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Case Report

DIODE LASER: "BLOODLESS" BOON FOR SOFT TISSUE SURGERY IN PERIODONTICS

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A R T I C L E I N F O

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A B S T R A C T

Along with the advancement in periodontal surgical techniques, many new surgical tools are being introduced for soft tissue surgeries. Soft tissue laser being one of them, have substantially helped and improved in the management of many periodontal soft tissue surgeries. Diode lasers are one of the most commonly used soft tissue laser due to its convenience and portability, and are nowadays the choice for many periodontal surgeries. The bloodless nature of lasers has significantly reduced the surgical time and also more favorable patient acceptance.

Introduction

Laser technology, specifically the diode laser is gaining popularity in general dental surgical practice with added benefits in a wide range of applications.[1] Lasers can be used as a potential alternative to simultaneously eradicate the diseased soft tissues, target the micro‑organisms as well as stimulate wound healing. Several lasers such as the carbondioxide (CO2), Ho: YAG, Nd: YAG, diode, Er: YAG have been experimentally utilized for soft tissue periodontal procedures.[2]

Diode laser is one of the most popular choices of laser technology for many surgical procedures because of its economical set-up, portability and convenience of use. In addition, it has good tissue penetration,[3] hemostasis and coagulation.[4] Diode laser with wavelengths ranging from 810 to 980 nm in a continuous or pulsed mode can be used as a possible modality for soft tissue surgery in the oral cavity. Based on the photothermal effect of the diode laser, the lesions of the oral mucosa are removed with an excision technique, or by ablation/vaporization procedures.[5,6,7]

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Case 1

Pre-surgical

Intra-surgical

Immediate post-surgery

1 Week post-surgery

1 Month post-surgery

Case 2

Pre-surgical

Intra-surgical

Immediate post-surgery

Pack placed

10 Days post-surgery

3 Months post-surgery

Mentioned below are three different cases visiting the deptt.of Periodontics at Govt. Dental & Hospital, Patiala.

Case 1:

A 27 years old female patient reported to the department with a chief complaint of tissue growth on the upper right front region that arouse 3 months before the referred time. Clinical examination revealed a lesion of approximately 2 x 1.7 x 1 cm in dimension w.r.t tooth no 12,13. The swelling was firm in consistency, pinkish red in color and showed pain and bleeding on palpation. No mobility of the involved teeth was seen. The patient had mild masticatory interference but was esthetically concerned. Radiographic examination revealed no bone loss around the involved teeth. Based on the above mention findings, a provisional diagnosis of epulis was made and surgical removal with diode laser with wavelength 980 nm, output power 3.5 watt, 300 µm optical fiber, continuous wave was done followed by coagulation with the laser tip in a sweeping motion. Specimen was then sent for histological examination. The histological examination showed results in favor of epulis. At one week follow up, it was observed that healing was satisfactory with mild recession w.r.t tooth no 13. At 1 month post operative visit, the lesion displayed complete healing with no pain. Patient was kept under observation on regular basis up to 6 months which shows no sign of recurrence.

Case 2:

A 24 years old female reported to the department with the chief complaint of slight mobility of the lower anterior teeth, inability to maintain proper hygiene and spacing in between lower anteriors. Clinical examination revealed a shallow vestibule and

Case-3

Pre-surgery

Intra-surgery

Immediate post-surgery

3 Months post-surgery

mucogingival problem in the lower anterior region. Patient was explained about the existing mucogingival problem and a vestibular extension procedure with laser was planned as the patient was highly anxious to undergo scalpel surgery.

The procedure was fully explained to the patient and consent was taken before the start of procedure. All necessary precautions were taken for patient, operator and assistant. Diode laser with wavelength 980 nm, output power 3 watts, 300 µm optical fiber, CW mode was used. The procedure consisted of surgical incision with the tip of laser at the vestibular fornix, extending to the distal line angle of the lateral incisors bilaterally. The depth of incision was double the depth planned for the final outcome. Accessory muscle fiber attachments were also removed. Periodontal pack was placed in between the incised margins and post-surgical instruction given.

The patient was seen after 10 days follow-up and the periodontal pack removed. Healing was uneventful. Re-evaluation after 3 months showed satisfactory outcome with observable gained in attached gingiva and reduction of the mobile tooth.

Case 3:

A 56 years old female patient reported to the department with a small swelling on the buccal mucosa near the corner of the mouth on the left side, which caused mild discomfort while chewing and also the patient was concerned with it. Clinical examination showed no lymph node enlargement. Intraoral examination revealed a solitary, sessile lesion in relation to the corner of the mouth measuring 0.7 x 0.5 × 0.4 cm^2. Based on its clinical presentation, a provisional diagnosis of fibroma was established.

The procedure was fully explained to the patient and consent was taken before the start of procedure. All necessary precautions were taken for patient, operator and assistant. Diode laser with wavelength 980 nm, output power 3.5 watts, 300 µm optical fiber, CW was used to excise the lesion from the base and the hemorrhage from the surgery area was controlled by moving the laser tip in a sweeping motion on the surgical site. No sutures were placed at the surgical site.The patient was recalled after 1-week follow-up. Mild scar tissue was observed, and the healing was satisfactory. The areas of excision were not tender to palpation, and surgical site displayed complete healing at the 3-month postoperative visit.

Discussion:

The use of laser in periodontics has been increasing day by day. The first laser was introduced in dentistry by Goldman et al in 1964[8]. Due to their many advantages, they are indicated for wider variety of procedures.[9,10, 11] numerous lasers such as the CO_2, Ho: YAG, Nd: YAG, diode, Er: YAG has been used for soft tissue periodontal procedures.[2]

The diode laser has been approved by the Food and Drug Administration for virtually all the soft tissue procedures. These procedures include soft tissue

curettage, incisions, pocket debridement, and ablative excisions.[12] The diode laser, due to their relatively small size, portability and lower cost, are frequently used in periodontal surgery like frenectomy, epulis fissuratum, fibroma, facial pigmentation and vascular lesions etc as compared to other laser equipment's. [7,13,14,15] The pump source is an electrical current, the photons are produced by electric current and laser active medium is semiconductor. The diode lasers have been used in three wavelengths 810,940 and 980nm in surgical treatments.[7]Laser transmits energy to the cells causing warming, welding, coagulation, protein denaturation, drying, vaporization and carbonization.[16,17] Benefit of diode laser over traditional surgery with scalpel comprises convenient mucosa removal, high precision in tissue destruction [18,19], easy ablation of soft tissue, immediate sterilization, decreased mechanical trauma, increased patients acceptance, no or few sutures [20], homeostasis, decreased bacteremia, decreased edema, less operative and postoperative discomfort little wound contraction and minimal scar [19,20]it has been reported by many authors that soft tissue surgery laser cause less discomfort and also better tolerance by the patients. Laser can decrease psychological trauma and panic during the surgical procedure due to reduced surgery time.[21,22]

Laser application on soft tissue can cause stimulation of fibroblast proliferation, collagen synthesis and vessels proliferation leading to faster wound healing.[23] Diode laser, being significantly absorbed in tissues due to presence of haemoglobin, causes better incisions and good coagulations of tissues. With the laser sterilization of wound, the inflammatory response is mild and delayed, which may corresponds to less discomfort. Also laser irradiation causes sealing of the nerve endings in the surgical contact area and the denaturalized collagen layer formed on the surface of the surgical wound serves to isolate it from the oral fluids. [18,24]

The disadvantages of diode application are delayed repair in case of larger lesions and charring of tissue in smaller lesions as compared to the application of conventional scalpel surgical procedure. In comparison to CO_2 lasers, it was reported that the thermal damage zone and marginal damage of the biopsy specimen was more in case of diode laser due to which they didn't relieve definite diagnosis by histopathological examination. [16,25,26]

Conclusion:

It has been observed in our experience that although the cutting efficiency of diode laser is slow as compared to conventional scalpel surgery, the overall surgical time is significantly reduced due to the bloodless nature of laser surgery. Hence the use of soft tissue laser for various periodontal surgery is highly recommended.

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