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CASE REPORT

Interdisciplinary Approach using Diode Laser for Esthetic Management of Missing Anterior Teeth

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ABSTRACT

A 30-year-old female patient was reported with pain and swelling in the region of 21. On clinical examination, a swelling was found close to the cervical margin of 21. The suggested treatment plan was periapical surgery of 21. On elevation of flap there was a vertical fracture in cervical region of 21, showing poor prognosis. Extraction of 21 was done and an interdisciplinary approach was carried out with laser-assisted root canal treatment of 12. Also laser troughing in 12 and 22 regions to serve as abutments and an ovate pontic preparation in 11 and 21 regions was carried out. Lasers can be used as an adjunct and/or alternative in the management of multiple dental procedures in the esthetic zone ensuring promising dental outcome.

Keywords: Laser, Endodontic failure, Ovate pontic preparation, Troughing, Laser-assisted root canal disinfection, Low level laser therapy.

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INTRODUCTION

When patients report to the dental office, it is the responsibility of the clinician to systematically examine the tooth and its supporting structure. Examination should involve viewing the extent of the fracture of the tooth and the type of fracture, any involvement of the alveolar bone, communication of the root canal to the external environment or any loss of crestal bone can contribute to the prognosis of the tooth involved.

Root canal treatment followed with a post and core along with a crown is more predictable conservative treatment of a fractured tooth. Soft tissue management of esthetically compromised anterior teeth is of utmost importance. Lasers being the latest technology in dentistry have paved its way for more predictable prognosis of such compromised cases. The diode laser has excellent ability to excise accurately and control bleeding along with a predictable soft tissue follow-up. The chromophore being melanin and hemoglobin the laser energy is poorly absorbed by hydroxyapatite. Thus, the diode laser is the preferential choice for safe cutting in close proximity to tooth structure and bone.

This case report explains the varied clinical applications of a diode laser in root canal disinfection, ovate pontic preparation, troughing of the abutment teeth and over all promising esthetic treatment outcome to a compromised patient.

MATERIALS AND METHODS

Diode 940 nm, (Ezlase Biolase, USA) was used for the study. It is a solid state soft tissue laser with GaAlAs as the medium and coming under the laser classification IV. A 400 mm surgical disposable tip was initiated prior to using it for excision of soft tissue and 200 mm non-initiated tip was used for root canal disinfection.

CASE REPORT

A 30-year-old female patient visited the dental office with pain and swelling in the upper anterior region (Fig. 1). On examination there was a soft tissue swelling in relation to 21. The patient had a metal with ceramic bridge in relation to 12, 11 and 21. A periapical radiograph of 21 revealed a communication in the cervical third of the tooth. When lateral rarefaction are seen in periapical radiograph, a presence of communication should be suspected. A perforation results in a communication which initiates and perpetuates a chronic inflammatory response. The treatment plan was to elevate the flap and examine the area and the seal the communication in 21.

A rectangular flap was raised and on examination of 21 after elevation, it revealed the presence of a fracture in 21 (Figs 2 and 3). The presence of vertical fracture was suggestive of poor prognosis to salvage the tooth. Hence,

Fig. 1: Patient with FPD in relation to 12, 11, 21. A swelling is seen in relation to 21

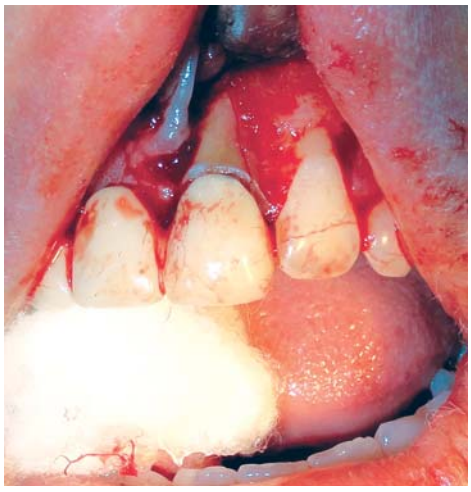

Fig. 2: Rectangular flap was raised, showing cervical fracture of 21

Fig. 3: Raised flap showing dehiscence and vertical fracture at the cervical margin in relation to 21

21 was considered for atraumatic extraction (Fig. 4). Following the extraction, a removable partial denture was given in the region of missing 11 and 21. The case was further followed with multidisciplinary approach using a latest advanced technology of lasers in dentistry. An Informed consent was obtained from the patient for laser intervention and universal precautions for lasers were followed during the entire treatment. 12 was fractured and was treated endodontically.

Below protocol was followed for the disinfection of root canal:

1. Access cavity was prepared in 12.
2. Cleaning and shaping was done up to size 35 file, irrigation was done copiously and intermittently with noncolored (nonpigmented) irrigants (Fig. 5).
3. A 200 mm size, noninitiated endodontic tip was used with laser settings of 1 W continuous wave (Fig. 6).
4. The laser tip was introduced 1 mm short of the working length and continuous circular motion rotating

Fig. 4: FPD is removed and 21 is extracted

Fig. 5: IOPA showing working length determination in 12

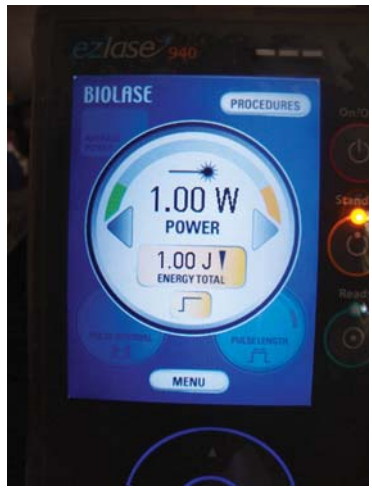

Fig. 6: Laser settings (Diode 940 mm, Ezlase, Biolase, USA)

2 mm/sec was done, 4 times in the canal with 5 seconds interval.

After laser radiation, obturation was done using sectional obturation with gutta-percha and later post space preparation was done in 12 (Fig. 7). A prefabricated metal post was

Fig. 7: IOPA showing sectional obturation in 12

Fig. 9: Immediate postoperative view showing bloodless field

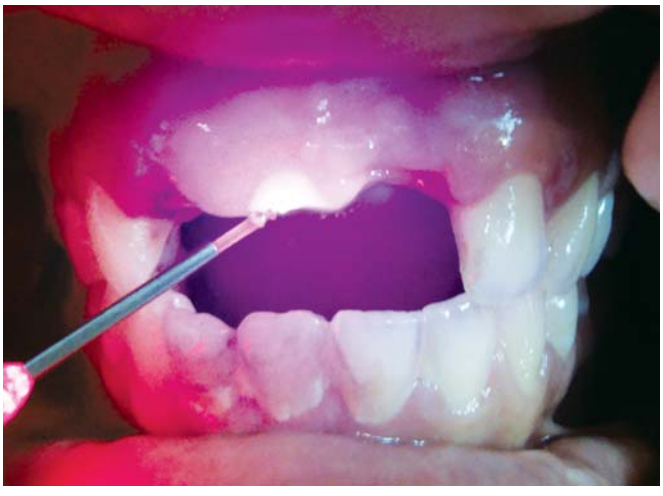

Fig. 8: Laser intervention is done for root canal disinfection in 12 and ovate pontic preparation in 11, 21 regions

Fig. 10: Immediate postoperative view after post placement and core build-up done in 12 and crown preparation done in 22

placed and core build-up was done in 12. 11 and 21 regions were prepared as a pontic bed with diode laser. A 400 mm surgical tip was initiated and used to sculpt the gingiva and emulate interdental papilla between two missing teeth 11 and 21 (Fig. 8). In the esthetic zone of upper anteriors which involves the display of teeth and the soft tissue, it is predominantly important for the dental practitioner to avoid dark circles and give a near perfect emergence profile to the missing teeth with prosthesis (Fig. 9).

The 22 was vital and hence tooth preparation was done (Fig. 10) to serve as an abutment for a metal with ceramic bridge. Troughing was also done in 12, 22 regions with lasers to ensure good gingival retraction for better emergence profile (Fig. 11).[1] Patient was recalled after 1 day for a postoperative checkup and the lased area was reviewed (Fig. 12). The patient was recalled at regular intervals and the 1 year postoperative review (Fig. 13) showed promising results.

Fig. 11: One week postoperative view showing excellent healing of extracted and troughed region with permanent bridge placement

DISCUSSION

When there is a communication between the canal space and the surrounding tissue, the treatment plan will be to

Fig. 12: One day postoperative view

Fig. 13: One year postoperative view

surgically close the communication. On elevation of the flap, a vertical fracture was detected. So the decision was made to extract 21 atraumatically.[2] Retreatment of the root canal treated 21 was not considered due to the following reasons:

1. A large-sized post and core was placed which was difficult to retrieve. Wherever, there is radiolucency in relation to endodontically treated tooth with a post, a retreatment will involve disengagement of the entire assembly (clinical crown, post and obturated gutta-percha).
2. There was an external communication and vertical fracture in the cervical third in the esthetic zone which has poor prognosis. Evans discussed management of radicular perforation or fracture below the edge of alveolar process, admitting the successful treatment is critical taking into consideration the close proximity to the gingival sulcus exhibiting highly guarded prognosis.
3. There could be a loss of crestal bone or a creation of a periodontal pocket where multiple interdisciplinary treatment procedures are necessary.

A 2-week interval was given for healing of the extraction site. Low level laser therapy (LLLT) was used on the extraction site for healing to be uneventful. LLLT has numerous benefits. However, the primary benefits include being non-surgical, promotes tissue healing, reduces edema, inflammation and pain. The biostimulative laser energy to the healing site brings about a cumulative tissue blastic activity and a feel good factor which has an evidence of accelerated wound healing according to the works of Endre Mester. These basic cellular changes are intended positive effects toward the treatment goal.

A multidisciplinary approach[3] was necessary in this case as we needed to do a root canal of 12 with postendodontic restoration, pontic preparation in 11, 21 region and troughing in 12 and 22 region. The available option was to do a conventional scalpel method, electrocautery or diode/erbium laser contouring in the pontic region.

Diode laser was used as the treatment of choice.[4] Diode lasers have a greater penetration depth, bactericidal effect and a better biostimulative effect when compared to the lasers of higher wavelength. The diode laser is not absorbed by the hydroxyapatite. Nevertheless, care should be taken when diode lasers are used in proximity to the periosteum. Accidental thermal damage to the bone can happen if the speed of the cut is slow and/or there is an increase of energy transfer. This increased heat could also lead to delayed healing or necrosis of bone. Care should be taken to move the laser tip at the recommended speed of cut, use a high vacuum suction to act as an exogenous coolant along with frequent irrigation of the treatment site. This aids in maximum thermal relaxation along with minimal collateral damage. The laser parameters which influence the laser energy transfer on the tissue under the surgeon's control are the power, time on the target tissue and the effective spot site of the tip influencing the power density. Using an initiated tip would focus the laser energy bringing out the desired laser ablation on the tissue. All these factors were taken into consideration while performing the laser excision and ovate pontic preparation.

The patient did not experience any pain or bleeding during the procedure, no topical anesthetic was used. Patient was called for a 1 day post-operative checkup to evaluate the initiation of the healing process. She appeared to be comfortable throughout the procedure and healing period with no problem in maintenance of the laser ablated site. Advantage of lasers in such cases includes bloodless, painless field and creating an interdental papilla between two edentulous pontic areas with ease and predictable gingival contouring with minimal discomfort to the patient.[5-8] Effective disinfection of the root canal 12 was done using laser as an adjunct. Infection was eliminated and reinfection and reinflammation was prevented. The laser light disinfects the bacteria especially *E. faecalis*[9] which is

the most predominant cause for endodontic failure. The laser light travels to 1,000 nm/sec as against conventional cleaning and shaping with the use of irrigants.[10] Gingival troughing with the diode laser around the prepared tooth also eliminated the need for a retraction prior to impression making. The use of advanced laser systems is a fitting example of technology being at the helm of modern day dentistry.

CONCLUSION

Laser interventions in soft tissue contouring are extremely popular and have been used with success for over a decade now. Dental lasers are useful clinical tools in the hand of a skilled operator enhancing his clinical efficiency and maximizing the advantages and benefits to the patients. This article demonstrated the combined use of the lasers both as an adjunctive and/or alternative way to successfully add and complement to the esthetic concern of a patient. The end result brought a hassle free smile for an esthetically compromised patient.

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REFERENCES

1. Lee EA. Laser-assisted gingival tissue procedures in esthetic dentistry. Pract Proceed Aesthet Dent 2006 Oct;18(9):Suppl 2-6.
2. Deppe H, Horch HH. Laser applications in oral surgery and implant dentistry. Lasers Med Sci 2007 Nov;22(4):217-21.
3. Lomke MA. Clinical applications of dental lasers. Gen Dent 2009 Jan-Feb;57(1):47-59.
4. Mathews MA. Diode lasers: A versatile clinical tool (a technical and clinical review). Intl J Laser Dent 2011 Sep;1(1):9-15.
5. Parker S. Lasers and soft tissue: Periodontology. B Dent J 2007;202(6):309-15.
6. Parker S. Lasers and soft tissue: 'Fixed' soft tissue surgery. B Dent J 2007;202(5):1-7.
7. Parker S. Lasers and soft tissue: 'Loose' soft tissue surgery. B Dent J 2007;202(4):185-91.
8. Thukral S, Thukral N, Jain S, Tambwekar S. Lasers in periodontal soft tissue surgeries. Solaze J Laser Dent 2009 Jan;3(1):15-18.
9. Rios A, He J, Glickman GN, Spears R, Schneiderman ED, Honeyman AL. Evaluation of photodynamic therapy using a light-emitting diode lamp against Enterococcus faecalis in extracted human teeth. J Endod 2011 Jun;37(6):856-59.
10. Gutknecht N, van Gogswaardt D, Conrads G, Apel C, Schubert C, Lampert F. Diode laser radiation and its bactericidal effect in root canal wall dentin. J Clin Laser Med Surg 2000 Apr;18(2):57-60.

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