

Reducing Osseointegration Time using UV Machine Implants Treatment: Clinical Report

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Abstract

This study's goal is to determine how well UV therapy works for placing dental implants. Panoramic X-ray, clinical image, CBCT were used to assess the effects of UV irradiation on reversing the biological aging process of implants. BIC is predominantly influenced by implant surface characteristics. Among the most popular methods of modifying an implant surface is the roughening of the surface using the sandblasted, large-grit, acid-etched (SLA) technique.

Keywords

Ultraviolet; Dental implant; Osseointegration; Bone-implant interface.

Introduction

The most important factor for osseointegration of implants is the correct interface between macro- and

micro-design, which varies depending on the classification of implants into three types based on external bone level, internal tissue level, and internal bone level. The implant surface has an approximately 50-nm-thick TiO₂ oxide film. With time, hydrocarbons in the air are adsorbed on to the oxide film, leading to a biologic aging process that prevents osseointegration. [1-2-3-4] The surface of implant begins to change from hydrophilic to hydrophobic after the manufacturing process. Efforts have been made to reverse this biological aging process and to induce the original hydrophilic state through UV irradiation. In line with this trend, in the present report, I will share my experience with UV machine (AB DENTAL) [5-10].

Materials and Methods

UV photo functionalization was performed by illuminating implants with UV light for 15 seconds using a specialized instrument (AB DENTAL UV ACTIVATOR ISRAEL). Specifications of the device were as follows: input voltage of AC 100 to 240 V \pm 10%, input current of 2.2 A in maximum. Multiple UV lamps were utilized to create the UV light as a mixed spectrum at wavelengths of 172 nm. Inside the device, the lamps were arranged to illuminate an implant in all directions homogeneously. We have used Ab dental implants that have had their surfaces roughened with calcium phosphate particles before undergoing multiple thermal acid etching procedures to determine the microstructure and surface roughness of the implants. Then, gamma irradiation is used to sterilize all implants.



Figure 1: Implants surface after UV treatment increasing the Hydrophilicity (AB DENTAL).



Figure 2: UV machine (AB DENTAL).

First Case: Immediate Implant in Molar Area

Female patient 45 years old.



Figure 3: Immediate implant placement in mandibular molar area; Extraction and implant (155 4,2 x11,5 Ab dental) and dentin graft.



Figure 4: Healing after 2 months and temporary restoration.



Figure 5: X-ray after 2 months.

Second Case: Immediate Implants and Crestal Sinus Lift

Male patient 72 years old.

Extraction and immediate implants (AB dental I5) 3,75 x13 and 4,2 x 11,5 and crestal sinus lift with osseodensification using dentin GRAFT IVORY GRAFT ISRAEL.

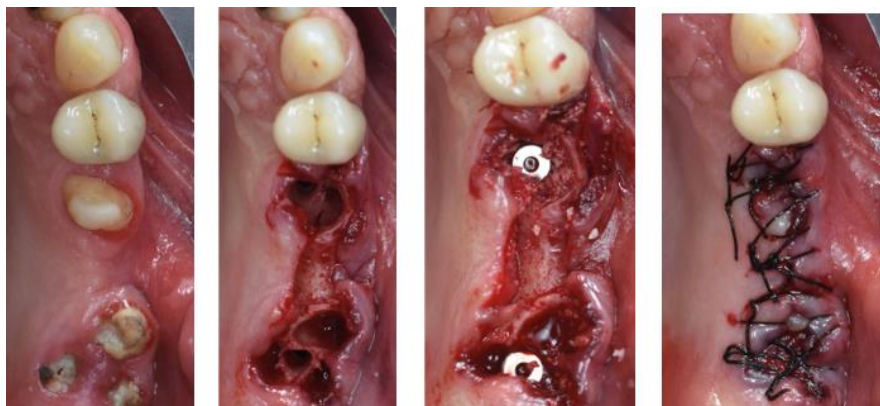


Figure 5: Extraction and immediate implants.



Figure 6: X-ray Initial.



Figure 7: X-ray after implants placement.



Figure 8: Healing after 3 months and temporary restoration.

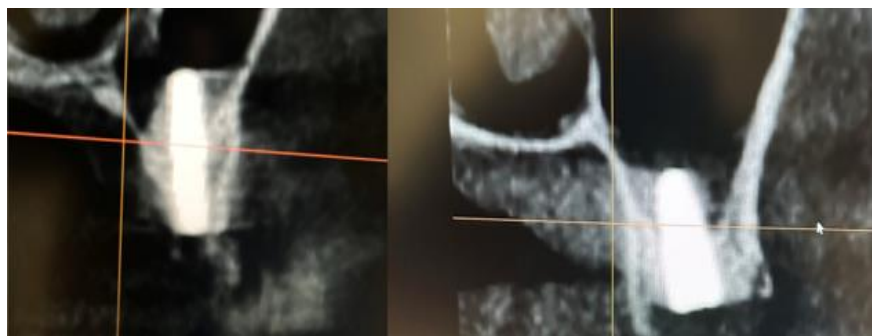


Figure 9: CBCT after 3 months.

Third Case: Immediate Implants and immediate restoration

Female patient 79 years old extraction and immediate implants (AB dental) dentin graft (IVORY GRAFT).



Figure 10: Initial X-ray.

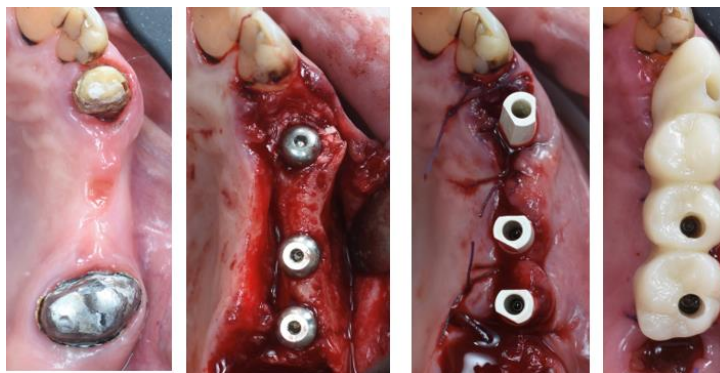


Figure 11: Extraction and immediate implants.



Figure 12: Immediate restoration.

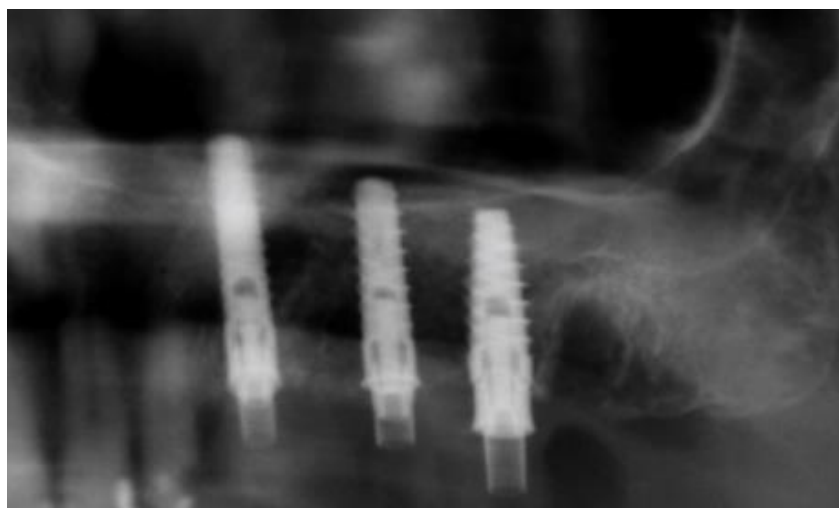


Figure 13: X-ray after implants placement.



Figure 14: Healing after 3 months.

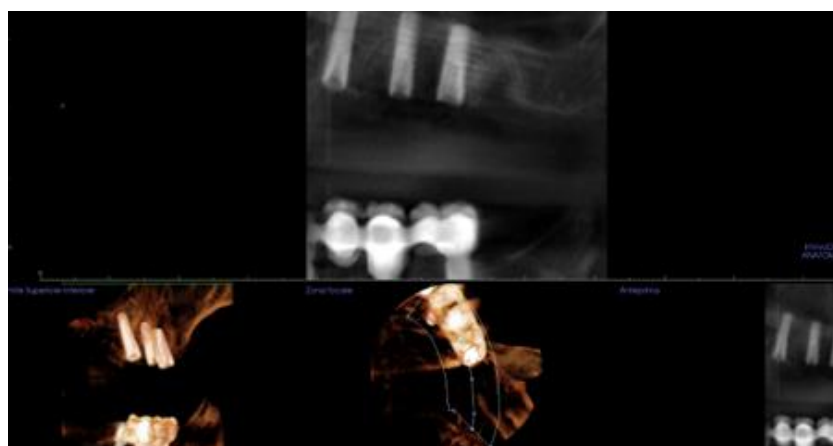


Figure 15: CBCT after 3 months.

Fourth Case: Immediate Implant in Esthetic Area with Immediate Restoration

Male Patient 50 Years old extraction immediate implant Dentin Graft (IVORY GRAFT) and immediate restoration.



Figure 16: Extraction and immediate implant with Dentin Graft.



Figure 17: Extraction immediate implant Dentin Graft.



Figure 18: Immediate temporary restoration.



Figure 19: Immediate temporary restoration.



Figure 20: Final restoration after 3 months.



Figure 21: X-ray after 3 months.



Figure 22: CBCT 3 months later.

Discussion

Photo functionalization are due to improving hydrophilicity and eliminating hydrocarbon contamination on the implant surface in addition to antibacterial effects, UV activation would increase the adsorption of plasma proteins of human body and improve osteogenic cell attachment, spreading, and proliferation. There is an important bacterial colonization on implants only 30 min after implant insertion which may be prevented by UV-photofunctionalization restricting the growth of oral bacteria and biofilm. Peri-implant-diseases-associated biofilms would affect the long-term outcome of dental implants. The microbial composition between periodontitis and peri-implantitis are similar; however,

dental implants are more susceptible to oral infections than natural teeth [11-14].

Conclusion

Many methods have been used to promote osseointegration for successful implant therapy, including photofunctionalization. UV photofunctionalization can change the surface wettability and eliminate the hydrocarbons that are generated by aging on the implant surface (15-17). According our clinical experience using this machine we have a significative reduction in terms of osseointegration time also in case of immediate restoration and post extractive procedures. However, further studies must be conducted in the future.

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