoacrylate in the treatment of Dentin hypersensitivity.

Methods: 24 subjects aged between 25-55 years with teeth hypersensitivity on contra lateral sides were selected. Group 1: 4 participants were treated with cyanoacrylate on the right, LASER on the left and vice versa on the rest 4. Group 2: First 4 participants were treated with cyanoacrylate on right and LASER +cyanoacrylate on the left and vice versa on the rest 4 subjects. Group 3: 4 participants treated with LASER +cyanoacrylate on right, laser on the left and vice versa on the rest 4 subjects of the group. Hypersensitivity was measured based on Visual Analog Scale (VAS). The readings were taken preoperatively, immediate post operatively and on 10th postoperative day.

Results: Clinical observations revealed that reduction in hypersensitivity immediate post operatively and 10 days later in the sites treated with LASER were 78.571% and

59.82% respectively. Cyanoacrylate alone showed a cent percent reduction in hypersensitivity both in the immediate post operative and also after 10 days. The percentage reduction in hypersensitivity when LASER followed by cyanoacrylate application was 97.9% in the immediate post operative measurement and 97.916 % after 10 days.

Conclusion: This study concludes that LASER, LASER with cyanoacrylate and Cyanoacrylate alone registered significant immediate reduction in dentin hypersensitivity. Results achieved with LASER alone was found inferior to the effect of cyanoacrylate alone and also with cyanoacrylate + LASER whereas LASER with cyanoacrylate and cyanoacrylate alone gave almost similar reduction in dentinal hypersensitivity.

Keywords: Cyanoacrylate, LASER, Dentinal Hypersensitivity, Diode, Visual Analog Scale.

Introduction

Dentin exposure may be the result of abfraction, abrasion, erosion and denudation of the root surface. Most common etiologic factor is gingival recession exposing the root surface due to gingival diseases, aging, incorrect tooth brushing, periodontal treatment, surgical /dental operative procedures and association of two or more of these factors.¹ Other factors include patient's deleterious habits, poor oral hygiene, chewing tobacco, excessive occlusal force, premature occlusal contact, and gastro esophageal reflux.² Cold and air stimulation are known to be the commonest stimuli while dietary acid is also shown to have a significant potential in evoking dentin hypersensitivity.³ Various theories have been put forward to explain the mechanism of dentin hypersensitivity which includes Odontoblastic transduction theory, Neural theory, Hydrodynamic theory.

Materials and Methods

This comparative split mouth clinical trial compared three treatment modalities, namely cyanoacrylate glue, diode LASER and combination of these two. Cyanoacrylate used was is o amyl 2 cyanoacrylate chemically under the trade name Amcrylate (Figure 1). 24 patients reporting to the Department of Periodontics with the chief complaint of tooth hypersensitivity were selected and assigned into one of the three groups mentioned below randomly. The measurement of hypersensitivity was done based on Visual Analog Scale (VAS). Air blast test was performed to assess the level of hypersensitivity and scores >3 in VAS (Figure 2) were selected.

Air blast test: A blast of air from a 2 way dental syringe of dental equipment was applied to the suspected teeth surface from a distance of 2mm and the patients response noted based o VAS scale.

All the subjects compliant with the inclusion and exclusion criteria were included in the study. LASER

protective protocols were followed for both the patient and the operator.

The groups were:

Group1: 8 participants were selected and 4 subjects were treated with cyanoacrylate on right, LASER on the left(vice versa on the rest 4 participants)

Group 2: 8 participants were selected and 4 participants treated with cyanoacrylate on right, LASER +(plus) cyanoacrylate on the left side (vice versa on the rest 4 participants)

Group 3: 8 participants were selected and 4 participants treated with LASER +cyanoacrylate on right, laser on the left(vice versa on the rest 4participants)

Inclusion Criteria were: At least 2 hypersensitive teeth assessed using Visual Analog Scale{VAS} score > 3 on air blast test. Subjects who has no untreated/ poorly treated dental caries. Age of the subjects should be between 25-55 years. Subjects shouldn't have taken any treatment for teeth hypersensitivity. Subjects who are willing to comply with the study protocol.

Exclusion Criteria were: Subjects currently on desensitizing therapy using any desensitizing toothpaste or any other modality. Allergies and idiosyncratic responses to any of the products being used. Carious teeth or teeth having any improper restorations. Excessive dietary or environmental exposure to acids. Teeth or supporting structures with any other painful pathology or defects. Subjects on vitamic C therapy. Subjects who are not willing to comply with the study protocol.

Statistical Analysis

The three measurements of hypersensitivity Viz pre operative, immediate post operative and 10 days post treatment of the three groups were statistically analysed . The differences in the scores were tabulated and from this the percentage reduction in hypersensitivity is calculated.

The scores are then compared among the groups using Kruskal Wallis test.

Result

The results of this split mouth study showed 78.571% immediate reduction (Figure 3) and 59.82% reduction in hypersensitivity when examined 10 days after the procedure in the sites treated with LASER. In the sites treated with cyanoacrylate alone showed a cent percent reduction in hypersensitivity both in the immediate post operative and also after 10 days (Figure 4). The percentage reduction in hypersensitivity when LASER followed by cyanoacrylate application was 97.9% in the immediate post operative measurement and 97.916 % after 10 days.

Discussion

Dentinal hypersensitivity (DH) is characterized by short sharp pain arising from exposed dentin in response to stimuli that may be thermal, evaporative, tactile, osmotic or chemical, and which cannot be ascribed to any other form of dental defect or pathology. Prevalence data shows that up to 57% of the general population suffers from this condition. The non-carious reasons for dentine hypersensitivity is mainly loss of tooth structure due to attrition erosion, abrasion, abfraction, etc. even though several theories have been put forward over many years to explain the sensitivity of the dentine, circumstantial and direct evidence disproved the theories of dentine innervations and odontoblastic transducer mechanism. This left the hydrodynamic theory for which significant evidence has occurred during 1950s and 1960s as most widely accepted theory to date. Dentinal hypersensitivity satisfies all the criteria to be classified as a true pain syndrome

In the clinical trial of Gerschman et al. teeth treated with laser and subjected to the air-jet test showed a 67% reduction in sensitivity when comparing the scores

obtained at baseline to those obtained at the final follow-up. In the present study, the results showed, with a 79% immediate reduction in dentinal hypersensitivity with laser, 100 % reduction with of cyanoacrylate and laser with cyanoacrylate. We can conclude from our study that laser showed less percentage compared to that of cyanoacrylate and laser with cyanoacrylate.⁴

In the study by Javid et al. (1987) 33% sodium fluoride (NaF) paste was compared to cyanoacrylate in patients with Dentinal hypersensitivity. They concluded that cyanoacrylate had an immediate desensitizing effect on hypersensitive dentin and was statistically more effective than NaF in reducing sensitivity to cold-air stimulation.⁵ This is justified by the different modes of action of the two products. Cyanoacrylate obliterates the entry of dentinal tubules, whereas the NaF causes a granular precipitation in peri tubular dentin. In the another study on effectiveness and safety of Tisuacryl in treating Dentin Hyper sensitivity by Perez M de L et al⁵ it was observed that the treatment was considered successful in 96.7% of patients (81.5% with severe Dentinal hypersensitivity and 100% with mild-to-moderate Dentinal hypersensitivity) and it was concluded that tissue adhesive based on N-butyl-2-cyanoacrylate was shown to be an effective, safe treatment of Dentinal hypersensitivity, especially for moderate and mild cases. The use of laser and cyanoacrylate may be advantageous in the treatment or the modulation of hypersensitive response. Therefore, present study was conducted to compare the clinical efficacy of laser, cyanoacrylate with the combination of laser and cyanoacrylate in the treatment of dentin hypersensitivity.

In the present study, cyanoacrylate and laser with cyanoacrylate showed statistically significant reduction in the DH when used in the split mouth. This was in accordance with the study by Olga D. Flecha et al.⁶ on Cyanoacrylate Versus Laser in the Treatment of Dentin

Hypersensitivity in which laser was compared with cyanoacrylate and concluded that cyanoacrylate is as effective as low-intensity laser in reducing Dentinal hypersensitivity.

Cyanoacrylate immediate desensitizing effect on hypersensitive dentin, has been shown to be biocompatible and used to treat hypersensitive teeth. It blocks the dentinal tubules, prevents displacement of fluids within the tubules, and results in little or no response to stimuli. A commercial presentation of cyanoacrylate in the form of glue has proven to be biocompatible. It has the advantage of being easily available, applicability, effectiveness and safety.⁷ A study carried out by Brugnera et al on treatment of dentinal hypersensitivity with diode laser showed the immediate analgesic effect using a diode laser.⁸ In contrary, a study by Lier et al on the treatment of dentin hypersensitivity by Nd: YAG laser showed that patients treated with laser did not show any difference than those treated with placebo.⁹

Conclusion

All groups registered significant immediate reduction in dentin hypersensitivity. Results achieved with LASER alone were found inferior to the effect of cyanoacrylate alone and also with cyanoacrylate + LASER whereas LASER along with cyanoacrylate and cyanoacrylate alone gave almost similar reduction in dentinal hypersensitivity.

References

1. Addy M. Tooth brushing, tooth wear and dentin hypersensitivity – are they associated?. *Int Dent J* 2005;55:261-7.
2. Orchardson R, Gillam DG. Managing dentin hypersensitivity. *JADA*.2006;137:990-98.
3. Chabanski MB, Gillam DG, Bulman JS, Newman HN. Prevalence of cervical dentine sensitivity in a population of patients referred to a specialist periodontology department. *J Clin Periodontol*.1996; 23:989-92.
4. Gerschman JA, Ruben J, Gebart-Eaglemon J. Lowlevel laser therapy for dentinal tooth hypersensitivity. *Aust Dent J* 1994;39:353-7.
5. Perez Mde L, Mayelin Guerra R, Fernandez M, Marquez D, Velazco G, Rodriguez J *et al* Effectiveness and safety of tissue acryl in treating dentin hypersensitivity (DH). *MEDICC Rev*.2010;12:24-8.
6. Flecha OD, Azevedo CG, Matos FR, Vieira-Barbosa NM, Ramos-Jorge ML, Goncalves PF *et al*. Cyanoacrylate Versus LASER in the Treatment of Dentin Hypersensitivity: A Controlled, Randomized, Double-Masked and Non-Inferiority Clinical Trial. *J periodontol* 2013;84:287-94.
7. Kimura Y, Wilder- Smith P, Yonaga K, Matsumoto K. Treatment of dentin hypersensitivity by lasers. A review. *J Clin Periodontol* 2000;27:715-21.
8. Ladalardo TCCGP, Pinheiro A, Campos RAC, Brugnera Júnior A, ZANIN F, Albernaz PLM *et al*. Laser Therapy in the Treatment of Dentine Hypersensitivity. *Braz Dent J* 2004;15: 144-50.
9. Lier BB, Rosing CK, Aass AM, Gjermo P. Treatment of dentin hypersensitivity by Nd:YAG LASER. *J Clin Periodontol* 2002;29:501-6.

Tables

Table 1: Kruskal Wallis Test						
		Mean % reduction	S D	Chi-Square	df	P
Immediate Percentage reduction	Laser	78.571	17.300	21.029	2	<0.001*
	Cyanoacrylate	100.000	0.000			
	Laser + Cyanoacrylate	97.916	8.333			
Percentage Reduction after 10 days	Laser	59.821	21.784	38.164	2	<0.001*
	Cyanoacrylate	100.000	0.000			
	Laser + Cyanoacrylate	97.916	8.333			

P<0.05 considered statistically significant; df= Degree of Freedom; SD= Standard Deviation
%= Percentage

Table 2: Multiple Comparisons Mann-Whitney Test			
Dependent Variable	Reference group	Comparison group	p
Immediate Percentage Reduction	LASER	CYANOACRYLATE	0.002*
		LASER+CYANOACRYLATE	0.005*
	CYANOACRYLATE	LASER+CYANOACRYLATE	0.780
Percentage Reduction after 10 days	LASER	CYANOACRYLATE	<0.001*
		LASER+CYANOACRYLATE	<0.001*
	CYANOACRYLATE	LASER+CYANOACRYLATE	0.780

P<0.05 considered statistically significant;

Figure Legends



Fig.1: Armamentarium for Cyanoacrylate application.

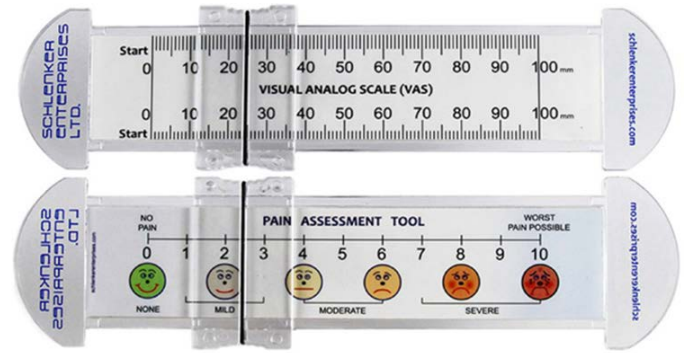


Fig. 2: Visual Analog Scale. Photo courtesy: <http://www.custompromotionalrulers.com>

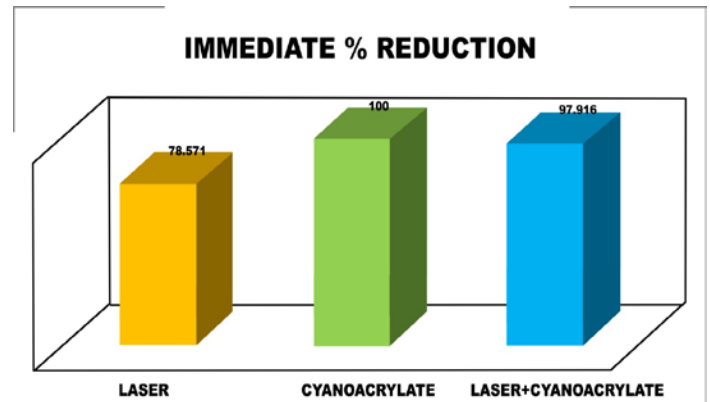


Fig. 3: Comparison of immediate percentage (%) reduction in hypersensitivity among the three groups.

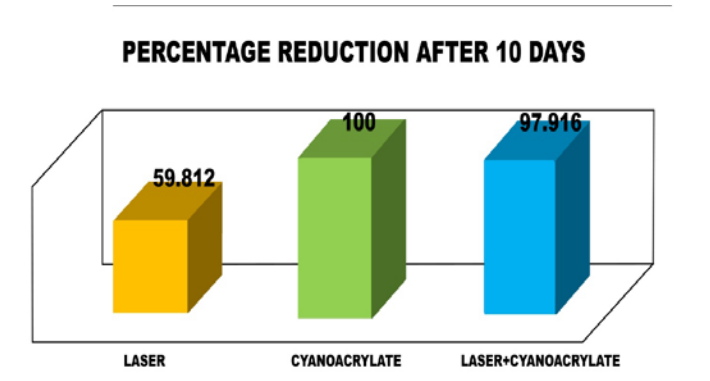


Fig. 4: Comparison of percentage (%) reduction in hypersensitivity among the three groups 10 days after the treatment.