



The Effect of Plasma Spray Treated Healing Abutment on Peri-Implant Soft Tissue: A Case Report

Dalia Yossri¹, Doaa Adel-Khattab^{2*} and Nevine Kheir El Din³

¹Assistant lecturer of Oral Medicine, Periodontology and Diagnosis, Faculty of Dentistry Ain Shams University, Egypt

²Associate Professor of Oral Medicine, Periodontology and Diagnosis Department, Faculty of Dentistry, Ain Shams University, Egypt

³Professor of Oral Medicine, Periodontology and Diagnosis, Faculty of Dentistry Ain Shams University, Egypt

***Corresponding Author:** Doaa Adel-Khattab, Associate Professor of Oral Medicine, Periodontology and Diagnosis Department, Faculty of Dentistry, Ain Shams University, Egypt.

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Abstract

Dental implants are one of the most used treatment modalities for restoring edentulous spaces. Despite being a procedure with highly predictable success rates. Complications related with implants are peri-implantitis and peri implant mucositis, that cause the imbalance between the bacterial load and the host's defenses. Healing abutments are used to re-establish the anatomical features and health state conditions of soft tissues which allow the proper formation of barrier epithelium and connective tissues. Plasma spraying is used for surface modification and decontamination. It has also been related to a decrease in marginal bone loss around implants and to a higher mean gain at the soft tissue marginal level compared to abutments with no treatment procedure. This case report demonstrates the clinical effect of plasma spray treated healing abutment on peri-implant soft tissue.

Keywords: Peri-Implant Soft Tissue; Plasma Spray; Healing Abutment

Introduction

During the soft tissue healing process, the features of the peri-implant mucosa are established, many biomaterials and surgical factors may have an influence on the outcome of soft tissue quantity [1]. Cleaning and disinfection procedures are mandatory during the prosthetic phases as inflammation of the peri-implant mucosa can lead to subsequent destruction of the alveolar bone [2]. Different modalities can be used for surface modifications and decontamination of implant abutments [3].

Plasma spray is a newly implemented implant technique using commercially available chairside plasma-jets. It generates an electrically neutral, ionized gas which can decontaminate surfaces.⁴ Plasma can be differentiated into two types: nonthermal (cold) atmospheric plasma (CAP) and thermal plasma, with a temperature of less than 40 °C at the point of application. Several *in vitro* studies had proved that the wettability and cell spreading on titanium surfaces is enhanced by plasma modification [5,6].

Case Description

A 34-year-old woman reported with the chief complaint of masticatory problem due to missing tooth upper left first premo-

lar and wanted to get it replaced (Figure 1). Treatment planning was confirmed with the patient by placement of dental implant to replace the missing tooth, Implant length was chosen according to the available bone height without endangering vital structures (i.e., 1 mm away from the maxillary sinus), while implant diameter had been chosen according to the mesio-distal and bucco-lingual dimensions of the edentulous ridge (Figure 2). Surgical implant placement was performed, (Figure 3,4) and three months post-operative healing abutment was installed after being treated with plasma device (Piezobrush® PZ2) under irradiation at 0.2 MPa for 80 seconds at 10 mm (20 seconds per each surface) [7] (Figure 5), after that impression was taken and the crown was delivered (Figure 6,7). Plaque and gingival indices for clinical assessment for healing abutment and peri-implant soft tissue were recorded at ten days after the second surgery and six months after prosthetic delivery.

Results

Clinical assessment after abutment placement, after 10 days showed Plaque index (PI = 0) and gingival index (GI = 0). Also, after 6 months after crown delivery Plaque index (PI = 0) and gingival index (GI = 0). Peri-implant soft tissue showed no signs of inflammation nor bleeding on probing.



Figure 1: Preoperative photographs, a. lateral view, b. occlusal view.

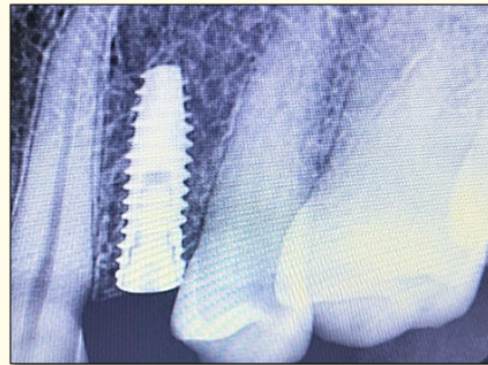


Figure 4: Postoperative periapical radiograph after implant placement.

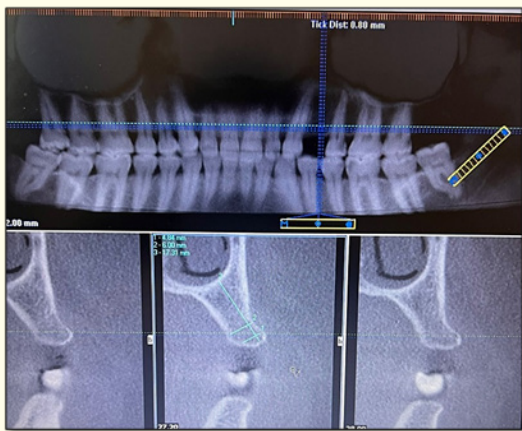


Figure 2: Preoperative CBCT.



Figure 5: Intraoral photographs of peri-implant soft tissue, a. after two weeks from second stage surgery

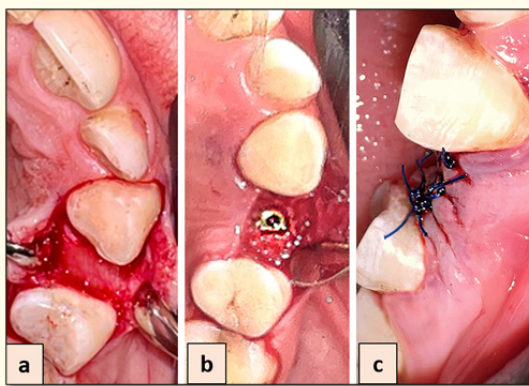


Figure 3: Intraoral photographs showing a. flap reflection, b. implant placement, c. flap closure.

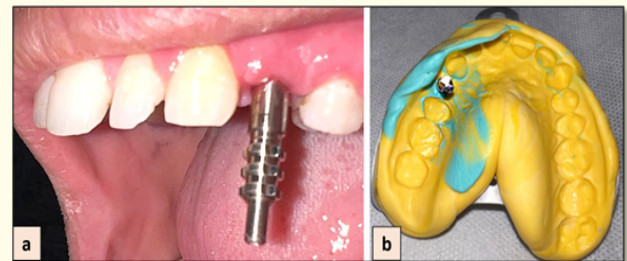


Figure 6: Photographs showing prosthetic procedure, a. transfer coping in place, b. secondary impression with implant analogue in place.



Figure 7: Clinical photograph showing the final prosthesis on implant.

Discussion

Plasma spray cleaning is used for decontamination due to its triple effect on titanium: cleaning, corrosion protection, and surface energy enhancement of the treated surfaces [8]. In this study. Plasma treatment showed no plaque accumulation on healing abutment (PI = 0) which is due to the peri-implant soft tissue seal formed during the healing which indicates the effect of plasma treatment on decreasing plaque accumulation on healing abutments and consequently on the peri-implant soft tissue inflammation, which is reflected on GI, confirming what was reported by Henningsen, *et al.* in 2018, that plasma spray treatment can decontaminate the surfaces with increasing their surface energy [9].

The result of this study is in agreement with what was published in the systematic review by Corvino, *et al.*, 2020 who evaluated the influence of modified titanium abutment surface on peri-implant soft tissue and reported that plasma caused better cell behavior compared with machined titanium [10].

Conclusion

The result of this case report showed that plasma spray is an effective method for titanium healing abutment surface treatment which can improve the peri-implant soft tissue healing around implants.

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