

Bone augmentation and simultaneous soft tissue thickening with collagen tissue matrix derivate membrane in an aesthetic area. A case report.

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SUMMARY

Aesthetic implant restoration in the anterior maxilla is a challenge for clinicians. Alveolar ridge and surrounding gingiva deficiencies aggravates implant placement in the aesthetic area.

This case report describes a technique for aesthetic single implant placement with simultaneous bone grafting and soft tissue thickening. At the time of implant surgery, allogenic (Maxgraft, Botiss Biomaterials, Germany) and xenogenic bone substitute (Cerabone, Botiss Biomaterials, Germany) was used for bone grafting, soft tissues were augmented simultaneously with collagen tissue matrix derivate membrane (Mucoderm, Botiss Biomaterials, Germany). After 4 months during second stage surgery the implant was exposed. Subsequently healing abutment was replaced with provisional crown for gingival contouring. An individual zirconia abutment was made and a cemented full-ceramic crown was placed for final restoration. The 12-month follow-up check-up revealed a pleasing aesthetic treatment outcome, as well as clinically healthy peri-implant soft tissues. Radiological examination showed a stable bone crest with minor bone remodelling around the implant platform. The use of a collagen tissue matrix derivate, simultaneously with GBR, in the aesthetic area can provide excellent results, by establishing and maintaining facial bone wall and thick soft tissue in aesthetic area.

Keywords: bone grafting, soft tissue augmentation, endosseous dental implant, collagen tissue matrix derivate membrane, peri-implant aesthetics.

INTRODUCTION

As far as 1995, Garber et al emphasized that the creation of aesthetic implant restoration with gingival architecture that harmonizes with the adjacent dentition is a formidable challenge, and it seems that after 20 years not much has changed in this area (1-4). Strict diagnostic criteria, surgical and prosthetic steps should be followed to reach the optimal result. Over the past years immediate implantation and early implant placement have been advocated as the best methods to retain good aesthetics (5-9). Late implant placement has lost its dominance in daily practice. These techniques have similar implant survival rates, but the aesthetic

outcome with immediate implant placement in some cases is doubtful (9, 10).

As a rule, 2-4 mm of buccal bone is lost after tooth extraction (11-12). Most commonly guided bone regeneration (GBR) is used to correct bone defects and build harmonious soft tissue architecture (13-15). Palatal connective tissue grafting (CTG) is usually used for this soft tissue thickening if needed (3, 16-20). However, additional morbidity caused by the harvesting procedure of CTG is a serious disadvantage. Collagen tissue matrix derivate membrane is an alternative for CTG in alveolar soft tissue augmentation.

The purpose of this article is to present a concept of simultaneous bone and soft tissue augmentation using collagen tissue matrix derivate and to discuss the biological rationale for clinical outcome using this method.

CASE REPORT

Initial situation

A 28-year old patient with a missing tooth 21 was treated with the restoration of an implant-borne

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Fig. 1. Initial clinical situation with upper left central incisor missing



Fig. 2. Four months after the extraction no significant bone loss around the neighbouring teeth is observed radiologically



Fig. 3. Occlusal view of the initial situation



Fig. 4. Buccal bone defect observed at the time of implant surgery



Fig. 5. Mesiodistal implant positioning and 3-wall alveolar bone defect on the facial aspect



Fig. 6. Orofacial implant positioning

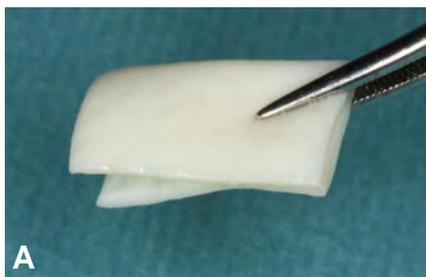


Fig. 7. Folded collagen tissue matrix derivate membrane (A); membrane sutured to the mucoperiosteal flap with mattress sutures (B)

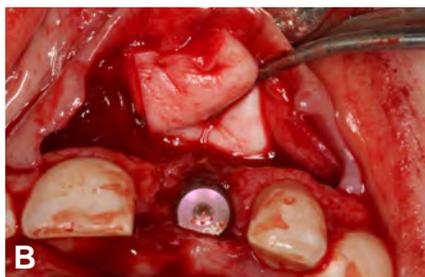


Fig. 8. Autogenous bone chips placed directly on the exposed implant surface

crowns. She demonstrated good oral and systemic health; no significant health problems that might influence the treatment were marked. Intraorally, the tooth gap in region 21 was noted. The alveolar ridge was slightly flattened. (Fig. 1-3)

Surgical procedure

The treatment plan included the placement of an implant with guided bone regeneration (GBR) and simultaneous thickening of the periimplant mucosa. The implant surgery was performed under local 4% articaine solution with a vasoconstrictor epinephrine (1:100 000) (Ubistesin forte, 3M ESPE) anaesthesia. A full-thickness flap was raised using a crestal incision in the edentulous area. The incision was extended through the sulcus of both adjacent teeth to the respective facial aspects. The mucoperiosteal full-thickness flap was elevated from the alveolar crest and periosteum was released with an incision at its base creating a split-flap to allow a tension-free primary wound closure following the completion of

the procedure (Fig. 4). Blood was collected with a sterile syringe and was mixed with granules of allograft bone material (Maxgraft, Botiss Biomaterials, Germany) of small particle size. Straumann Bone Level implant system (Institut Straumann AG) was used for implantation procedures. The implant bed preparation was completed according to the standard protocol using sharp spiral drills of increasing diameter and copious cooling with chilled saline solution. The bone chips collected from the drills were soaked in blood and stored in a sterile metal dish. A prefabricated surgical stent was used to evaluate the correct three-dimensional position of the implant platform. Mesiodistally, the implant platform was positioned 1,5 mm from adjacent teeth, in the corono-apical direction – approximately 3 to 4 mm apical to the anticipated midfacial mucosal margin of the future implant crown. (Fig. 5). Orofacially, the implant was positioned 2 mm palatal to the prosthetic point of emergence (Fig. 6). Implants achieved good primary stability. The exposed implant surface was clearly



Fig. 9. DBBM granules placed to resemble the contour of the alveolar crest on the facial aspect



Fig. 10. Surgical site after suturing

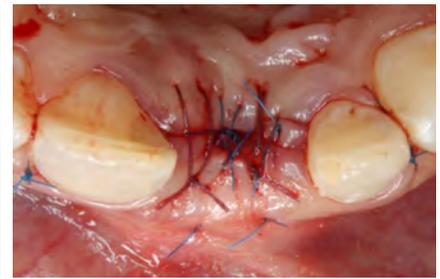


Fig. 11. View at the time of sutures removal 2 weeks post op



Fig. 12. Four months post op well maintained vertical tissue height is observed



Fig. 13. The roll technique used for implant exposure 4 months post op



Fig. 14. Delivery of initial provisional restoration (A) and contoured provisional restoration (B)



visible inside the alveolar process, resulting in a crater-like defect with 3-wall defect morphology on the facial aspect. A 2 mm healing abutment was placed on the implant.

A collagen tissue matrix derivate membrane (Mucoderm, Botiss Biomaterials, Germany) 15×20 mm in size was fitted by the size of the defect and sutured to the mucoperiosteal flap using 6-0 polypropylene suture materials with two mattress sutures (Fig. 7). The local bone augmentation was first performed with autogenous bone chips, which were placed directly on the exposed implant surface (Fig. 8). The second layer of xenogenic bone substitute (Cerabone, Botiss Biomaterials, Germany) was placed to contour the alveolar crest on the facial aspect (Fig. 9). At the end of the surgery, implant was closed by suturing the mucoperiosteal flap with attached membrane (Fig. 10). The existing partial denture was shortened over the surgical sites to avoid pressure of the underlying tissues. Patient received amoxicillin antibiotic for 5 days, 500 mg 3 times a day, starting 1 hour before the

surgery, and a non-steroid anti-inflammatory medicine. In addition, the patient was asked to hold ice for the following 6 hours and avoid tooth brushing in the surgical site, as well as hot food. Chlorhexidine digluconate 0.12% (Perioaid, Barcelona, Spain) rinses were instructed to use twice daily for plaque control for 2 weeks postoperatively.

RESULTS

The postsurgical healing progressed well and without any complications. The sutures were removed after two weeks (Fig. 11). After 4 months, the implant sites were healed and had showed a well-maintained vertical tissue height similar to the neighbouring teeth papilla height (Fig. 12). During second stage surgery implant was exposed with the roll technique – a small U shape incision was performed and closed semilunar split flap between gingiva and periosteum facially was made with rolling in of residual soft tissue (Fig. 13). One week later, a provisional acrylic resin res-



Fig. 15. Radiographic view 6 months post op demonstrates well integrated implant



Fig. 16. Placement of individual zirconia abutment (A) and a full-ceramic definitive crown (B)



Fig. 17. 12 months post op clinically pleasing esthetic outcome is observed (A). Radiological examination revealed stable marginal bone level around the implant (B)

toration was made (Fig. 14). The provisional crown remained in place for 6 month after loading. The 6-month follow-up examination demonstrated clinically healthy peri-implant soft tissues, radiographic examination showed a well-integrated implant (Fig. 15). An individual zirconia abutment was made and a full-ceramic definitive crown was placed (Fig. 16). The 12-month follow-up examination revealed a pleasing aesthetic treatment outcome, as well as clinically healthy peri-implant soft tissues (Fig. 17 a). Periapical radiograph showed a stable bone crest with minor bone remodelling around the implant platform (Fig. 17 b).

DISCUSSION

The surgeon is responsible for the pink aesthetic result, i.e. for the creation of harmonious soft tissue around the implant, which mimics the neighbouring healthy teeth. It is well known that achieving the optimal aesthetic result in the aesthetic area may be challenging and requires strict diagnostic and surgical steps – determining the anatomical risk factors, three dimensional implant positioning, implantation time, bone and soft tissue augmentation, and soft tissue conditioning with a temporary crown. Usually bone and soft tissue grafting is indicated for good aesthetic outcome. Guided bone regeneration (GBR) is well-documented and shows excellent results, when xenogeneic bone substitute is used, because of low substitution for holding the buccal contour. Most often, a collagen membrane is used to cover

graft material, because of low complication risk. Sometimes, soft tissue augmentation is needed, but additional morbidity caused by the harvesting procedure of connective tissue grafts in the palate could be the reason for avoiding routine soft tissue grafting (20, 21). There is a hypothesis that connective tissue graft (CTG) needs to be placed on top of the periosteum for good blood supply (18, 20, 22). This would make soft tissue grafting more complicated and require better surgical skills.

A collagen tissue matrix derivate has been suggested to use in implant surgery for replacing of CTG from palate. This material is not new in oral applications and it was successfully used for covering of recessions, socket preservation after tooth extraction, alveolar ridge thickening before and after implantations and in other clinical situations (23-35).

In this case report collagen tissue matrix derivate was used simultaneously with GBR with good success after 1-year follow-up. Parameters for this approach need further investigation in order to determine if it is possible to augment soft tissue in one procedure, when collagen tissue matrix derivate is sutured directly to periosteum, for example. Another parameter that should be explored is the rationality to use soft tissue augmentation routinely for every aesthetic case to improve the outcome. The third parameter that merits further investigation is the possibility to replace CTG with collagen tissue matrix derivate without losing its properties.

CONCLUSION

This case report shows that the use of an collagen tissue matrix derivate, simultaneously with GBR, in the aesthetic area can provide excellent results, by establishing and maintaining facial bone wall and thick soft tissue in aesthetic area. This technique could replace the usage of CTG from palate with no additional morbidity and improvement of the aesthetic result. Well-designed clinical trials with an adequate number of patients are necessary to determine the efficacy of this technique for final aesthetic result.

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