

Diode Laser Assisted Management of Endo-perio Lesion in Maxillary incisor using LANAP: A Case Report

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Abstract

Case Report

Aim: Sequential treatment of Endodontic and Periodontal lesions with the help of a Diode laser. **Introduction:** Endodontic Periodontal lesions present a difficult diagnostic and treatment challenge to the clinician and treatment often requires a combined therapeutic effort. Both endodontic and periodontal surgical procedures may be indicated for treatment of these lesions. **Case Description:** This case report presents a chronic primary endodontic lesion with secondary periodontal involvement in relation to 21. Treatment included root canal obturation, followed by scaling and root planing as well as laser curettage and cleaning (Laser Assisted New Attachment Procedure - LANAP). This procedure resulted in clinical attachment gain without affecting the soft tissue profile. **Conclusion:** Sequential treatment of endo-perio lesions along with a soft tissue diode laser is more effective and less traumatic than conventional surgical methods. Such technological innovations present opportunities to offer flexible treatment options to patients while simultaneously enabling clinicians to expand their level of skill. Furthermore, these procedures can be performed with minimal postoperative challenges. **Clinical Significance:** While conventional periodontal treatment techniques usually result in a reduction of pocket depth through tissue shrinkage, which leads to exposure of the root surface, the diode laser induces healing without these undesirable effects, thus giving the added advantage of less patient discomfort and faster healing. In addition, in this case, both endodontic and periodontal treatments were carried out sequentially in the same appointment, resulting in shorter chair side time, eliminating the need for a second appointment for periodontal surgical procedures. This line of treatment may hold better prospects of treating endodontic periodontal lesions in a shorter time.

Keywords: LANAP, Endo-Perio Lesion, DIODE

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Background

Establishing an accurate diagnosis is the first step to success in endodontic therapy. In many cases, the diagnosis is easy to establish, but there are certain cases where the situation becomes more complex, especially when it co-exists with periodontal disease. It is well known that clinical endodontic diagnosis is based on the patient's history, clinical evaluation and the radiographic appearance of the lesion. Diagnosis of necrotic pulps may be difficult to establish because symptoms and signs may be inconclusive and poorly localized.

The relationship between periodontal and pulpal disease was first described by Simring and Goldberg in 1964.¹ Since then, the term, 'perio-endo lesion' has been used to describe lesions due to inflammatory products found in varying degrees in both the periodontium and the pulpal

tissues. The dental pulp and periodontal tissues are closely related. The pulp originates from the dental papilla and the periodontal ligament from the dental follicle and is separated by Hertwig's epithelial root sheet. As the tooth matures and the root is formed, three main avenues for exchange of infectious elements and other irritants between the two compartments are created by (1) dentinal tubules, (2) lateral and accessory canals, and (3) the apical foramen. When the pulp becomes inflamed/infected, it elicits an inflammatory response of the periodontal ligament at the apical foramen and/or adjacent to openings of accessory canals.² Noxious elements of pulpal origin, including inflammatory mediators and bacterial byproducts, may leach out through the apex, lateral and accessory canals, as well as the dentinal tubules, triggering an inflammatory response in the periodontium including an early expression of antigen presentation.

An acute exacerbation of a chronic apical lesion in a tooth with a necrotic pulp may drain coronally through the periodontal ligament into the gingival sulcus. This condition may clinically mimic a periodontal abscess. Primary endodontic lesions usually heal following root canal treatment. The sinus tract extending into the gingival sulcus or furcation area disappears at an early stage once the affected pulp has been removed and the root canals have been well cleaned, shaped and obturated. If, after a period of time, a suppurating primary endodontic disease remains untreated, it may then become secondarily involved with marginal periodontal breakdown. Plaque forms at the gingival margin of the sinus tract and leads to marginal periodontitis. The tooth subsequently requires both endodontic and periodontal treatment. Primary endodontic lesions with secondary periodontal involvement should first be treated with endodontic therapy followed by periodontal therapy.³ This reduces the potential risk of introducing bacteria and their byproducts during the initial healing phase.⁴ If the endodontic treatment is adequate, the prognosis depends on the severity of the marginal periodontal damage and the efficacy of the periodontal treatment. With endodontic treatment alone, only part of the lesion will heal to the level of the secondary periodontal lesion.

While scaling and root planing remain the initial treatment modalities in periodontal therapy, the use of a soft-tissue diode laser can be considered as an efficacious and helpful tool, and an adjunct to conventional therapy both for its decontaminating and biostimulating effects. LANAP is a step-by-step procedure developed within a practice setting specifically for treating moderate to advanced periodontitis. Dr. David Scharf was the first

periodontist on Long Island trained and licensed to perform the FDA-approved and patented procedure called LANAP or Laser Assisted New Attachment Procedure. Patterned after the Excisional New Attachment Procedure (ENAP), LANAP is designed to remove diseased and necrotic tissue selectively from within the periodontal sulcus. Traditional periodontal therapy removes tissue height to reduce the pocket depths. As LANAP is a regenerative procedure, the patient does not lose tissue volume and bone is regenerated. Furthermore, LANAP is much easier on the patient during the procedure and the patient has less post operative discomfort. The procedure combines the best effects of laser soft tissue surgery with well-established principles of periodontal disease management.

In this case report the authors have used soft tissue diode as it not only more efficient, but is also an innovative, gentle, less traumatic and more precise technology. The major component of a soft tissue diode laser is a semiconductor chip or crystal. It is important for all dentists to understand the physical characteristics of different laser wavelengths and their interaction with biological tissues,⁵ as this will ensure that the lasers are used safely and beneficially.⁶

The use of soft tissue lasers in the cosmetic dental practice opens a new frontier in the treatment of conditions that were previously considered impossible. Lasers bring about specific thermal effects which depend on open power density, cooling, duration of exposure, specific wavelengths, emission modes and tissue characteristics.⁷

Case Description

A 23-year-old male patient reported to the outpatient section of the department with the chief complaint of pain, swelling and pus discharge from his maxillary left central incisor which he had experienced for one month (Figure 1). Patient gave a history of trauma dating back to one year. Using a Williams graduated periodontal probe, periodontal probing depths were measured at 10 mm mesially, 9 mm labially and 8.5 mm distally (Figure 2). On electric pulp testing both 11 and 21 showed a negative response. A periapical radiograph showed radiolucency involving the periapical area of 11 and 21 (Figure 4). A diagnosis of a primary endodontic lesion with secondary periodontal involvement was made in relation to 21, and a diagnosis of chronic apical periodontitis was made in relation to 11.

Subgingival scaling was performed (Figure 3). Access cavities were prepared in the maxillary right and left central incisors. Cleaning and shaping of the canals was done with 5.25% sodium hypochlorite irrigation followed by Laser



Figure 1: Pre-operative view.

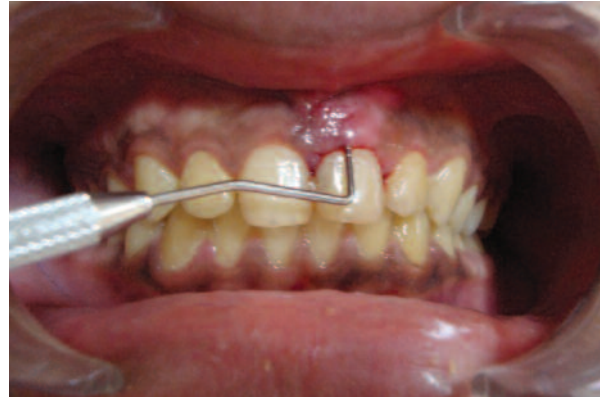


Figure 2: Periodontal probing depth measured labially was 9mm.

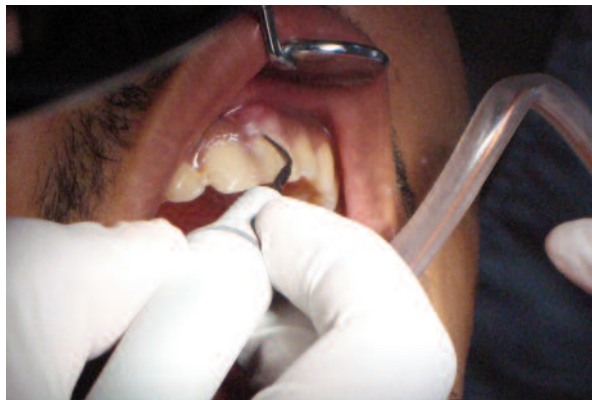


Figure 3: Subgingival scaling was performed.

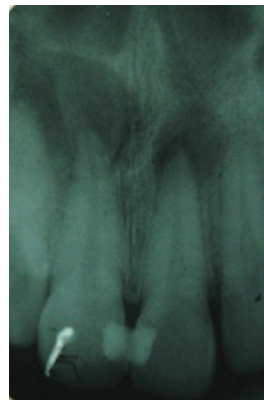


Figure 4: Preoperative Radiograph.



Figure 5: Post-operative Radiograph.

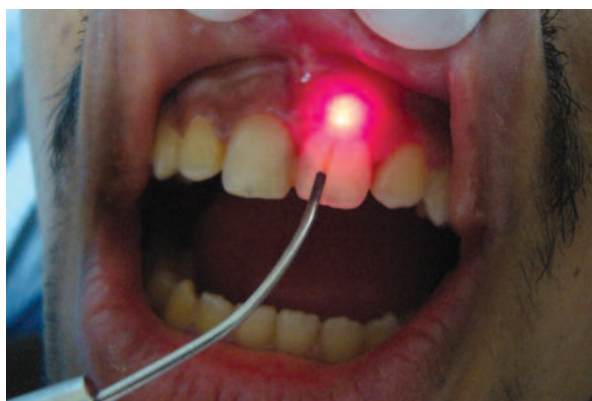


Figure 6: LANAP was done using diode laser.



Figure 7: After laser treatment.

disinfection. The canals were dressed with calcium hydroxide as intracanal medicament and access cavities were sealed with IRM cement for one week, after which the patient was recalled. The absence of pain or signs of inflammation indicated that the root canal treatment could be completed.

New attachment procedure was performed on the same appointment using a 980nm Diode laser, (SiroLaser, Sirona, The Dental Company) with optical fibre thickness 320 μ m, operating with a power range of 0.5-1.5 W in continuous mode. The first pass with the laser (referred to as laser troughing) was accomplished by using 0.5-1 W



Figure 8: Periodontal pocket depth measured after 15 days was reduced to 5 mm.



Figure 9: At 2 month recall.

power (Figure 6). It was executed by moving the fiber continuously, beginning at the gingival crest and not initially into the sulcus. The laser was aligned exactly parallel to the root and the entire interior of pocket was brushed with the distal end of optical fibre.

A second pass with the laser at 1-1.5 W power was done, which completed debriding the pocket, provided hemostasis, and created a soft clot and a closed system. The tissue was compressed against the root surface for about 1-2 minutes to close the pocket and stabilize the fibrin clot. Occlusal trauma was checked and corrected. Patient was prescribed antibiotics, analgesics and chlorhexidine mouthwash. Post surgical instructions were given.

A two months recall revealed a stable situation and disappearance of pain and swelling (Figure 9). Periodontal pocket depth as measured by a Williams graduated periodontal probe was 1mm mesially, 0.5 mm labially and 1.5 mm distally (Figure 10). The final restoration was completed with composite.

Discussion

Endo-perio lesions are common conditions that are difficult to diagnose and persist if not treated completely. However, if the patient's history is taken carefully and thorough evaluation of all possible routes is carried out, these lesions can be completely eliminated to give excellent results. An accurate diagnosis helps in formulating a correct treatment plan, and in most cases, a properly done endodontic treatment is sufficient to eliminate the infection. However, wherever, a secondary periodontal involvement exists, it requires specific therapy to achieve success.

Today, there are various options to treat periodontal



Figure 10: Periodontal pocket depth measured after 2 months was reduced to 0.5 mm labially.

defects. LANAP is a step-by-step procedure developed within a practice setting specifically for treating moderate to advanced periodontitis. The primary goal of LANAP is debridement. It helps in bacterial decontamination whereby it kills *Actinobacillus actinomycetemcomitans* and *Streptococcus mutans*. It has shown to promote re-establishment of connective tissue attachment and, in some cases, osseous regeneration. Owing to its less invasive nature, there are a number of noticeable advantages and benefits that LANAP offers over traditional surgery. Traditional incisional surgery (such as a flap with osseous resection) results in reduced pocket depth due to apical repositioning of the gingival margin exposing the root surface to the oral cavity. Scalpel surgery could result in possible attachment loss, gingival cratering and gingival recession.⁸ The pain and discomfort associated with periodontal surgery is well-known.⁹ By comparison, laser periodontal surgery eliminates pockets with minimal recession or repositioning of the gingival margin. Soft

tissue diode lasers offers dentists added benefits as portability, affordability and ease of use. The unit is available with battery operation, wireless foot pedal and convenient procedure programs. The unit dose fiber tips are precleaved and stripped. The ergonomic handpiece is designed for more comfort and less fatigue. For sterilization, detachable sleeves are included. The cordless and user friendly device has a simplified control panel with touch screen that displays the mode, power setting (watts) and time (in seconds).

A diode laser has become ideal for soft tissue procedures because it possess an affinity for both gingival pigment and haemoglobin.^{10, 11} As a result, a soft tissue laser can separate soft tissue precisely, seal blood vessels, and sanitise the treated area,^{12,13} with it's gentle action resulting in very little post operative swelling.¹⁴ Laser troughing makes it possible to visualize and access the root surface by removing necrotic debris, reducing tissue tension, and controlling bleeding. It also defines tissue margins prior to ultrasonic and mechanical instrumentation, preserves the integrity of the mucosa, and aids in maintaining the free gingival crest. This technique allows for selective removal of sulcular or pocket epithelium while preserving fibrous connective tissues.¹⁴ The hemostatic capability of intraoral laser surgery has been known and utilized for decades.¹⁵ Dentists who practice laser sulcular debridement have reported high patient comfort and acceptance.¹⁴

Soft tissue diode lasers allow cosmetic dentists to perform clinical procedures in a more efficient and less traumatic and invasive manner.¹⁶

Conclusion

Endo-Perio lesion always poses a challenge to the clinician for correct diagnosis and treatment planning. It is imperative that both endodontic lesion and periodontal lesion be addressed individually and sequentially. Soft tissue diode laser is more effective and less traumatic than conventional surgical methods. Such technological innovations present opportunities to provide flexible treatment options to patient while simultaneously enabling clinicians to expand their level of skill. Furthermore, these procedures can be performed with minimal postoperative challenges.

Clinical significance

Endodontic Periodontal lesions present a difficult diagnostic and treatment challenge and treatment often requires a combined therapeutic effort on the part of the clinician. Both endodontic and periodontal surgical procedures may be indicated for access and treatment of these lesions.

While scaling and root planing remain the initial treatment modality in periodontal therapy, the use of a soft-tissue diode laser can also be considered as an efficacious and helpful tool, and an adjunct to conventional therapy both for its decontaminating and biostimulating effects.

While the conventional periodontal treatment techniques usually result in a reduction of pocket depth by shrinkage of tissues leading to exposure of the root surface, the diode laser brings about healing without these undesirable effects, while giving the added advantage of lesser patient discomfort and faster healing. In addition, in this case both endodontic and periodontal treatments were carried out sequentially in the same appointment resulting in shorter chair side time, eliminating the need for a second separate appointment for periodontal surgical procedures. This line of treatment may hold better prospects of treating endodontic periodontal lesions in a shorter time.

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