

## Original Research

### Laser-assisted Full Mouth Disinfection Approach to prevent recolonization in periodontal pockets

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#### ABSTRACT:

**Brief background:** Periodontitis is considered as the result of the interaction between microbial factors and the host's immune response. It is an imbalance within the immune system, and as such, both bacteria and environmental factors play an important role in the development and manifestation of this disease. The primary goal in periodontal treatment is the reduction or suppression of pathogens from periodontal sites. This can be achieved through subgingival debridement using machine-driven or hand instruments. **Material & Methods:** This conventional periodontal treatment, performed quadrant by quadrant in multiple visits, was re-evaluated in the early 1990s when the full-mouth disinfection concept was introduced. This technique was described by Quirynen in 1995, with the intention of performing the scaling and root planing in one or two visits in a 24-hour range. This was done with the goal of avoiding the possibility of cross-contamination between treated and untreated quadrants. It comprised full-mouth scaling and root planing in less than 24 hours with a strict regime of post-operative chlorhexidine use. **Result and Conclusion:** Over the years, several modifications to the full-mouth disinfection approach have been suggested. This article describes how a modified full-mouth disinfection approach with adjunctive use of laser therapy in deep periodontal pockets helped to avoid potential recontamination by periodontal pathogens at already treated sites and also enhanced the periodontal health of chronic periodontitis patients.

**Keywords:** Full Mouth Disinfection, Laser, SRP, Pocket, CHX

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#### INTRODUCTION

Periodontal diseases have achieved the status of a worldwide public health burden. The most common periodontal diseases are plaque-induced inflammatory conditions that arise as a result of interactions between bacterial plaque and the host immune and inflammatory responses. These interactions result in:

- Loss of connective tissue attachment to the root surface;
- Necrosis of root surface cementum;
- Apical migration of the junctional epithelium;
- Pocket formation
- Further plaque biofilm develops in the subgingival environment

As this process continues, loss of supporting alveolar bone occurs, which may lead to increased mobility and tooth loss. The conventional and gold-standard approach to periodontal treatment is quadrant-wise

scaling and root planing (performed within time intervals of 1 to 2 weeks), largely based on the mechanical removal of bacterial deposits from the teeth and root surfaces removing plaque and calculus, decontamination of root surfaces, and disruption of the subgingival biofilm. With adequate supragingival plaque control, this initial cause-related therapy allows the resolution of inflammation and a reduction in probing pocket depths.<sup>1</sup>

However, microorganisms exist in other oral niches, like saliva, tongue, cheeks, and tonsils, and these can migrate from these sites back to the subgingival space, contaminating the already treated quadrants. To prevent this, as part of a new approach, the concept of 'full-mouth disinfection' as a distinct treatment modality emerged in the mid-1990s following a paper published by Quirynen et al. (1995)<sup>2</sup>, which described a novel treatment strategy. It suggested that

undertaking full-mouth scaling and root planing within 24 hours, with extensive use of adjunctive chlorhexidine, would help to prevent the re-infection of previously treated sites during therapy and also target other ecological niches within the oro-pharynx. It was expected that such an approach could deliver improved clinical and microbiological results when compared with standard quadrant-by-quadrant scaling and root planing. This approach would also reduce the number of patient visits.<sup>3</sup>

Several studies have since been published that have sought to establish the relative efficacy of various applications of FMD protocol in non-surgical periodontal therapy literature review. Since the FMD technique was first described, several teams have made changes to the protocol.<sup>3</sup>

This case report describes how the full mouth disinfection approach when combined with the advancements of laser irradiation enhanced the periodontal health of the patient.

### CASE REPORT

A 32-year-old male patient reported to the Department of Periodontics, Sri Guru Ram Das Institute of Dental Sciences and Research, Sri Amritsar with a chief complaint of bleeding gums and redness around teeth for the last 2 months.

The patient initially started experiencing bleeding from gums on tooth brushing and eating. Due to the chronic bleeding while brushing, he quit brushing with a toothbrush. Gradually he started to develop swelling of the gums in the maxillary and mandibular anterior region that was spreading posteriorly to involve the entire gingiva (FIGURE 1). The patient developed difficulty in mastication and was also concerned about his esthetic disfigurement resulting over time. The patient denied any current and past medical history, adverse habits, allergies, and medications.

Intraoral examination revealed poor oral hygiene characterized by severe plaque and calculus accompanied by spontaneous bleeding, pus discharge, and obvious marginal inflammation, especially around the upper and lower anterior teeth. Pit and fissure caries were present in relation to all first molars. Generalized pockets ranging from 4mm to 7mm were present, the majority being pseudo pockets. The panoramic radiograph showed a horizontal pattern of bone loss in both the maxilla and mandible.

Based on the clinical and radiographic examination a diagnosis of Chronic inflammatory gingival

enlargement with localized periodontitis was made. The patient was offered treatment involving a Full Mouth Disinfection (FMD) approach with the adjunctive use of laser therapy (TABLE 1).

After an initial consultation, a further appointment was scheduled to obtain periodontal records to optimize patient oral hygiene. Two further appointments were then scheduled to complete a full mouth disinfection procedure in which full mouth scaling and root planning were performed twice within the time period of 24 hours under local anesthesia of 2% lidocaine with 1:80000 adrenaline. This procedure was performed with the help of the ultrasonic device, and hand instrument (Gracey curets, Hu-Friedy Instruments, Chicago, IL.) in combination using only light pressure with complete overlapping of instrumentation strokes of limited duration to obtain smooth surfaces within 24 hours. Followed by brushing the dorsum of the tongue with 1% chlorhexidine gel, rinsing twice with 0.2% chlorhexidine mouthwash, and Subgingival irrigation with 1% chlorhexidine mouthwash 3 times within 10 minutes post-operatively.<sup>2</sup>

On completion of full mouth debridement, all teeth received low-level laser therapy using an 810 nm wavelength diode laser (AMD LASERS Picasso, USA). Specially designed safety glasses were provided to the patient, operator, and dental assistant for protection of the eyes from the laser beam. The laser was fired at the orifice of the gingival margin at a distance of 1 cm, using a setting of 1.5 Watts as a continuous wave. Each tooth received 5–10 sec of exposure. The patients returned on the next day for final laser therapy. The diode laser was operated at a peak power of 1.8 Watts, using a 400µm Fiber-optic tip. The tip was initiated and introduced into the pocket with a smooth stroking action, starting coronally and working towards the bottom of the pocket. No more than 30 sec were allocated to each tooth. Oral hygiene instructions were reinforced. The patient is advised to do mouth rinses with 0.2 percent chlorhexidine mouthwash twice per day for 1 minute over a 2-week period. (FIGURE 2 and 3)

At re-evaluation after six weeks (FIGURE 4), bleeding was absent and there were no pockets greater than 4 mm. The patient entered a programme of supportive periodontal care and a further review 6 months after treatment showed clinically significant results with no bleeding and periodontal pockets (FIGURE 5).



**FIGURE 1: Clinical appearance of gingival tissues at Baseline**



**FIGURE 2 FIGURE 3**

**FIGURE 2 AND 3: Laser therapy at deep periodontal pocket sites in Upper and Lower Jaw**



**FIGURE 4: Clinical appearance of gingival tissues post-periodontal therapy at 6 weeks**



**FIGURE 5: Final appearance of gingival tissues 6 months after completing Laser assisted- full-mouth disinfection**

**Table 1: Original protocol of FMD given by Quirynen et al. (1995)**

<b>1-SRP "full-mouth"</b>	All teeth in two visits within 24 hours, under local anesthesia
<b>2-Brushing the back of the tongue</b>	For 1 minute, with 1% CHX gel
<b>3- CHX Mouthwash</b>	2 times, for 1 minute, with 10mL of CHX at 0.2% and gargling the last 10 seconds to reach the tonsils
<b>4-Subgingival irrigation of all pockets</b>	3 times, for 10 minutes, with 1% CHX gel, after each of the 2 sessions, and repeated on Day 8
<b>5-Mouthwash (at home)</b>	With 10mL of CHX at 0.2%, twice a day for 1 minute, over 2 weeks
<b>6-Oral hygiene instructions</b>	Tooth brushing, interdental cleaning with brushes or other hygiene aids, brushing of the tongue

## DISCUSSION

The primary objective of initial periodontal therapy is the disturbance, disruption, and control of the pathogenic plaque biofilms on the tooth surface. Mechanical debridement using subgingival scaling and root planing (SRP) can unequivocally be considered as a well-established and effective method for causal non-surgical therapy of periodontitis. Different adjuvant treatment measures have been suggested to increase the effectiveness of this treatment.<sup>4</sup> Besides the use of adjuvant systemic and local antibiotics, laser-supported therapy (**Trombelli et al.,2020**)<sup>5</sup> and the concept of the one-stage full-mouth disinfection (FMD) have been discussed to provide additional clinical and microbiological benefits (**Lang et al.,2008**)<sup>6</sup>. This approach was introduced more than 25 years ago (**Quirynen et al.,1995**)<sup>2</sup> and was based on the observation that recently treated periodontal pockets would be rapidly re-colonized by periodontal pathogens from yet-untreated periodontal pockets and oral niches (**Danser et al.,1994**)<sup>7</sup>. Therefore, in contrast to a quadrant-wise SRP (Q-SRP) with several appointments over periods of 1–2 weeks, the goal of the FMD was to minimize the risk of re-contamination by performing a full-mouth SRP within 24 hours, in combination with a comprehensive disinfection of all oropharyngeal

niches using chlorhexidine during and up to 2 months after the mechanical treatment.<sup>8</sup>

Since the introduction of the FMD concept, different variations of full-mouth treatment approaches have been published. For many years, the laser has been recommended as an additional or additional protocol in the treatment of nonsurgical periodontal disease, due to its ability to achieve tissue ablation effects, hemostasis, bactericidal, and detoxifier effects against periodontal pathogenic bacteria. (**Giovanni Matares et al.,2017**)<sup>9</sup>

Several studies have proven the effectiveness of laser use during periodontal therapy, highlighting an improvement in the depth of survey, in the gain of clinical attachment, and the reduction of gingival bleeding in moderate and severe pockets: after a single application of the 810 nm diode laser, improvements have been achieved in parameters such as PPD and CAL but also in levels of IL1- $\beta$ .<sup>10</sup>

In the present case, full-mouth disinfection was performed in accordance with the protocol of **Quirynen et al. (1995)**<sup>2</sup>, with the adjunctive use of laser therapy. It was recommended to use a diode laser after scaling and root planing sessions for about 20–30 s in each periodontal pocket (810–980 nm, 1.5 W), favoring biostimulation, decontamination, and cauterization of the tissue. Clinically significant results were found with the reduction in bleeding and



periodontal pocket depth with a gain in attachment level.

In light of this information, it can be stated that laser treatment which is implemented as an adjunct to FMD has a statistically significant positive effect on clinical parameters. In addition to that, there is a need for new studies to discover in which mechanisms does laser affect periodontal health.<sup>10</sup>

## CONCLUSION

Although the evidence from the scientific literature is somewhat equivocal, the use of full-mouth treatment protocol and its variation in the management of periodontal diseases is an effective way of providing periodontal treatment. Full-mouth debridement carried out within a single day can be very efficient way to deliver initial periodontal therapy in patients with reliable plaque control. The overall decision on the most appropriate treatment strategy should therefore be based on patient preference and convenience of the treatment schedule.

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