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Case Report

An Unusual Complication of Root Canal Treatment and its treatment by Laser Biostimulation

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Abstract

The inferior alveolar nerve can be damaged as an iatrogenic complication of endodontic treatment. Endodontic related parasthesia is a potential complication though not common. This paper presents a case of over extension of obturating material from the root canal system of tooth 47 into the inferior alveolar canal and its subsequent parasthesia of lower lip and adjacent tissues extra-orally and intra-orally in the gingiva extending anteriorly to midline and posteriorly to mental foramen. The Planned treatment was re-endodontic treatment of tooth 47 by Thermafil[R] followed by bio stimulation of the soft tissues and gums with Low-level laser therapeutic treatment (LLLT). Visual Analog Scale (VAS) was used to evaluate the degree of sensitivity. Biolase[R] low level Diode 810 nm laser was used in non contact mode for 12 sessions with a gap of 10 days between each session. Sufficient result was obtained within 5-6 months of biostimulation within the parameters of laser therapy.

Keywords: Nerve Damage; Endodontic Treatment; Laser; Biostimulation

Introduction

Endodontical treatment of pulpally involved teeth has gained due to advancement in the materials and techniques. The success of the Root Canal Treatment depends on proper elimination of all pathological pulp and dentin tissues, sufficient biomechanical preparation and hermetically sealing the root canal system. Limiting the obturation to the apical constriction is sought for an ideal result and prevent complications arising due to over obturation.

Mandibular teeth are supplied by inferior alveolar nerve which is the branch of mandibular division of trigeminal nerve. Increased risk of injury to IAN during endodontic treatment may be due to its anatomical position. Nerve damage such as mechanical trauma and neurotoxicity can be caused by endodontic materials extruding beyond the apical foramen. The symptoms of nerve injury may range from paraesthesia [1] to hyperaesthesia or even dysaesthesia [2]. Improper working length determination will may lead to over filing of the canal system and further complications. Conservative and surgical are two alternative options for treatment of IAN injury because of endodontic therapy [3].

There is scientific literature which denotes three feasible actions of low-intensity lasers in the treatment of paresthesia: enhanced reformation of the injured nerve tissue, incitation of adjoining nerve tissues and biomodulation of the nerve response [4].

This article discusses a case report of over extension of obturating material from the canal system of tooth 47 with subsequent parasthesia on the right side of face from lip in the midline to the cheek and gingiva from mental foramen to the midline and the treatment of partasthesia by Low-level laser therapy (LLLT).

A Case Report

A 38years old male reported to dental clinic with complain of paresthesia on right side of face from lip in midline to the cheek and gingiva from mental foramena to the midline, he was having difficulty in shaving the affected extra oral area. His medical history was non-significant. He gave history of endodontic treatment of tooth 47 one month back and started developing parasthesia two weeks ago. Patient was asked to take a neurology consultation to rule out any neuropathy of systemic origin. Radiography of lower right back region revealed over extension of gutta purcha into the inferior alveolar canal from tooth 47. (Figure 1) After thorough examination and diagnosis the treatment plan was drafted which consisted of re-treatment of tooth 47 with Thermafil[R] and biostimulation of extra oral and intra oral soft tissue by Low-level laser therapy (LLLT using Biolase Laser System.

Figure 1: Showing gutta percha extending into the inferior alveolar canal.

In the first sitting gutta percha was removed with the help of solvent and scaler (Figure 2a and b). Then the tooth was obturated by thernmafil[R] system (Figure 3).

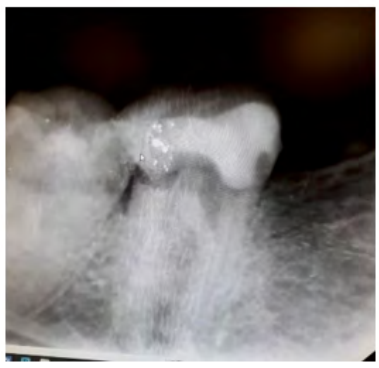

Figure 2(a): X ray after removal of gutta percha.

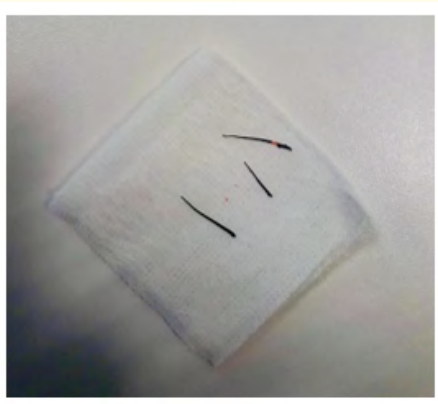

Figure 2(b): Removed gutta percha points.

Figure 3: Obturated Tooth.

In the second sitting subjective evaluation of nerve damage was done with the help of visual analog scale (VAS) (Figure 4). All biosafety standards were properly followed before irradiation; the patient's skin and oral mucosa were dried with sterile gauze. Visual Analog Scale (VAS) was used to evaluate the degree of sensitivity on a 10 cm scale: with mark "0" (zero) = no symptoms (conventional sensitivity) and mark "10" (ten) = absence of sensitivity.

LLLT was delivered by Biolase laser (Figure 5), wavelength 810 nm Diode laser. Power 1-Watt, continuous mode for 5 minutes and in non-contact mode. Laser beam was pointed on the following tissue landmarks (Figure 6). On the first laser therapy session, VAS reading was recorded VAS = 10 (i.e., total lack of sensitivity) in all

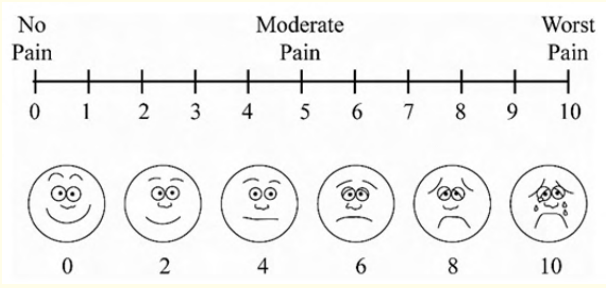

Figure 4: Visual analogue scale.

regions affected by paresthesia and VAS = 0 on the contralateral side. 72 hours later and prior before the second laser therapy session, the patient reported some improvement in chin and intraoral sensitivity; reading being VAS = 8 and VAS = 7 respectively, indicating that the effect of parasthesia decreased a bit. A gap of 10 days was given in between the sessions. Post 8th sessions, the patient reported good recovery of chin, oral and gum sensitivity (VAS = 2). At the end of 12th session the patient began to feel the region below the lower lip (VAS = 0).

Figure 5: Biolase laser system.

Figure 6: Showing target laser beam on anatomical landmarks.

Discussion

The mental nerve, the largest branch of the alveolar inferior nerve, emerges from the mental foramen and divides into 3 branches. The branches of the mental nerve in turn innervate the skin overlying the mental area, mucus membrane se branches innervate the skin of the mental area, mucous membranes, the skin of the lower lip, and the gingival extending posteriorly to the second premolar. Any damage to the IAN affects the senses in these regions [14]. The inferior alveolar nerve (IAN) damage usually seen post third molar surgery, enucleation of pathological lesions, orthognathic surgery, root canal treatment, implant surgery. According to Pogrel MA the incidence of iatrogenic trauma to IAN from endodontic trauma ranges from 0-33.2% [5]. These injuries may range from mild paresthesia to complete anesthesia and/or pain, affecting important functions such as speech, eating, and drinking. These influences have an effect on the quality of life of a patien, [2] therefore proper planning and diagnosis is required prior to the treatment.

Thermafil^{R} (Densply) is a warm root canal filling method. It consists of a flexible plastic carrier in the centre coated with a layer of alpha-phase gutta-percha. The plastic carrier serves as an application device and should exert pressure [6]. It remains in the root canal after obturation. The obturator must be warmed to soften the gutta percha before insertion into the root canal system. The objective of the system is to achieve a three-dimensional, reliable obturation in less time than the classical root canal filling technique [7].

Santos., *et al.* [8]. in his study evaluated the effect of laser therapy on the sensorineural recovery of patients undergoing oral surgeries and observed significant improvement across sessions in patients with short postoperative period of 30 days and patients with persistent sensory abnormalities in the late postoperative period from 6 months to 1 year; however, the first group of patients showed the best results. In this case we started laser biostimulation immediately next sitting after re-endo.

Silveira., *et al.* proposed from his study that LLLT biostimulation by the visible red wavelength is specifically absorbed by proteins [9]. Aditionaly Barez., *et al.* in 2017 reported that LLLT supports axonal growth in injured nerves model systems in animal experiments, but the photoreceptors responsible for the biological effects of LLLT have not yet been identified [10]. According to the other studies chromophores in the mitochondrial cytochrome

system or in endogenous porphyrins absorb laser energy [10]. We aimed to achieve nerve regeneration by utilizing the effect of laser biostimulation in our study and we see that the paresthesia in the lip area is decreased. Gasperini G., *et al.* in 2014 concluded that LLLT can lead to reduce the long-standing sensory nerve impairment following implant surgery, endodontic overfilling, third molar surgery, mandibular sagittal split osteotomy, bisphosphonate-associated osteonecrosis [11].

Ahlgren from his study deduced that the materials like gutta-perchaor calcium hydroxide showed nerve damage both in experimental studies and in clinical cases [12].

In a study by Gencoglu on comparison of obturation technique, it was concluded that obturation with thermafil had a higher percentage of success as compared to other obturation system [13].

Conclusions

Paresthesia of oral tissue is a localized condition of sensory abnormality due to injury because of certain dental procedures. Within the limits, Low level laser therapy was effective in the treatment of inferior alveolar nerve paresthesia caused by over extension of obturating material in a mandibular tooth. The other advantage of using Laser was better acceptance by the patients, painless, noninvasive and no side effects. The results of the present study support findings mentioned in various other studies that LLLT therapy is capable of enhancing the long-lasting sensory disturbances.

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