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Case Report

Glowing Implants: Enhancing IPG-DET with UV Activator and Growth Factors Technique: A Case Report with a Follow-Up

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Abstract

With the use of CGF (PRF) the fibrin acts as provisional extra-cellular matrix, induces vascularization, and fibrin matrix positively affects the osteogenic differentiation, CGF (PRF) combined with osteoblastic stem cells induces bone formation in ectopic site [7].

The ultraviolet light causes the growth factors to become more active, allowing them to penetrate deeper into the tissues and stimulate more robust regeneration, with the revolution in implant dentistry, an increasingly high esthetic demand has produced a challenge when replacing missing teeth in the maxilla or mandible. Dimensional changes after tooth extraction are compensated for with different socket preservation techniques, and, sometimes, hard and soft tissue augmentations are needed to minimize these hard and soft tissue dimensional changes [5].

The aim of this study was to test the *in vitro* differentiation effects of concentrated growth factors (CGF), a platelet rich preparation, using a uv activator device that emits ultraviolet light. This light can be used to activate certain compounds, such as growth factors, that have been applied to a patient's tissues [1].

When the uv activator is used in conjunction with growth factors, it can help to enhance their effects.
Vuv activation > next-generation uv technology
Removes implant pellicle and regenerates hydrophilicity,

Titanium implants undergo biological aging

The minute they are manufactured.

Time-dependent carbon builds on the surface naturally.

The carbon layer is defined as implant carbon pellicle or implant pellicle.

Titanium goes from hydrophilic to hydrophobic and loses its biological capability [2].

Keywords: *Glowing Implants; IPG-DET; UV Activator; Growth Factors*

Introduction the IPG-DET Technique

Is a cutting-edge method for implantation that has shown great promise in the field of regenerative medicine. This technique involves the use of growth factors to stimulate tissue regeneration and repair, leading to faster healing times and better outcomes for patients [3].

One key component of the IPG-DET technique is the use of a uv activator. This activator helps to enhance the effects of the growth factors, implant pellicles are made of hydrocarbon molecules, titanium implants no longer have titanium surfaces at the molecular level [5].

The IPG-DET technique involves the injection of growth factors directly into the site of injury or damage. These growth factors are then activated using the uv activator, which causes them to become more potent and effective.

The activated growth factors then begin to stimulate the body's natural healing processes, promoting the regeneration of damaged tissues and accelerating the healing process [8].

The IPG-DET technique with uv activator has a wide range of clinical applications. It can be used to treat a variety of injuries and conditions, including musculoskeletal injuries, chronic wounds, and even neurological disorders.

The technique has shown promising results in both preclinical and clinical studies and is quickly becoming a popular choice among physicians and researchers in the field of regenerative medicine [15-17].

Clinical and radiographic analysis of immediate implant placement with glowing implant enhancing IPG-DET with uv activator and growth factor technique: a case report with a 1-year follow-up.

Failure to integrate with the bone, postoperative infection, the objective of this case report to evaluate and assess the clinical and radiographic outcome of the use of a UV activator in implantation with the IPG-DET technique, the uv activator is used with growth factors and not with water saline technique with immediate implant placement after 1 year of final restorative crown placement [18].

Objective of the Study

This case focused on a 40-year-old healthy non-smoking patient referred to the periodontology clinic for evaluation of a loose crown of the upper right 1st molar maxillary. After clinical and radiographic examination, the old implant was deemed unrestorable as the buccal space was 3 mm sub gingivally, compromising the crown and the old implant, intra oral examination shows soft buccal bone as not good implant positioned. Cone beam computed tomography (CBCT) showed sufficient apical and buccal bone for immediate implant placement with no periapical lesion. The area was planned for immediate implant placement to use the healthy palatal bone. The risk and benefits of the procedure and treatment plan options were explained to the patient, and a signed written consent form was acquired from the patient. Oral hygiene instructions and scaling were performed before the surgery (Figure 1 and 2).

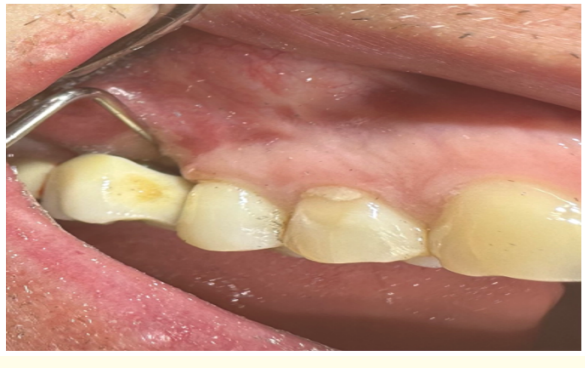


Figure 1

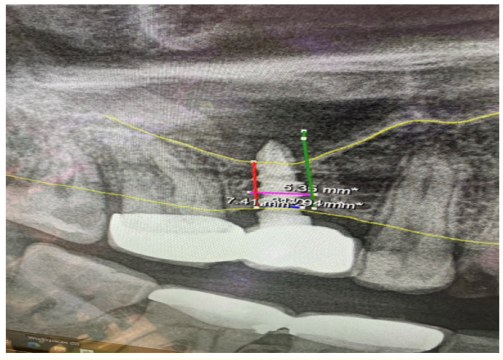


Figure 2

After administration of the local anesthesia (2% lidocaine with 1:100,000 epinephrine, dentsply pharmaceuticals, USA), a flap done buccally and interdentally, the old implant of the upper maxillary 1st molar was extracted mesiodistally, and atraumatic using a long needle diamond bur buccally, using a round diamond bur, on the buccal bone was adjusted and trimmed to be flushed with the crestal buccal bone level, and to separate it from the adjacent crown on the 2nd upper maxillary molar (Figure 3).

Figure 3

Then, the socket was debrided and thoroughly irrigated with sterile normal saline and betadine solution (Figure 4).

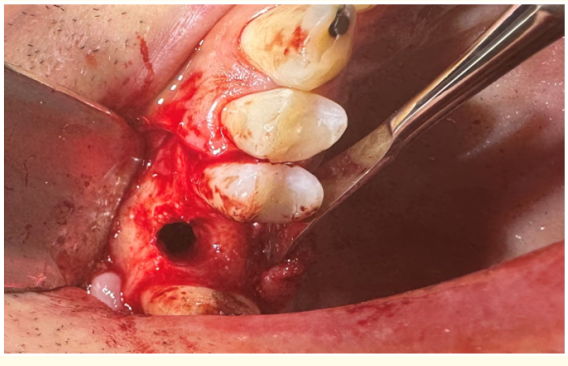


Figure 4

Bone defects and the loose of interdental papillae are generally less serious than with larger gaps involving several teeth.

Tissue reconstruction achieves good and, above all, predictable results in most cases.

The results of the present study suggest that in histological evaluation because of its biological compounds, prf results earlier vessel formation and tissue maturation compared to connective tissue graft.

Platelet-rich fibrin (PRF) belongs to a new generation of platelet concentrates, with simplified processing and without biochemical blood handling, leads to the intrinsic incorporation of platelet cytokines and glycanic chains in the fibrin meshes.

Growth factors: BMP bone morphogenetic protein. FGF fibroblast growth factor. PDGF platelet derived growth factor. IGF insulin like growth factor. TGF transforming growth factor. VEGF vascular endothelial growth factor, etc.

To get a clot: remove the anticoagulants < platelet rich fibrin> PRF

Platelets = growth factors, leukocytes = growth factors, fibrin organizes the slow release of growth factor and thrombospondin, a gold stander to achieve for all surgical platelet concentrates technologies, comparative release of growth factors from platelet rich plasma, prf and advanced-prf, optimized platelet rich fibrin with the low speed concept; growth factor release biocompatibility and cellular response fibrin is a provisional extra-cellular matrix through which cell migrate during the repair. [growth factors half-life=3mn] in choukroun's platelet-rich fibrin [wargo] (Figure 5).

Figure 5

As we are close to the maxillary sinus we replaced the a prf in to the aria of the extracted implant, filling the space and making under layer beneath the maxillary sinus (Figure 6).

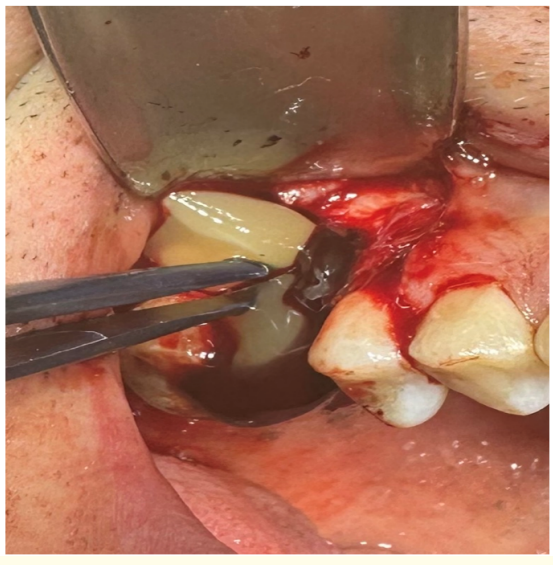


Figure 6

The PRF matrix, created in the previous process of blood centrifugation, was placed within the osteotomy site in two distinct consecutive stages. At first stage, one half of the matrix was inserted through the osteotomy site and into the sinus by means of the fibrin injector (Silfradent-Italy), which proved to be a great tool for the swift insertion of the fibrin gel block.

Start preparing the palatal area for immediate implant replacement with using the first pilot drill with 500n and 40 tourq. Then using the manual 3 mm drill to the length of 10 mm then with 4 mm drill for the osteotomy just up to 3 mm depth from the crestal edge in the wright position for the replacement of the new implant (Figure 7).

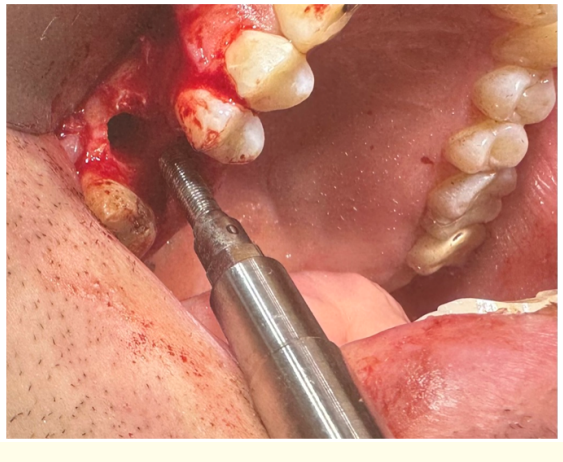


Figure 7

Initial implant placement with minimal invasive procedures during “IPG” DET employment.

Straight out-of-the-package implants are bio-compromised. Titanium implants undergo biological aging the minute they are manufactured.

Hydrocarbons grow on the surface over time, forming a carbon film called implant pellicle.

As a result, the titanium changes from hydrophilic to hydrophobic.

New uv technology removes implant pellicles and regenerates hydrophilicity.

They exploited cutting-edge vacuum UV (Vuv) light with a 172 nm wavelength and an innovative synthetic quartz technology [21].

Figure 8

Implant surfaces are covered with a pellicle coating, just like teeth. Dr. Ogawa at the ucla school of dentistry did extensive research and defined this hydrocarbon build-up as implant pellicle.

Much like the dental pellicle impedes tooth re-mineralization and provides a foundation for oral bacterial biofilm, the implant pellicle significantly compromises osseointegration and increases the attraction of oral bacteria.

However, Vuv effectively removes the implant pellicle, maximizing osseointegration and minimizing biofilm development (Figure 7).

The implant pellicle is a film that forms on implant surfaces when the titanium binds to hydrocarbons in the atmosphere. The hydrocarbons of the pellicle prevent bone deposition and, instead, attract bacteria and facilitate biofilm formation [33] (Figure 8)

The research-proven effects of UV photo functionalization in cell cultures and animal models are as follows: 98% bone-to-implant contact capability. 5X’S greater number of osteogenic cells attach to the implant surface in the initial stage. 4X’S greater protein absorption to the implant surface, 3X’S faster osseointegration in the early healing stage [20].

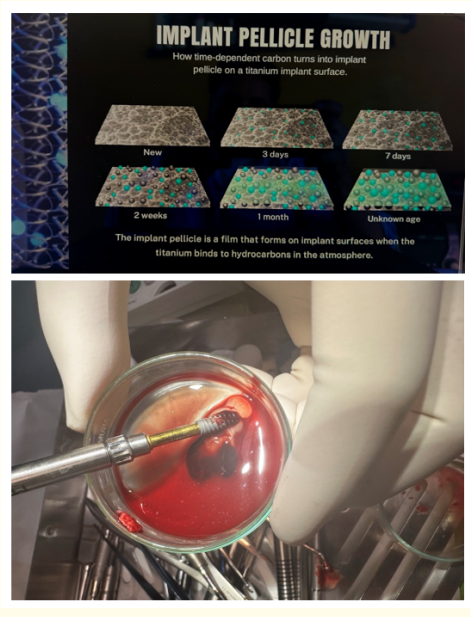


Figure 9

I made this research regarding the [use of a uv activator in implantation with the IPG-DET technique, the uv activator is used with growth factors and not with water saline] (Figure 9).

The Vuv activation goes beyond removing implant pellicles, increasing osseointegration, and enhancing soft tissue seal. It also increases interfacial adhesion between materials. On top of that, crowns, bridges, and implant access holes become clean for bacteria-free delivery, making them bacteriophobic surfaces [26].

The parameter measured is named Implant Stability Quotient (ISQ). It ranges from 0 to 100 ISQ units, with high values indicating high stability of the implant. It considered as an indirect measurement of Osseo-Integration. ISQ values derived from the clinical evaluation procedure made in all placed implants ranged between 63 and 72. This case it was 69. And torque 40.

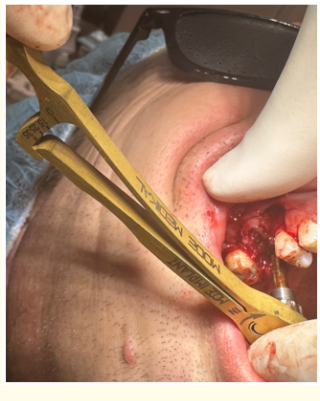
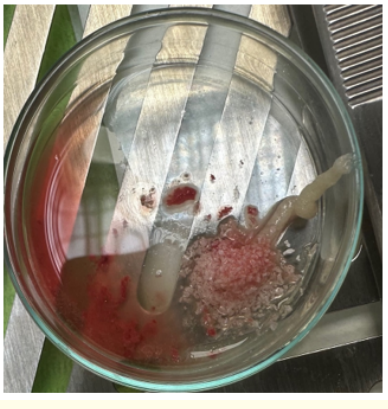


Figure 10

Healing cap was replaced at the same day of the surgery.



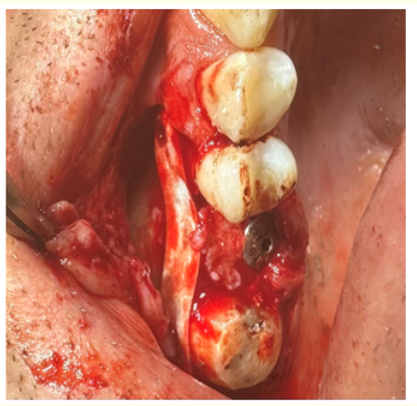


Figure 11

The bone deficit was replaced with bone fragments and the bovine bone as well as xino graft made as stick bone covering all the surface, on the top of that we replaced a resorbable membrane covered with the a PRF.

Finally, adaption of the flap and fixation with horizontal U mattress suture and simple interrupted sutures.

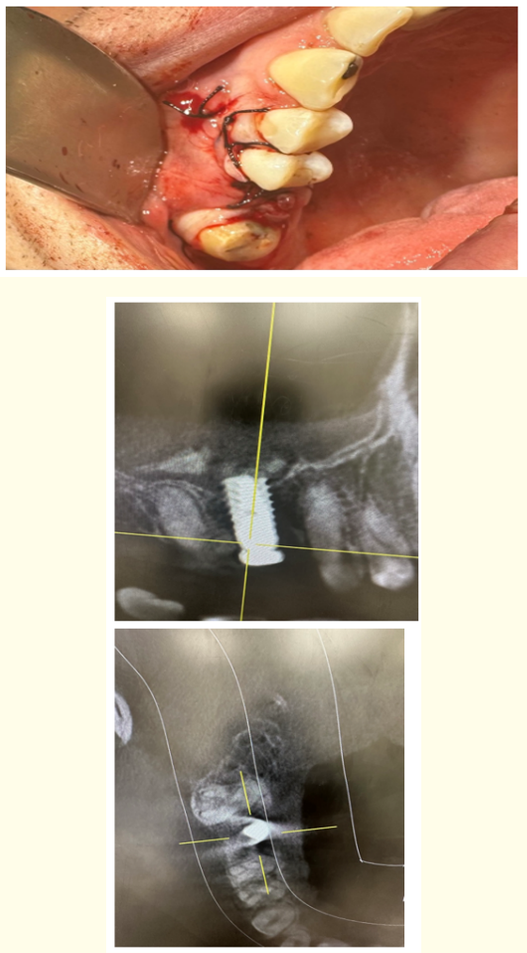


Figure 12

Postoperative instructions were given to the patient, and the patient was prescribed antibiotics (Augmentin 1000 mg) every 12 hours daily for 7 days, ibuprofen 600 mg every 8 hours daily for 4 days for pain relief and 0.2% chlorhexidine gluconate mouth wash every 12 hours daily for 2 weeks.

The patient was recalled for postsurgical re-evaluation after 1 and 2 weeks.

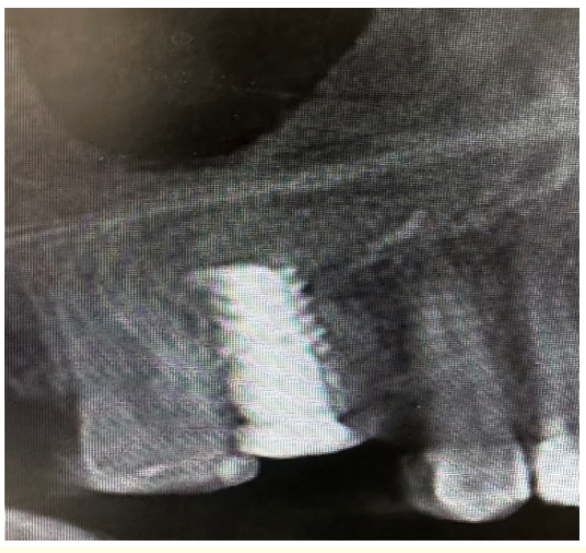


Figure 13

The final implant crown was placed after 3 months of implant placement. The patient was recalled for clinical and radiographic (periapical radiograph) evaluation and maintenance after 6 months, and after 1 year for clinical and radiographic evaluation (CBCT) and maintenance.

Results and Discussion

Irresistible attraction Vuv photofunctionalization removes implant pellicles by decarbonizing the titanium, restoring hydrophilicity.

This dramatically increases blood wettability, thereby improving the adhesion of proteins and osteoblasts - enhancing osseointegration [23].

Before Vuv activation < the blood forms drops, and fails to penetrate the threads >

After Vuv activation < the blood adheres to the entire implant surface >

An increased number of human fibroblasts attach and adhere to uv-treated healing abutments, enabling better soft tissue healing and sealing [32].

“Pellicle-free implants. Finally! This changes everything. One-minute uv treatment maximizes osteoblast attachment and function. Uv has solved all the technical challenges the original uv activator had”.

To evaluate the efficacy of various UV sources that decarbonize and remove implant pellicles, methylene blue solution was tested on the implants.

With the Vuv, the solution becomes perfectly clear after just one minute of exposure, eliminating all the carbon [33].

Conclusion

The osseo-integration procedure was evaluated and measured both visually in terms of radiographic scans and clinically via stability values. Radiographic evaluation show CBCT scans at various tooth areas depicting extensive bone formation at the implant surgical site [35].

Key points of "IPG" DET are the integration of concentrated growth factors (CGF with stem cells CD34+) along with bone grafting and intentional perforation of sinus membrane towards a rapid implant insertion. The two-stage insertion of CGF-CD34+ is also an innovative procedure providing a more solid environment for the implant to be placed combined with the regenerative ability of the sinus membrane [37].

Disclosure

The author declares no financial interest and no conflict of interest exists.

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