

## The Effect of Combination Therapy of Laser and Synthetic Bone Graft in Treatment of Peri-Implantitis

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### ABSTRACT

**Background:** The success of the osseointegrated dental implants depends on health of the surrounding peri-implant tissues. The primary cause for failure of osseointegrated implant is because of the development of peri-implant diseases, specifically peri-implantitis. The success of an implant with peri-implantitis is purely depends on absolute elimination of the peri-implant diseases, making the surface of the implant sterile, prevention of recolonization of the putative periodontal pathogens and regeneration of the supporting hard tissues around the implant. One of the successful treatment modalities for peri-implant diseases is guided bone regeneration (GBR) by using autogenous bone graft, allogeneous and synthetic bone grafts. The regeneration around an implant is also enhanced by the use of laser therapy. This case report shows the effective treatment of bone defects around dental implants using the laser and synthetic bone graft.

**Keywords:** Peri-implantitis, Guided bone regeneration, Perioglass.

### INTRODUCTION

Peri-implantitis is defined as an inflammatory process which affects the tissues around an osseointegrated implant in function, resulting in the loss of the supporting bone. It is associated with bleeding, suppuration, increased probing depth, mobility and radiographical bone loss<sup>1</sup>. Periimplant disease can be caused by mainly 3 three pathogenic entities which includes bacterial process or inappropriate biomechanical balance (overload) or a combination of the first two factors. Bacterial infections play the most important role in the failure of dental implants. Bacterial flora which are associated with periodontitis and peri-implantitis, are found to be similar.<sup>2</sup> Studies have shown that the bacterial flora at the failing implant

sites consist of gram-negative anaerobic bacteria which includes porphyromonas gingivalis, prevotella intermedia and actinobacillus actinomycetem comitans, which is same as the pathogens in periodontal disease.<sup>1</sup> These bacteria form a biofilm which establishes harmful inflammatory response in host and inhibits bone cells reattachment to the implant surface. So the main in the treatment of periimplantitis is the elimination of the periimplant inflammation and stabilization of the bony attachment (levels of osseointegration). Treatment of peri-implant infections includes mechanical debridement, chemical therapy and surgical procedures which aimed at removing bacteria and decontamination/detoxification of the implant surface using chemical agents or laser beam. By using mechanical and

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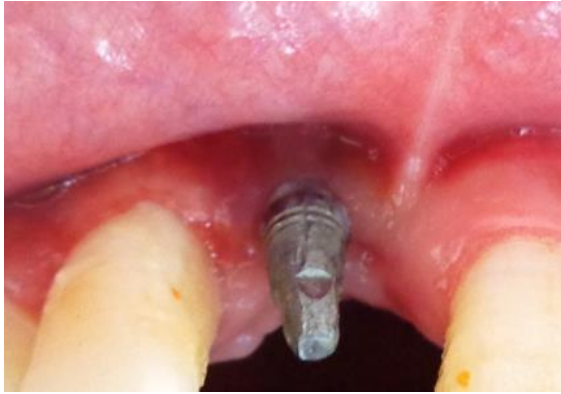


Figure 1: Preoperative clinical photograph.



Figure 2: Pre operative radiograph.



Figure 3: Incision was given

chemical procedures complete implant decontamination has found to be unsuccessful because of limited access to implant microstructures, due presence of resistant bacterial strains, ineffective drug dosages and inadequate bactericidal effect. So application of lasers for



Figure 4: Mucoperiosteal flap was elevated.



Figure 5: Debridement was done using diode laser.



Figure 6: After debridement.

decontamination of implant surface has come into existence.<sup>3</sup> Laser not only effectively removes subgingival calculus but also shows excellent effects on soft and hard tissue ablation with strong bactericidal and photobiomodulation effects. The advantages of diode laser are pocket



Figure 7: Bone graft (perio glass) was placed.



Figure 8: Sutures were placed.



Figure 9: 3 months post operative clinical photograph.

decontamination, peri-implantitis, implant uncovering, incisions, pigmented pathogens, implant surface decontamination. Diode laser of 810nm effectively helps in reducing bacterial contamination and inflammation as it has bactericidal effect without changing the implant surface pattern followed by guided bone



Figure 10: 3 months post operative clinical radiograph.



Figure 11: After crown placement

regeneration treatment.<sup>4</sup> It showed excellent coagulant properties with superficial tissue absorption without damaging underlying tissues. Surgical approach included surgically debride the soft, periimplant tissues affected by the chronic infection, decontaminate the microimplant surface and apply bone regeneration techniques that helps in regenerating the lost bone.<sup>5</sup>

#### **MATERIALS AND METHODS**

A 18 years old male patient came to the department of periodontics, Meghna institute of dental sciences, Nizamabad with a chief complaint of loosening of implant with a history of implant placement in upper front right tooth region 1 year back. On clinical examination, peri-implant mucosa was inflamed with tender on palpation, bleeding on probing and grade I mobility (figure 1). No occlusal

trauma or parafunctional habits were detected. Intra oral periapical radiograph revealed bone loss around the implant suggestive of group II peri-implant defect (figure 2). Peri-implant regenerative therapy was planned for the patient. The treatment of peri-implantitis was procedure was explained to the patient and informed consent was taken before performing the treatment. Treatment strategy included debridement of implant surface peri-implant tissues using 810nm diode laser and regenerative surgical procedure.

After achieving adequate local anaesthesia, intrasulcular incision was given (figure 3) on the implant surface and adjacent teeth on either side of implant and full thickness mucoperiosteal flap was reflected (figure 4). Upon reflection of flap, removal of granulation tissue was performed using 810nm diode laser in contact and continuous wave mode (0.7 W) for 20-30 sec both on the implant surface and peri-implant tissues (figure 5). Then the peri-implant defect area was irrigated using a combination of normal saline and 10% povidone iodine (figure 6). Bone graft (perio-glass) was placed (figure 7) and the flap was reapproximated and sutured using non resorbable sutures (figure 8). Antibiotics and non steroidal anti inflammatory drugs were prescribed for 5 days and patient was advised to use 0.12% chlorhexidine mouth wash for 1 week. Patient was recalled after 10 days for suture removal. The patient was asymptomatic postoperatively and sutures were removed after 10 days.

## RESULTS

Post operative examination revealed satisfactory healing. Reevaluation of the patient was done at 1<sup>st</sup> and 3<sup>rd</sup> month and it was found out that there was a decrease in the implant mobility with adequate bone fill and uneventful healing (figure 9 and 10). Crown placement was done (figure 11).

## DISCUSSION

Diode lasers show bactericidal effect due to a localized increase in temperature and it detoxifies root and implant surfaces by inactivating bacterial endotoxins. It can directly contact the implant surface without inducing melting, cracking or crater formation. It does not damage titanium surfaces, which is useful when uncovering submerged

implant. It is hemostatic and produces no smear layer.<sup>6</sup> It also stimulates fibroblasts and osteoblasts which help in increased production of RNA messengers leading to significant collagen production during periodontal tissue healing. It causes photo bio-stimulation in which stimulates tissues and improve healing as well as it reduces pain. In some cases it can weld together the edges of soft tissue flaps, thus lessening the need for sutures.<sup>7</sup> In this case diode laser of 810nm is used and as it has photo-biostimulation property it showed excellent healing of peri-implant tissues.

Only one human study was published between 2002 and 2014 on diode laser implant decontamination. Maiorana et al published a case report, with no control, with a 1-year follow-up. Initial treatment was done with ultrasonic debridement and diode laser. This was followed 1 week later by flap surgery with a second, deeper ultrasound and laser decontamination, plus guided bone regeneration with a collagen membrane. It was found that laser therapy effectively reduced bacterial contamination and inflammation.<sup>4</sup>

Perioglas is a silicate based synthetic bone augmentation material used for grafting periodontal osseous defects since 1995. Histologically in animal models it showed good repair of surgically created defects. It is biocompatible and shows osteoconductive activities. It gets resorbed and replaced by bone and the remaining granules were in close contact with bone able to improve bone healing at the interface between titanium dental implants.<sup>8</sup> In this case report perioglas was used for regeneration of bone around implant.

## CONCLUSION

Prognosis of the affected implant depends upon early detection and treatment of periimplantitis. Treatment of peri-implantitis with the use of an 980nm diode laser along with the use of perioglas synthetic bone graft material for bone regeneration can be an effective alternative treatment modality. It showed reduction in soft tissue inflammation, and preserve longterm periodontal health. Regardless of the method used, correctly performed supportive periodontal therapy is a key factor in successful implant therapy.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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