Soft Tissue Augmentation by Xenogeneic Collagen Matrix Versus Subepithelial Connective Tissue Gra

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Submitted by:
Mohamed Omar Ismail
PhD Candidate
Faculty of Dentistry
Minia University

Soft tissue augmentation by xenogeneic collagen matrix versus subepithelial connective tissue graft around early implant placement in maxillary esthetic zone

Proposal Submitted to

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Presented by

Mohamed Omar Ismail

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Of

Prof Dr Mohamed Abdel Moniem Ebrahem

Professor of Oral Medicine, Oral Diagnosis and Periodontology

Faculty of Dentistry, Minia University

Introduction

Dental implants have been considered a good option for partially edentulous patients in maintaining healthy mucosa with minimal crestal bone loss and no extensive harm to the adjacent natural teeth **(Henry, P. J, 2000).**

Three basic protocols for implant placement were defined according to the time between tooth extraction and implant installation; in the type-1 protocol (immediate implant installation), implants are placed in fresh extraction sockets, with the aim to engage the remaining socket walls with the implant. In the type-2 protocol (early implant placement), implants are placed approximately 4–8 weeks after tooth extraction. The main objective of this protocol is to ensure the lack of pathology when placing the implant and, at the same time, to optimize the availability of soft tissue for primary healing and probable lateral bone augmentation. In the type-3 protocol (early-delayed/conventional implant placement) the implants are placed once most of the dimensional changes in the alveolar ridge have occurred (12–16 weeks) **(Lanza et al., 2015).**

The early implant-placement protocol has been suggested because it shares some of the advantages of immediate placement, such as using bone volume immediately after extraction, although already in the second month there is alveolar bone loss; it also allows for the primary closure (epithelium-connective tissue) of the wound. It is indicated in the presence of acute infectious processes; early implant placement is associated with a lower frequency of mucosal recession compared to immediate placement, when combined with regeneration procedures **(Sanz et al., 2012).**

Implant therapy in the anterior maxilla is challenging for the clinician because of the esthetic demands of patients and difficult pre-existing anatomy

(Ebenezer et al., 2015). Placement of dental implant in the esthetic zone is a technique sensitive procedure with a little room for error **(Al-Sabbagh et al 2006).**

Enough keratinized tissue was considered important for marinating healthy tissue around dental implant, Also soft tissue biotype has been considered as a critical factor, where patients would show either thin scalloped gingiva or thick flat biotype Moreover, it has been proven that thin biotype had higher liability for gingival recession from any trauma during the surgical and prosthetic procedures in comparison to thick flat biotype and the underlying bone could suffer from rapid resorption in association with soft tissue recession **(Elbattawy et al.,2020).**

Consequently, plastic augmention procedures have been introduced to achieve better esthetics in conjunction with implant placement **(Burkhardt & Lang 2014).** There is consensus that the addition of soft tissue graft to the surgical implant protocol in patients with thin scalloped biotype increases gingival thickness and improves esthetic outcomes, especially at the buccal gingival margin level. It is likely to even improve longer-term soft tissue stability (**Shetty & Bhat 2013).**

Subepithelial Connective Tissue Graft has been widely utilized aiming at increasing the width and thickness of keratinized tissue either around natural teeth or around implants for resisting and treating recession, masking the metallic implant color and also for papillary reconstruction **(Karthikeyan et al., 2016).** Both free gingival and connective tissue grafts are however associated with significant patient morbidity due to the need for a donor palate site, that leaves the periosteum exposed after surgery. Unfortunately, high morbidity is common in all types of surgeries where autologous grafts are

involved (like bone grafting techniques), while xenogeneic materials do not present such inconvenience **(Puri et al., 2019).**

An ideal non autologous graft for soft tissue substitution should promote haemostasis, be infection resistant, favour the formation of granulation tissue, have a low post-operative morbidity and have a fast healing time **(Maiorana et al., 2016).**

Mucoderm® is a natural type I/III collagen matrix derived from porcine dermis that undergoes a multi-stage purification process to remove all non-collagenous proteins and cells, as well as potential bacteria and viruses. These processing results in a three-dimensional stable matrix consisting of a naturally cross-linked open porous collagen network that serves as a scaffold for the adhesion and migration of connective tissue cells and blood vessels **(Pabst et al. 2015).** Thus, mucoderm® supports revascularization, fast soft tissue integration and offers a safe alternative to the autologous connective tissue **(Schmitt et al. 2016, Zafiropoulos et al. 2016, Rossi et al. 2016).**

Mucoderm will be used in this study as axenogenic collagen matrix for soft tissue augmentation in maxillary esthetic zone

Aim of the study

The aim of this study is to compare the clinical and radiographic outcomes of xenogeneic collagen matrix to Subepithelial Connective Tissue Graft in maintaining crestal bone and enhancing soft tissue around early implant placement in maxillary anterior zone

Patients and methods

Patient selection

This investigation will be included 12 implants placed in 12 patients with missing maxillary tooth in the esthetic zone Subjects will be selected from the outpatient clinic, Department of oral Medicine and Periodontology, Faculty of Dentistry, Minia University.

Inclusion criteria:

1-Selected patients of both sexes are 25-55 years old.

2-Patient will be free from any systemic diseases that might affect healing,or complicate the surgical procedures according to modified Cornell Medical Index**(Glick M.,2003)**

3- Thin tissue biotype ,Trans-gingival periodontal examination will be made 2, 4 and 6 mm apical to the gingival margin at the mesiolabial and distolabial line angle as well as midlabial **(Cuny-Houchmand et al., 2013)**

4- Cooperative, motivated, and hygiene conscious patients.

Exclusion criteria:

1- Pregnant women.

2-Smokers

3-Precense of persistent chronic infection in the implant site.

4- Patient at growth phase with partially erupted teeth

5- Patient with para-functional habits that produce overload on the implant such as bruxism and clenching

6- Patient with insufficient vertical inter-arch space upon centric occlusion to accommodate the available restorative component

Ethical regulation

The complete treatment plan will be explained to all patients including detailed steps, risks, and expected results and their full signed consent will be obtained prior to entry into study. The study will be complied with the rules

set by the International Conference on Harmonization Good Clinical Practice Guidelines, and the Declaration of Helsinki and the research ethics committee of the Faculty of Dentistry, Minia University.

Clinical evaluation:

Patients will be evaluated clinicaly and radiographically along the course of the study at basline, 6, 12 months after the implant insertion.

The following records will be performed:

1-Clinical photographs, Study casts at baseline.

2-A preoperative cone beam computed tomography (CBCT) will be performed for each patient prior to the surgery to determine bone height and width and decide the implant length and diameter to be placed and to evaluate the underlying bone condition.

3-Full mouth periodontal parameters will be recorded using William% graduated periodontal probe to evaluate the periodontal status (plaque index, gingival index, pocket depth, clinical attachment loss).

4-Trans-gingival probing will be done at the mesial line angle 2, 4 and 6 mm apical to the gingival margin. At the same apico-coronal direction three points will be recorded at the mid-buccal and at the distal line angle **(Rotenberg & Tatakis, 2014).**

5-The width of keratinized gingiva will be measured using graduated periodontal probe and recorded as the distance from the mucogingival junction to the gingival margin

Assessment methods:

Patients will be evaluated clinically and radiographically along the course of the study (immediate after the implant insertion) at bassline 0, 6 and12 months.

Clinical assessment:

Clinical parameters will be included: gingival thickness (GT), keratinized tissue width (KTW)

GT will be measured by trans gingival-piercing of the tissues using an anesthetic needle with a rubber stopper 2mm coronal to the MGJ and in the mid distance mesio-distally. KTW will be measured at the mid buccal area from the gingival crest to the MGJ

Treatment plan:

All procedures will be done under completely aseptic conditions.

Patients will be anaesthetized by buccal and palatal infiltration.

Crestal incision and full thickness mucoperiosteal flap will be elevated buccally and lingually. Then the bone width will be measured again using bone caliper to confirm the implant width as detected in CBCT.

Sequential drilling will be started by the pilot drill till the last drill that suited the planned implant size. Before implant placement a parallel pin will be used to check the implant parallelism.

Implant insertion will be done in the osteotomy site using torque wrench by self-tapping fashion till the implant will be placed 0.5-1mm below the alveolar bone crest with adequate primary stability

The site will be prepared to receive the graft and allow its fixation.

Randomization

The study will be used simple randomization to allocate patients into test and control groups.

Then, random allocation will be performed using computer-generated random numbers to determine which group they will be assigned

Group1 (control group):

SCTG will be from the palate by single incision technique .The SCTG will be placed in the pouch over the recipient site below the labial/buccal flap and extending palatally. The graft will be sutured in a horizontal mattress manner to the labial/buccal flap .The palatal wound from which the SCTG harvested, will be sutured by sterilized, natural non absorbable silk

Group2 (test group):

The matrix was shaped to match the desired size in the recipient bed.

Radiographic assessment:

-Radiographic evaluation will be performed for all patients at baseline, 6and12 months following treatment by using cone beam CT

Post-Operative Care:

post operatively Antibiotic cover will be prescribed in the form of Amoxicillin–clavulanate potassium (Augmentin) 2x1000mg/day and ketoprofen 150 mg twice per day for 5 days after implant insertion, All patients were asked to perform the following measures after each surgical time: Cold packs for the first 3 hours, Soft diet for the first week, warm chlorhexidine gluconate 0.1% mouth wash twice per day in the second post-operative day and was continued for two weeks, Avoid touching of the surgical site while brushing and eating. The sutures were removed after 7 - 10 days post-surgically, one week later the operation site was again checked to ensure complete soft tissue healing. Implants loading will be done 4 months after placement and final prosthesis be delivered.

Statistical analysis:

-All data will be tabulated and analyzed by statistical method

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