

Case Report

Diode Laser- A New Hope For The Treatment Of Dentinal Hypersensitivity

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ABSTRACT

Dentinal hypersensitivity (DH) or cervical dentinal sensitivity is a frequent clinical disorder. It is defined typically in response to thermal, chemical, tactile or osmotic stimuli and it appears to be a common problem with various reports indicating an incidence between 4 to 74% among the population. A 38 year old male patient reported with severe cervical dentinal hypersensitivity after scaling and root planing. Patient was treated with diode laser of 810nm wavelength with inactive fibre. Hypersensitivity was comparatively reduced, the treatment was repeated after 7 days, and observed that there was a total reduction of hypersensitivity. It was maintained till 1 month without any side effects. Conclusion: Application of diode laser was effective in reducing the severe form of cervical dentinal hypersensitivity when given in two applications.

Key word-Dentinal hypersensitivity, diode laser, dentinal tubules, tactile stimulus, evaporative stimulus

Introduction

Dentine sensitivity (DS) or dentinal hypersensitivity (DH) is one of the most commonly encountered clinical problems. It is clinically described as an exaggerated response to application of a stimulus to exposed dentine, regardless of its location.^[1,2] It is characterized by short, sharp, pain arising from exposed dentine in response to stimuli, typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any dental defect or pathology.^[3] Some authors have substituted the word "dentine" and added the site, such as cervical or root, resulting in various other terminologies (e.g., cervical sensitivity/hypersensitivity) to describe the same clinical condition.^[4] This condition is prevalent among a large portion of individuals aged 30-40 years. The nociceptive stimulus commonly reported in the majority of cases is that of cold, followed by the mechanical stimulus of toothbrushing and the chemical stimulus of diet with a high concentration of sugar.^[5] The hydrodynamic theory proposed by Brannström and Åström,^[6] in 1964, is still currently accepted to explain the relationship between pain of dentinal origin and the displacement of odontoblasts in the dentinal tubules

displacement of odontoblasts in the dentinal tubules. Thermal, physical and chemical stimuli would cause the displacement of the pulp – dentinal fluid thus stimulating the pulpal nervous termination. Most of the treatments tested have aimed to block exposed dentinal tubules, but none of these treatments has produced consistently effective and long lasting results^[7]. In the last two decades, the introduction of lasers gave a new lease of life to DH therapy. The laser photobiomodulation action in dental pulp due to the production of large quantities of tertiary dentine is believed to cause physiological obliteration of tubules. The low power lasers (soft lasers) act directly on nerve transmission.^[8]

Diode laser irradiation has enabled a DH reduction equal to or superior to conventional agents such as potassium nitrate, sodium fluoride and fluoride varnishes.^[9,10,11] Hence presenting a case report of treatment of cervical dentinal hypersensitivity using Diode laser.

Case Report

A male patient aged about 38 years reported to Dental Out Patient Department of Periodontology at Rama Dental College and Hospitals with a chief complaint of dentinal hypersensitivity after scaling and root planing. Patient was systemically healthy with no history of smoking and pan chewing. On clinical examination patient had no abrasion, erosion or recession. Patient reported after 3 days of completion of scaling and root planing with a complaint of hypersensitivity interdentally and margins of the cervical region of all the teeth. VRS score was evaluated using tactile stimulation and air blast stimuli.

Tactile stimulation

Tactile stimuli was evaluated by running a probe perpendicular to the buccocervical exposed root surface. Patient's response was evaluated using the VRS.

VRS:

- 0- No discomfort ; but patient feel the stimuli
- 1- Slight discomfort; but not painful
- 2- Painful during application of stimuli
- 3- Painful during application of stimulus and immediately afterward

Air blast stimulation

Air blast stimuli was tested with a three-way syringe; the air was delivered from a standard dental unit air syringe at 40 psi (± 5 psi) and 70F (± 3 F). The air was directed at the exposed surfaces of all the teeth for two seconds from a distance of approximately 10 mm. Patient responses was evaluated using VRS.

The test was carried out for all the teeth and on all the surfaces. Patient had a VRS score of 3 in both tactile and air blast stimulation on all the surfaces of the tooth. Hence a diode laser of 810nm wavelength was used for treatment. After completely air drying the tooth surface , diode laser (810 nm,)was directed at a minimum distance from the tooth of 0.5cm and not more than 1.0 cm, placed perpendicular to the tooth for 1minute. This procedure was carried out on all the surfaces of the tooth. After half an hour VRS score was evaluated and it was reduced to 1 and patient was comfortable with the procedure.. Hence proving the effect of diode laser in the treatment of cervical dentinal hypersensitivity.

Discussion

Among the different lasers used, desensitization seems to depend mostly on the type of laser therapy adopted.



Figure showing evaluation of VRS by tactile and air blast stimulation



Figure showing application of diode laser on 1st and 7th day

Since the desensitizing mechanism is distinct for each emitted wavelength, success rates reported differ according to laser device, irradiation parameters (adequate wavelength, power density, wave mode, frequency of pulses and number of irradiation repetitions) and investigative methods used to assess dentinal pain.^[12] Since the DH pain is triggered by the action of thermal or mechanical stimuli on exposed dentinal tubules, the methodology used for assessing the same is based on pulpal response to cold air or tactile stimulation. The VRS was used for evaluation of the patient response to air blast stimulus and tactile stimulation since pain is a highly subjective sensation. In this case report, patient had a complaint of severe hypersensitivity 3 days after scaling and root. The VRS was 3. Diode laser of 810 nm wavelength with an inactive fibre was applied on all the surfaces and evaluated after half an hour. The severe sensitivity was reduced to slight sensitivity and VRS was reduced from 3 to 1. Patient was recalled on 7th day. He continued to have slight sensitivity and hence the procedure was repeated. After half an hour, patient sensitivity was reduced to 0. Patient reported no adverse reaction and was comfortable. After 1 month, patient was recalled and assessed for hypersensitivity. Patient had no pain, hypersensitivity or any form of discomfort. Hence the 2nd application of laser therapy was found to be more effective in this particular case. Focussing on the effectiveness of the sole diode laser, this was investigated by many authors. Matsumoto et al. Showed an 85% improvement in teeth treated with laser; Aun et al. Reported success in laser – irradiated teeth in 98% of their cases; Yamaguchi et al. noticed an effective improvement index of 60% in the group treated with laser compared to 22.2% of the control non laser group. Kumazaki et al showed an improvement of 69.2% in the group treated with laser compared to 205 in the placebo group. Gerschman et al. in a double blind study, found significant values in the laser treated group. In fact sensitivity to thermal stimuli was reduced by 67%

whereas the placebo group had a reduction of 17%. Sensitivity to tactile stimuli was reduced by 65%, while the placebo group showed a reduction of 21%. Another study carried out by Brugnera et al showed the immediate analgesic effect using a diode laser.^[13] The desensitizing effect of laser therapy observed in the study may be attributed to a mechanism through which diode laser can induce changes in neural transmission networks within the pulp (depressed nerve transmission), rather than alterations in the exposed dentine surface. In addition, laser therapy may stimulate the normal physiological cellular functions. The laser would stimulate the production of sclerotic dentine, thus promoting the internal obliteration of dentinal tubules ; and this is in accordance with the study done on dental pulp in teeth carried out by Matsumoto et al^[14]. The laser application may contribute to the repair of the dentine –pulp complex, preserving the pulp vitality; which may explain the maintained immediate effect and late effects of laser therapy.

Conclusion

The present case report concludes that the application of laser therapy which was repeated after a week produced a better effective result in reducing severe cervical dentinal hypersensitivity after SRP which was maintained up to 1 month. The application of diode laser has shown efficacy in rapid DH reduction as well as the stability of results. The effect was apparent at 30 min and 1 week and it remained stable until 30th day. Owing to the rapid action and stability of the results, diode laser can be considered a useful tool for DH reduction in periodontal patients as a potential adjunct to conventional periodontal therapy.

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