Original Article - Retrospective Study

The use of Buccal fat pad free graft in regenerative treatment of peri-implantitis: A new and predictable technique

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ABSTRACT

Introduction: Peri-implantitis is a common condition, but no particular treatment protocol has shown to be definitively effective. Fat tissue in the oral cavity is widely available and easily accessed. The aim of the current study is to present a novel technique in the treatment of peri-implant lesions, utilizing a free fat tissue graft from the buccal fat pad (BFP). **Patients and Methods:** Free fat graft (FFG) was harvested from the BFP in eight patients and used with bone substitutes to regenerate 22 peri-implant lesions. Mechanical debridement of the implants surface and the granulation tissue were made with curettes or with Er: YAG laser. Clinical parameters such as plaque index, bleeding on probing, pocket depth, gingival recession, and the clinical attachment level were recorded as a baseline during the follow-up period. In addition, radiological evaluation was made preoperative during the follow-up period. **Results:** The donor site of the free fat graft was healed without cosmetic defect in all patients. Twenty-two peri-implant lesions were followed up for 12 months. Bleeding on probing and the pocket depth were significantly improved, and the clinical attachment level was achieved and maintained during the follow-up period due to the fibrous healing of the free fat graft. Satisfactory esthetic and functional outcomes of the treated implants were achieved and maintained. **Conclusions:** Free buccal fat graft heals by fibrosis. The fibrotic tissue adheres strongly to the implant surface and with stand the recurrence of the peri-implant lesion and provides stable and predictable outcome.

Keywords: Buccal fat pad, fibrous healing, free fat tissue, peri-implantitis, soft tissue grafts

INTRODUCTION

Peri-implantitis is defined as an inflammatory process affecting the soft and hard tissue around a functional osseointegrated implant, resulting in the loss of supporting bone.[1,2] Several treatment modalities have been used and reported in the treatment of peri-implantitis and include different devices for mechanical debridement, topical antiseptic/antimicrobial materials, Er: YAG laser device, and different bone regenerative procedures.[3-8] The ER: YAG laser in the treatment of peri-implantitis is used for debridement of the infected implant surface and in the vaporization of granulation tissue and leads to clean implant surface with healthy peri-implant intra-pocket.[8-11]

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The buccal fat pad (BFP) was first defined as fat tissue by Bichat in 1802. The BFP is located in the masticatory space and consists of central body (corpus) with four extensions: Buccal, pterygoid, superficial, and deep temporal. The body and the buccal extension make up more than 50% of the BFP. They are accessible from the oral cavity and are the portions of the BFP that may be used as donor sites for fat tissue grafts.[12-14] Egyedi[15] was the first to report the use of the BFP as a pedicled graft in 1977; since then, several publications have described the different applications of the BFP as a pedicled graft.[15-31]

The concept of transplanting autogenous fat as free graft is well-documented for cosmetic surgery. It has been used more than 100 years, and its clinical behavior, characteristics, and healing are well known in this area of medicine.[32] The main mechanism of healing of free fat grafts (FFGs) is by fibrosis.[33]

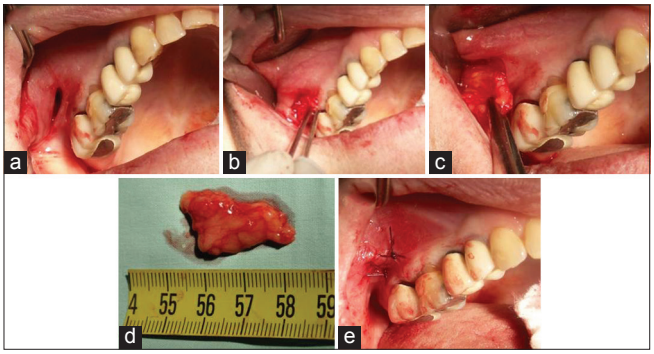

Figure 1: The donor site. The standard approach to the buccal fat pad. Horizontal incision above the second and third maxillary molars (a). The fat tissue is reached via blunt dissection (b). The fat tissue is mobilized to the oral cavity (c). The desired fat tissue volume is harvested (d). Suturing of the donor site incision (e)

In 1983, Neder reported the use of BFP as a free graft for oral lesion reconstruction in two patients.[34] Kablan and Laster in 2012 first reported the use of free buccal fat graft (FBFG) with bone augmentation.[35] In their report, they discussed the advantages of the FBFG and the clinical and histologic healing stage, the main healing nature of the FFGs was fibrosis of the graft.[35] Therefore, I believe that the use of FBFG with bone substitute may lead to a long-term significant improvement of the peri-implantitis lesion, due to the fibrosis healing of the FBFG, and may create satisfactory clinical attachment level.

The aim of the present report was to introduce additional use of the FBFG, as a simple method developed by the author, for the treatment of peri-implant lesions.

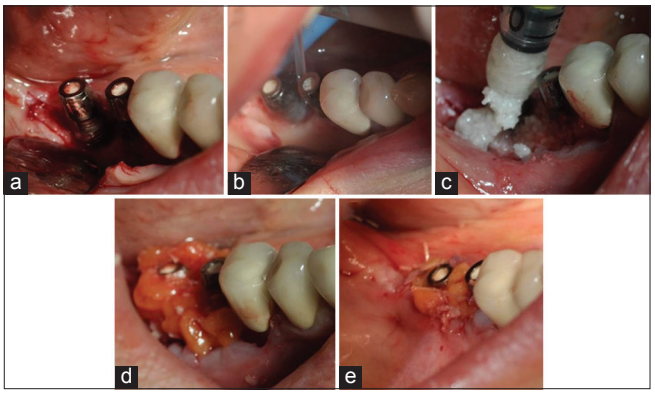

Figure 2: The recipient site. Surgical procedure at the recipient side: Raising a full thickness flap around the diseased implants (a). Implant surface debridement and decontamination, using Er:YAG laser, wave length 2940 nm (b). Augmentation around the implants using xenograft bone substitute (c). Covering the site with FBFG (d). Securing the site with sutures (e)

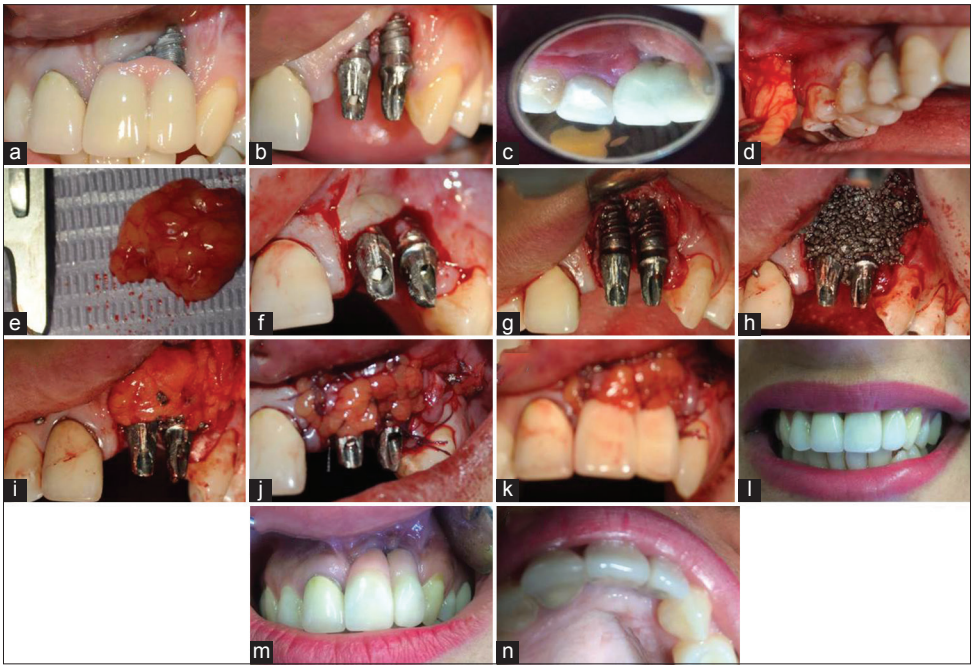

Figure 3: Case 1: Peri-implant lesions involving implants in the place of left central and lateral incisors. Clinical preoperative view (a-c). FBFG harvesting (d and e). Intraoperative clinical pretreatment view (f and g). Regenerative treatment with bone substitute (h) and FBFG (i-k). Treatment outcome and follow-up (l-n)

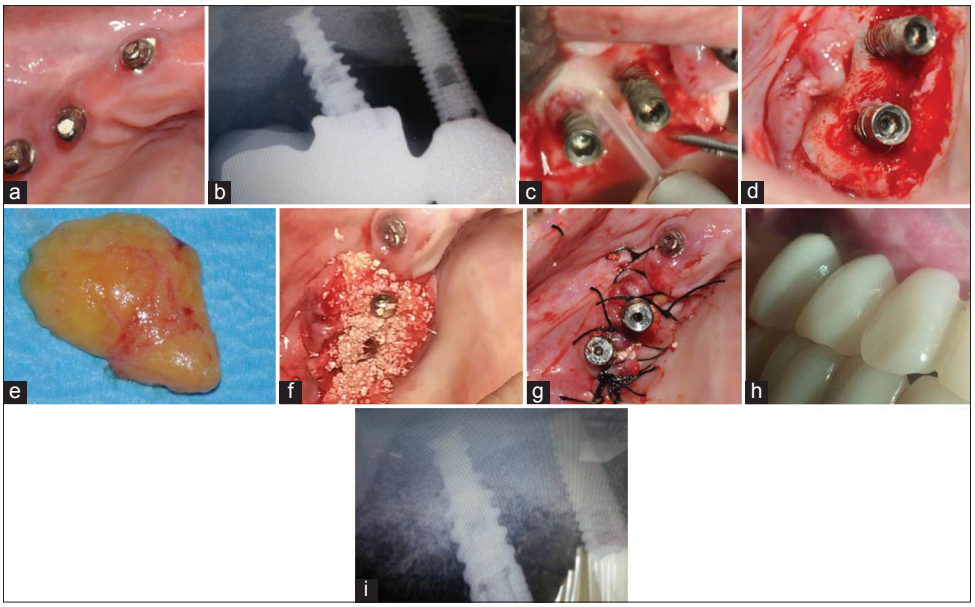

Figure 4: Case 2: Peri-implant lesions involving 2 implants at the first and the second right maxillary bicuspids. Clinical and radiological preoperative view (a and b). Cleaning of recipient site with Er:YAG lazer (c). Recipient site after debridement (d). Harvested FBFG (e). Regenerative treatment with bone substitute and FBFG (f). Suturing of operative site (g). Clinical and radiological treatment outcome and follow-up (h and i)

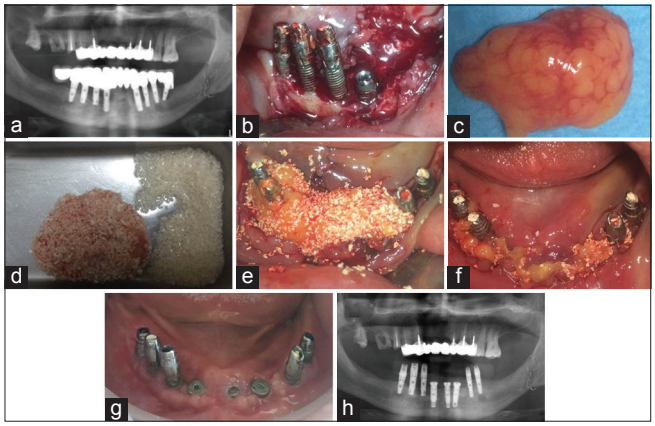

Figure 5: Case 3: Peri-implant lesions involving mandibular implants. Radiological and clinical preoperative view (a and clinical intraoperative view (b)). Harvested FBFG (c). FBFG covered with xenograft (d). Regenartive treatment with bone substitute and FBFG (e). Suturing of operative site (f). Treatment outcome and follow-up (g and h)

PATIENTS AND METHODS

Methods

During the last 2 years, the free fat tissue graft was used as a soft tissue graft in a combination with bone substitutes to regenerate 22 peri-implant lesions. Clinical parameters such as plaque index, bleeding in probing, pocket depth, gingival recession, and the clinical attachment level were recorded as a baseline during the follow-up period. In addition, radiological evaluation was made before the operation and during the follow-up period.

The BFP was accessed intraorally via a small incision as described in detail at the technique presentation paragraph. The recipient site was prepared by mechanical debridement of the implants surface with Er: YAG laser, some were debrided with curettes. Following the removal of the granulation tissue, the site was grafted with bone substitute and FBFG. Once FBFG was in place, the flap was placed coronally and sutured firmly. Follow-up was held every 2 weeks for the first 3 months and thereafter every 3 months. The healing process was uneventful. The clinical parameters in the treated lesions using FBFG were recorded at the follow-up visits after surgery.

TECHNIQUE

The donor site

The FBFG was harvested from the BFP via the standard approach [Figure 1]. This approach allows access to the BFP through a small horizontal incision in the free mucosa above the second and the third maxillary molars [Figure 1a]. Through blunt dissection, the fat tissue is accessed [Figure 1b] and easily mobilized to the oral cavity by progressive blunt dissection [Figure 1c]. The desired FFG is harvested [Figure 1d and e], the BFP is pushed back in its place, and the incision is sutured [Figure 1e].

The recipient site

Full thickness flap was designed and raised around the implants, and the peri-implantitis lesion was evaluated [Figure 2a]. First, the entire implant surface was cleaned and decontaminated, using curettes or Er: YAG laser [Figure 2b], wave length 2940 nm (Syneron, Israel). Second, the residual bone surfaces were also cleaned and decontaminated [Figure 2b]. Third, the granulation tissue was removed and evaporated by the laser [Figure 2b]. Throughout rinsing of the site with normal saline was performed to remove all the debris at the surgery site.

Bone substitute was used to augment the recipient site around the implants [Figure 2c] and was covered with FBFG [Figure 2d]. Bovine-derived bone was used as the bone substitute except the first case in which titanium granules were used. The FBFG was easily spread over the bone and around the implants, and then secured by four sutures: Two at the buccal side and two at the

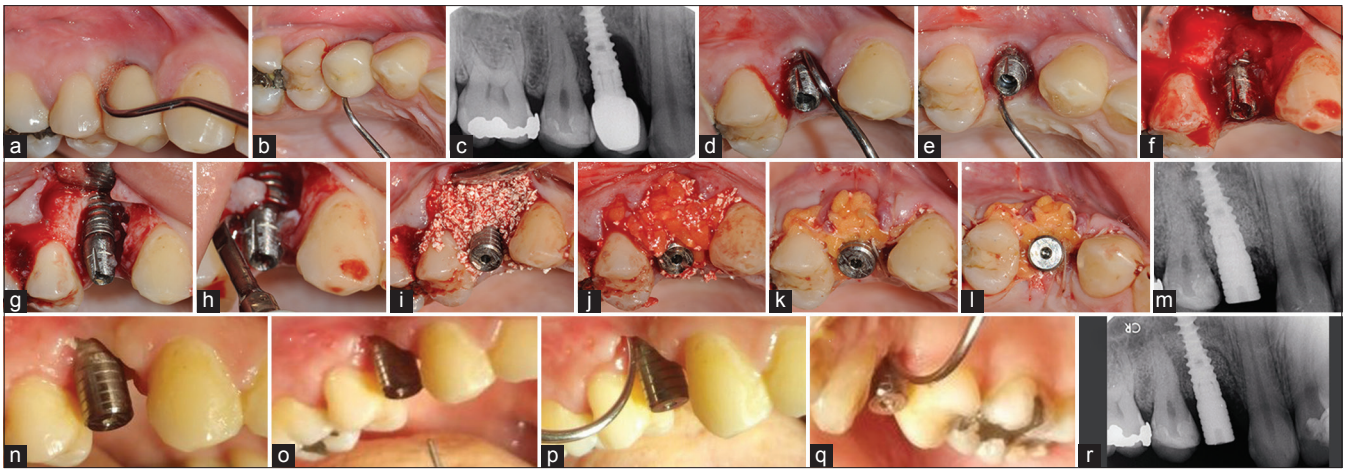

Figure 6: Case 4: Clinical views preoperative, probing depth 8 mm (a and b). Preoperative periapical X-ray (c). Intraoperative views, probing depth 8 mm (d and e), bone loss and granulation tissue (f), debridement of the granulation tissue and implant surface cleaning (g and h), bone graft (i), FBFG (j), and suturing of the FBFG and the recipient site (k and l). Immediate periapical X-ray (m). One month follow-up; 3 mm probing depth (n-q). Periapical X-ray 6 weeks postoperative (r)

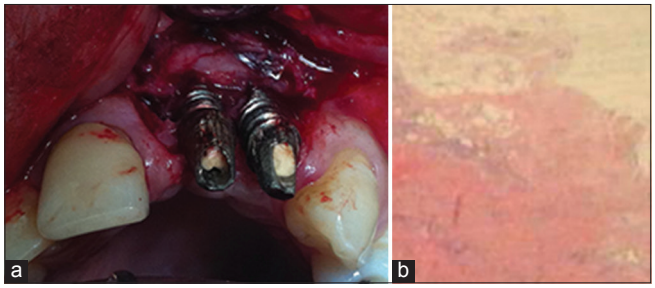

Figure 7: Open look at the recipient site 4 months after surgery showed fibrosis healing of the BFFG (a), the histology revealed mature fibrosis with fat tissue remnants (b)

lingual or palatal side of the flap. The recipient site original flap was coronally positioned and sutured over the FFBG. The FFBG can be left partially exposed [Figure 2e].

CASE PRESENTATIONS

Case 1

A 29-year-old female was referred because of exposed old implants at the anterior maxilla. Her main complaint was severe esthetic problem. Upon examination, two implants in the position of the left maxillary central and lateral incisors suffered from an evident recession of 5 mm at the buccal aspect and 2 mm at the palatal aspect [Figure 3a-c]. A mild bleeding on probing was also observed. She was treated in one stage; the treatment included harvest of FFG from right BFP [Figure3d and e], mechanical debridement of the implants and granulation tissue with curettes [Figure 3f and g]. Placing of bone substitute (titanium granules) [Figure 3h] and FBFG over the bone [Figure 3i] was performed, following coronal repositioning of the flap and suturing [Figure 3j and k].

Follow-up examinations at 2 weeks and 1 month after the surgery showed uneventful recovery. At 4 months, satisfying improvement of the hard and soft tissue around the 2 implants was noted. The final fixed prosthesis was performed with good esthetic outcome [Figure 3l-n]. The patient has been followed for 18 months.

Case 2

A 58-year-old woman was referred due to chronic peri-implantitis at implants at the position of the right maxillary bicuspids [Figure 4a]. She was suffering from recurrent episodes of swelling and frequent suppuration; pocket depth of 5 mm was recorded. The periapical radiograph revealed severe bone loss around the implants [Figure 4b]. Her treatment included cleaning and disinfection of the implants and removing of granulation tissue with Er: YAG laser [Figure 4c and 4d]. Regeneration of the peri-implants lesion was done with bovine-derived bone substitutes and FBFG [Figure 4e-g]. The clinical and radiographic follow-up revealed an excellent resolution of the periimplantitis. The patient has been followed 14 months with stable outcome [Figure 4h and i]

Case 3

A 49-year old man, he had full mandibular arch rehabilitation over 8 implant, since 6 years. He was referred due to peri-implantitis. Clinical and radiographic examination revealed moderate to severe peri-implantitis that affects all of the mandibular implants [Figure 5a]. About 3 implants were removed and replaced and 5 implants were saved and treated. The treatment was mechanical debridement of the implants and the granulation tissue with curettes [Figure 5b]. Regeneration of the peri-implants lesion was done with bovine-derived bone substitutes and FBFG [Figure 5c-f]. Ten months follow-up exhibited a significant improvement [Figure 5g and h].

Case 4

A 22-year-old female was referred with peri-implant lesion at the upper first right premolar [Figure 6a-c]. A 8 mm probing depth was recorded around the implant [Figure 6d-e]. Her treatment included cleaning of the granulation tissue and the implant surface with curettes [Figure 6f-h], Regeneration of the lesion was performed with bovine-derived bone substitute and FBFG [Figure 6i-m]. The clinical evaluation after one month showed improvement of the lesion and the probing depth was 3mm [Figure 6n-q]. Periapical X-ray 6 weeks after the surgery demonstrate the regenerative bone gain [Figure 6r]. This patient is followed 2 months.

RESULTS

FBFGs were used in 22 peri-implant lesions, in 8 patients (6 women, 2 men; mean age, 39 years; range, 29–62 years). The healing process was uneventful. The BFPs healed very well without complications and esthetic disturbance.

The peri-implantitis signs such as suppuration, local swelling, and bleeding were improved. In six cases (6/8), the probing depth was reduced from 5–6 mm to 2–3 mm. In two cases (2/8) with gingival recession around the implants, new soft tissue attachment was obtained by the treatment and maintained during the follow-up period. The radiographic follow-up showed regeneration of new bone around the treated implants.

DISCUSSION

This clinical case series present the FBFG as a new soft tissue graft and describes its use in combination with particular bone substitutes for regenerative treatment of peri-implantitis. The final outcome was satisfactory in the patient series, and the technique predictably provided regeneration of the treated lesions.

The BFP has been used in oral and maxillofacial reconstruction for more than three decades, and its application is well documented. Singh *et al*. reviewed the applications in oral and maxillofacial reconstruction and its potential benefits and limitations, especially its size and applications for the posterior sites of the oral cavity.[16] The donor site, the BFP, is easily accessed through the oral cavity with minimal morbidity, making harvesting a very easy and fast procedure and providing plenty of tissue.

Kablan and Laster discussed in their article the disadvantages and limitations of the pedicled BFP and showed the advantages of the FBFG, especially its use in the entire oral cavity.[35]

The nature of healing of the pedicled BFP in maxillofacial surgery has been widely reported, and the main mechanism is fibrosis and fast epithelialization of the graft.[16,21-23]

Autologous FFGs are widely used in cosmetic surgery. FFGs may be taken from different donor sites and transplanted to different recipient sites throughout the body, and it is well-documented that the major healing process of the FFG is fibrosis of the fat tissue.[32] In maxillofacial surgery, the author was the first to investigate and report the clinical and histologic healing process of the FFG. In that report, immature fibrosis was seen 1 month and mature fibrosis of the FBFG was seen 4 months after the surgery.[35]

The fibrosis healing nature of the FBFG may transform thin tissue biotype to thick biotype and improves the soft tissue quality and volume of the recipient site. This was obvious when the FBFG was used during bone augmentation.[35]

In the present case series, the advantages of the FBFG were augmentation of the affected and missed soft tissue around the implants. Furthermore, it was observed that the resulted fibrotic tissue was strongly adhered to the coronal part of the treated implants [Figure 7a], and in the histological specimen demonstrates mature fibrosis [Figure 7b]. I believe this will maintain the stability of the outcomes for long time, but more follow-up is still required for the treated cases.

CONCLUSIONS

In this patient series, the Buccal fat pad free graft (FBFG) was a simple procedure that can be performed quickly with minimal morbidity. The donor sites healed very well, without any cosmetic disturbance, making the harvesting of FBFGs a minor and insignificant procedure. The use of FBFGs in the treatment of peri-implantitis enhances protection of the augmented bone particles and augments the soft tissue at the recipient site. The fibrotic healing of the FBFGs improves the clinical attachment level of the soft tissue around the implants and should improve their survival. The mean follow-up period of the current patients was 12 months. Excellent functional and esthetic outcomes were achieved, without recurrence of the peri-implantitis, but additional follow-up is necessary to indicate the long-term reliability of the FBFGs in the treatment of peri-implantitis.

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Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. Mombelli A. Etiology, diagnosis, and treatment considerations in peri-implantitis. Curr Opin Periodontol 1997;4:127-36.
2. Zitzmann NU, Berglundh T. Definition and prevalence of peri-implant diseases. J Clin Periodontol 2008;35 8 Suppl: 286-91.
3. Schwarz F, Bieling K, Latz T, Nuesry E, Becker J. Healing of intrabony peri-implantitis defects following application of a nanocrystalline hydroxyapatite (Ostim) or a bovine-derived xenograft (Bio-Oss) in combination with a collagen membrane (Bio-Gide). A case series. J Clin Periodontol 2006;33:491-9.
4. Schwarz F, John G, Mainusch S, Sahm N, Becker J. Combined surgical therapy of peri-implantitis evaluating two methods of surface debridement and decontamination. A two-year clinical follow up report. J Clin Periodontol 2012;39:789-97.
5. Wiltfang J, Zernial O, Behrens E, Schlegel A, Warnke PH, Becker ST. Regenerative treatment of peri-implantitis bone defects with a combination of autologous bone and a demineralized xenogenic bone graft: A series of 36 defects. Clin Implant Dent Relat Res 2012;14:421-7.
6. Deppe H, Mücke T, Wagenpfeil S, Kesting M, Sculean A. Nonsurgical antimicrobial photodynamic therapy in moderate vs severe peri-implant defects: A clinical pilot study. Quintessence Int 2013;44:609-18.
7. Thierbach R, Eger T. Clinical outcome of a nonsurgical and surgical treatment protocol in different types of peri-implantitis: A case series. Quintessence Int 2013;44:137-48.
8. Smeets R, Henningsen A, Jung O, Heiland M, Hammächer C, Stein JM. Definition, etiology, prevention and treatment of peri-implantitis – A review. Head Face Med 2014;10:34.
9. Schwarz F, Sculean A, Rothamel D, Schwenzer K, Georg T, Becker J. Clinical evaluation of an Er: YAG laser for nonsurgical treatment of peri-implantitis: A pilot study. Clin Oral Implants Res 2005;16:44-52.
10. Ashnagar S, Nowzari H, Nokhbatolfoghahaei H, Yaghoub Zadeh B, Chiniforush N, Choukhachi Zadeh N. Laser treatment of peri-implantitis: A literature review. J Lasers Med Sci 2014;5:153-62.
11. Dubin B, Jackson IT, Halim A, Triplett WW, Ferreira M. Anatomy of the buccal fat pad and its clinical significance. Plast Reconstr Surg 1989;83:257-64.
12. Stuzin JM, Wagstrom L, Kawamoto HK, Baker TJ, Wolfe SA. The anatomy and clinical applications of the buccal fat pad. Plast Reconstr Surg 1990;85:29-37.

13. Dumont T, Simon E, Stricker M, Kahn JL, Chassagne JF. Facial fat: Descriptive and functional anatomy, from a review of literature and dissections of 10 split-faces. Ann Chir Plast Esthet 2007;52:51-61.
14. Ilankovan V, Soames JV. Morphometric analysis of orbital, buccal and subcutaneous fats: Their potential in the treatment of enophthalmos. Br J Oral Maxillofac Surg 1995;33:40-2.
15. Egyedi P. Utilization of the buccal fat pad for closure of oro-antral and/or oro-nasal communications. J Maxillofac Surg 1977;5:241-4.
16. Singh J, Prasad K, Lalitha RM, Ranganath K. Buccal pad of fat and its applications in oral and maxillofacial surgery: A review of published literature (February) 2004 to (July) 2009. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010;110:698-705.
17. Tideman H, Bosanquet A, Scott J. Use of the buccal fat pad as a pedicled graft. J Oral Maxillofac Surg 1986;44:435-40.
18. Stajcic Z. The buccal fat pad in the closure of oro-antral communications: A study of 56 cases. J Craniomaxillofac Surg 1992;20:193-7.
19. Rapidis AD, Alexandridis CA, Eleftheriadis E, Angelopoulos AP. The use of the buccal fat pad for reconstruction of oral defects: Review of the literature and report of 15 cases. J Oral Maxillofac Surg 2000;58:158-63.
20. Martín-Granizo R, Naval L, Costas A, Goizueta C, Rodriguez F, Monje F, *et al.* Use of buccal fat pad to repair intraoral defects: Review of 30 cases. Br J Oral Maxillofac Surg 1997;35:81-4.
21. Samman N, Cheung LK, Tideman H. The buccal fat pad in oral reconstruction. Int J Oral Maxillofac Surg 1993;22:2-6.
22. Alkan A, Dolanmaz D, Uzun E, Erdem E. The reconstruction of oral defects with buccal fat pad. Swiss Med Wkly 2003;133:465-70.
23. Chakrabarti J, Tekriwal R, Ganguli A, Ghosh S, Mishra PK. Pedicled buccal fat pad flap for intraoral malignant defects: A series of 29 cases. Indian J Plast Surg 2009;42:36-42.
24. Colella G, Tartaro G, Giudice A. The buccal fat pad in oral reconstruction. Br J Plast Surg 2004;57:326-9.
25. Khouw YL, van der Wal KG, Bartels F, van der Biezen JJ. Bilateral palatal reconstruction using 2 pedicled buccal fat pads in rhinolalea aperta after extensive necrotizing tonsillitis: A case report. J Oral Maxillofac Surg 2004;62:749-51.
26. Baumann A, Ewers R. Application of the buccal fat pad in oral reconstruction. J Oral Maxillofac Surg 2000;58:389-92.
27. Loh FC, Loh HS. Use of the buccal fat pad for correction of intraoral defects: Report of cases. J Oral Maxillofac Surg 1991;49:413-6.
28. Vuillemin T, Raveh J, Ramon Y. Reconstruction of the maxilla with bone grafts supported by the buccal fat pad. J Oral Maxillofac Surg 1988;46:100-6.
29. Chen G, Ping F. Immediate reconstruction of the maxillary with bone grafts supported by the buccal fat pad. Zhonghua Kou Qiang Yi Xue Za Zhi 1992;27:88-9.
30. Zhong LP, Chen GF, Fan LJ, Zhao SF. Immediate reconstruction of maxilla with bone grafts supported by pedicled buccal fat pad graft. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2004;97:147-54.
31. Chen GF. Use of hydroxyapatite and buccal fat pad in reconstruction of maxillary bone defects. Chin J Oral Maxillofac Surg 1994;4:112-3.
32. Shiffman MA (Ed). Autologous fat transfer. Art, science and clinical practice. Springer-Verlag Berlin Heidelberg; 2010. Part I p. 3-40.
33. Nguyen A, Pasyk KA, Bouvier TN, Hassett CA, Argenta LC. Comparative study of survival of autologous adipose tissue taken and transplanted by different techniques. Plast Reconstr Surg 1990;85:378-86.
34. Neder A. Use of buccal fat pad for grafts. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1983;55:349-50.
35. Kablan F, Laster Z. The use of free fat tissue transfer from the buccal fat pad to obtain and maintain primary closure and to improve soft tissue thickness at bone-augmented sites: Technique presentation and report of case series. Int J Oral Maxillofac Implants 2014;29:e220-31.