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Case Report

Aesthetic Management of Peri-Implant Soft Tissue Dehiscence. A Case Report of a Combined Perio Restorative Approach

Ahmed Hamdy, Dalia M. Ghalwash

Department of Oral Medicine and Periodontology, Faculty of Dentistry, The British University in Egypt, El-Sherouk city, Egypt

Abstract

This case report designates a combined perio restorative technique in the management of peri-implant 3-dimensional soft tissue defects in an esthetic zone. A staged approach was implemented to treat this case; the first stage was planned to treat the horizontal defect around the implant, in which crown was removed, and coronally advanced flap with connective tissue graft were used to treat the soft tissue defect. At the second stage, a modified coronally advanced flap with connective tissue graft was used to augment the vertical defect, and no vertical releasing incision was made in this stage to maximize the blood supply to the advanced flap. De-epithelized free gingival graft was harvested from the palate to obtain better fibrous connective tissue graft . Graft was placed over the site to compensate for the vertical defect and flap was advanced to ensure primary closure without tension. Resin-bonded bridge was used as a provision after modification to avoid any soft tissue contact. Healing by primary intention was attained providing a clinically healthy soft tissue surrounding a well-functioning restoration, and periapical radiographs showed a stable crestal bone level without presence of mucositis or peri-implantitis. Within the limitations of this clinical case report, it revealed the possibility of fully restoring severe horizontal and vertical peri-implant soft tissue defects and at the same time attaining high level of patient satisfaction via a combined mucogingival and prosthetic approach; nevertheless, the long-term preservation of this successful outcome needs to be monitored.

Keywords: Dehiscence, Dental Implants, Esthetic, Gingiva, Soft Tissue

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Introduction

Dental implants are often used for the rehabilitation of lost teeth in esthetic areas. The primary objectives are obtaining optimum esthetics and function for patient satisfaction. Implant research was primarily conducted on establishing that quality and quantity of bone around implants are principal success criteria.[1]

Hence, sufficient bone volume is a necessity preceding implant positioning, with several ridge preservation and ridge augmentation techniques implemented accordingly,[1,2] while the significance of soft tissues around implants was often overlooked.

Recently, more attention was directed to the significance of peri-implant soft tissues from both a biologic[3,4] and an esthetic viewpoints.[5,6] Peri-implant soft tissue complications are an ongoing clinical challenge, that is, volume deficiency, scarcity of attached mucosa, and peri-implant gingival recession. A substantial decrease in ridge dimensions always occurs after tooth extraction.[7,8] This is not restricted to bone but might also be associated with a soft tissue volume deficiency or attached tissue loss.[9] Many factors impact the level of peri-implant soft tissues, such as height and width of the facial bone, peri-implant gingival biotype, and orofacial position of the implant.[4,10]

The increased esthetic demands dictate that the contour and color of peri-implant soft tissue should be in congruence with the neighboring teeth to gain patient

Address for correspondence: Dr. Ahmed Hamdy, Department of Oral Medicine and Periodontology, Faculty of Dentistry, The British University in Egypt (BUE), Shorouk City 11835, Cairo, Egypt.
E-mail: ahmed.esmaail@bue.edu.eg

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contentment; therefore, surgical management of soft tissue defect around implants might be needed.[11] The present study describes a combined perio restorative approach in the management of peri-implant 3-dimensional soft tissue deficits in an esthetic zone.

Clinical Presentation

A 26-year-old female patient was referred to a private practice in Cairo, Egypt, for the assessment of a single maxillary right central incisor implant-supported crown. The unpleasant look upon smiling was her chief complaint [Figure 1A]. The patient was extremely unhappy with her previous dentist who placed the implant; however, she was more concerned about the implant removal idea suggested by another dentist, with a reconstructive bone surgery, a provisional partial denture and placement of new implant and restoration. She had no systemic contraindications for implant therapy. Upon clinical examination, a disharmony in the soft tissue margins of the implant supported crown was revealed, having the buccal gingival scalloping 4 mm more apically in relation to the neighboring teeth [Figure 1B]. Furthermore, a horizontal defect in soft tissue was evident leading to poor emergence profile of the implant-supported crown. Additionally, the underlying implant surface was noticeable while smiling because of the reduced soft tissue thickness buccally [Figure 1C]. The position of implant head was 5 mm apical to the cemento-enamel junction of the neighboring teeth on radiographs, and a saucer shape bone defect was found around the implant [Figure 2A]. Placement of the implant in close proximity to the labial plate of bone led to its subsequent total loss [Figure 2B]. The principal target of management was reducing the vertical defect of soft tissue and eliminating the soft tissue margin incongruity between neighboring incisor and the implant crown to enhance the esthetics. While the secondary target was to augment the soft tissue thickness buccally to conceal the implant surface and create a proper emergence profile. A prophylaxis session was done to remove microbial deposits, and the patient was instructed on minimizing marginal soft tissue trauma during tooth brushing around the implant by using the coronally directed roll technique.

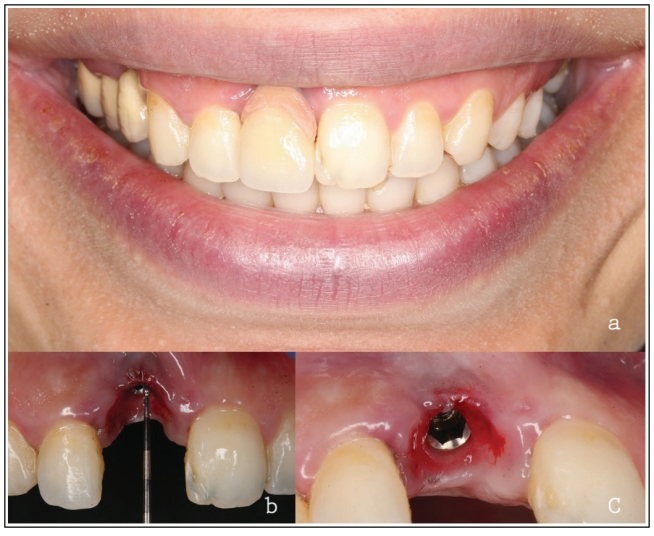

Figure 1: (A) A patient's grin displaying an unsightly crown restoration on the right central incisor. (B) Thin soft tissue borders in the buccal region that transparently reveals the implant surface beneath. (C) The buccally positioned implant is covered by incredibly thin, soft tissue in the occlusal view

Case Management

Written informed consent was acquired from the patient. A staged approach was implemented to treat this case; the first stage was planned to treat the horizontal defect around the implant followed by a second stage 3 months later to augment the defected vertical height of the peri-implant gingival margin. In the first stage, crown was removed, and the soft tissue defect was managed by placement the flap in a more coronal direction,[11] accompanied by connective tissue grafting procedure[12-14] on the buccal surface of the implant.

After local anesthesia, a horizontal incision was performed to create an envelope shaped flap from the upper right lateral to left central following by two vertical releasing incisions starting from mesio-buccal line angles. The flap was elevated using a split-full-split method in a corono-apical orientation [Figure 3A]. Surgical papillae were excised by split thickness technique till the bone crest buccally to expose around 2–3 mm of buccal bone beyond the exposed root and bone dehiscence at the implant location, then full thickness flap was lifted.

The residual labial part of the papillae was de-epithelialized to expose the underlying connective tissue so that the surgical papillae of the buccal coronally advanced flap is secured upon suturing.

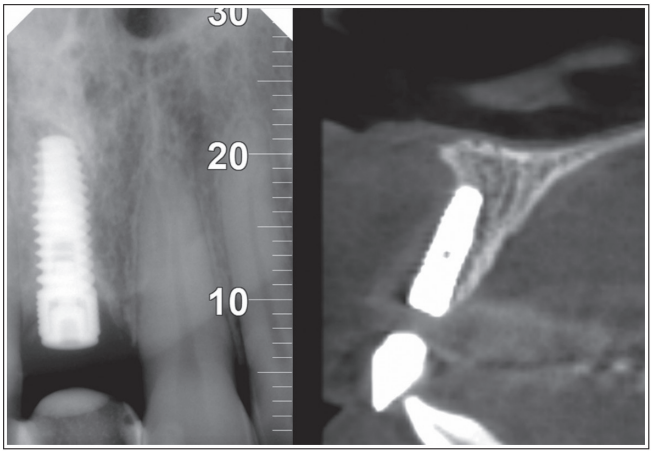

Figure 2: (A) Radiograph showing the implant's deep position and saucer shape crestal bone loss surrounding the implant platform. (B) Sagittal view showing complete labial bone loss

Connective tissue graft (CTG) was harvested from the palate to compensate for the horizontal soft tissue defect masking the colored and buccally exposed implant surface. Graft was harvested by a trap-door technique to ensure better primary closure of the palatal donor site.

Two resorbable interrupted sutures were used to attach this CTG to the anatomical papillae at the base of the exposed implant, 1 mm apical to the central incisor at the cemento-enamel junction level [Figure 3B]. Two split-thickness incisions were used to advance the buccal flap in the coronal path: one was "deep," severing the muscle attachments to the periosteum, whereas the other was "superficial," removing the muscle from the flap's internal mucosal layer. Before the flap was closed, the healing abutment was installed over the implant. The flap's papillae were passively superimposed with the occlusally de-epithelialized papillae around the implant abutment with care. Anchoring the flap in a coronal location was done via sling sutures (6/0 PGA, Egysorb) [Figure 3C]. At the end of surgery, a temporary restoration was fabricated and cemented with temporary cement. The provisional restoration was reduced to prevent any soft tissue contact [Figure 3D]. Antibiotics was prescribed to the patient for 7 days (amoxicillin and clavulanic acid ·1000mg b.d.s)[1]in addition to an anti-inflammatory drug (ibuprofen b.d.s)[2] for analgesia and anti-inflammatory reasons.

The patient was instructed to avoid brushing at the surgical site, and to rinse with a 0.12% chlorhexidine solution for 1 min three times a day. Sutures were removed 2 weeks after surgery; then plaque control in the surgical site was retained by chlorhexidine rinse two times a day for additional 2 weeks. Also instructed to brush with an ultra-soft toothbrush for 4 weeks. Then, a combination of soft brush with chlorhexidine rinse one time a day for an additional month.

1 Amoxil MUP Egypt
2 Amoun Egypt

After that full interproximal mechanical cleaning was carried out. Recalling the patient for prophylaxis was done every month till the second stage was due after 3-month healing period.

At the second stage, a modified coronally advanced flap with CTG was used to augment the vertical defect, healing abutment was removed, cover screw was secured, and no vertical releasing incision was made in this stage to maximize the blood supply to the advanced flap. Free gingival graft was obtained from the premolar-molar area of the palate and got de-epithelized with a knife blade to obtain better fibrous CTG. Graft was placed over the site to compensate for the vertical defect and flap was advanced to ensure primary closure without tension [Figure 4]. Resin-bonded bridge was used as a provision after modification to avoid any soft tissue contact. The patient received the same postoperative instructions as in the first stage.

After 3-month follow-up, starting our prosthetic phase, a suitable abutment for the required implant was not available in the market anymore so we started fabricating a custom abutment using the implant internal connection impression to manufacture a well-fitted temporary and final titanium abutments for completing the prosthetic phase. One horizontal incision was performed to expose

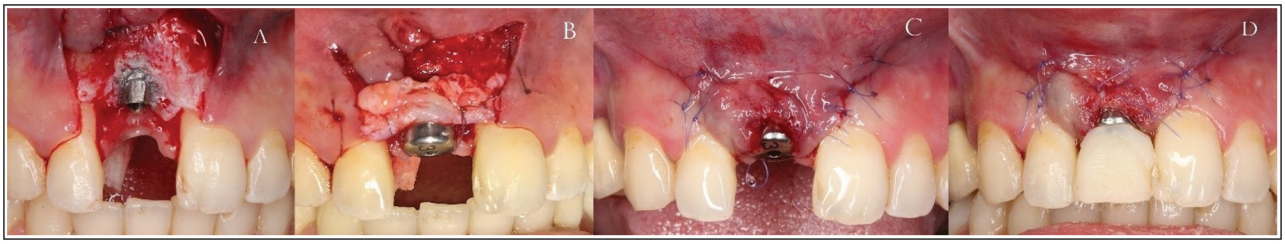

Figure 3: (A) Flap elevation and implant neck were de-threaded to favor soft tissue healing. (B) Connective tissue graft was sutured to cover the implant neck to mask the colored implant exposure. (C) Flap was coronally repositioned over the healing abutment and sutured. (D) Temporary crown was cemented to adjacent teeth

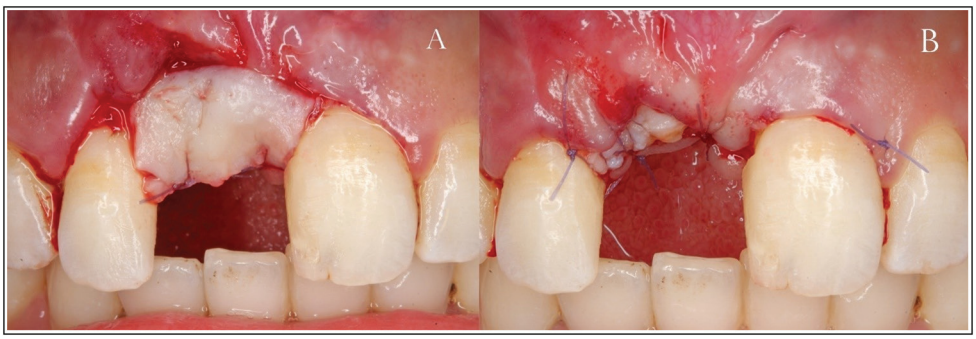

Figure 4: (A) connective tissue graft is placed over the ridge to augment the vertical defect. (B) CAF is utilized to partially cover the graft and sutured in place

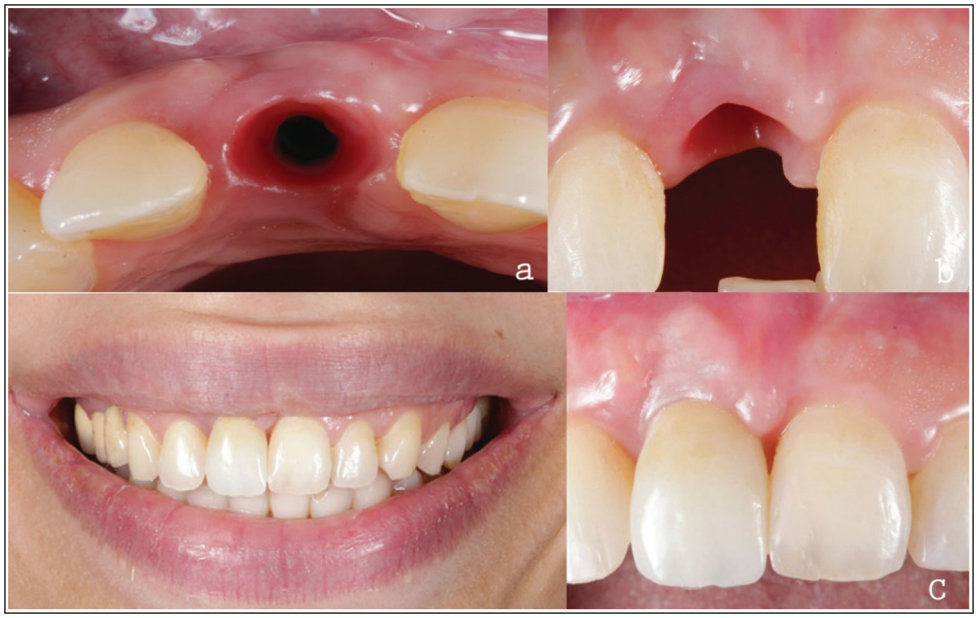

Figure 5: (A) Occlusal view demonstrating the thickening of the buccal soft tissue around the implant. (B) Three months post-surgery, the soft tissue margin at the implant site is the same as the gingival margin of the contralateral central incisor. (C) Postoperative smile view demonstrating the crown's emergence profile faithfully reproducing that of a natural tooth from.

the implant platform followed by implant loading with provisional crown. Care was taken to leave a mesial and distal gingival embrasure allowing the papilla to creep in and fill. The patient was informed to wait for another 3 months to reach better gingival architecture and emergence profile.

Clinical Outcomes

Three months later, postoperative healing was uneventful; a final impression and cast were made in order to design the final restoration. A multilayered full-contoured zirconium restoration was used for an implant rehabilitation simulating the left central with a proper emergence profile relative to the new height of the soft tissue which was 4 mm more coronal in comparison to the baseline [Figure 5B]. The soft tissue thickness was 2.5 mm. Thus, a complete masking to the implant shadow was achieved with the surgical technique [Figure 5A]. The probing depth was within the physiologic boundary (<4 mm) without bleeding upon probing around the implant supported crown. The height and the color of the peri-implant keratinized tissue were well incorporated with the neighboring gingiva [Figure 5C]. The patient was recalled after 3, 6, and 12 months for regular periodontal support sessions. The final esthetic appearance made the patient extremely content. Healing by primary intention was attained providing clinically healthy soft tissue surrounding a well-functioning restoration, and periapical radiographs showed a stable crestal bone level without the presence of any mucositis or peri-implantitis signs [Figure 6].

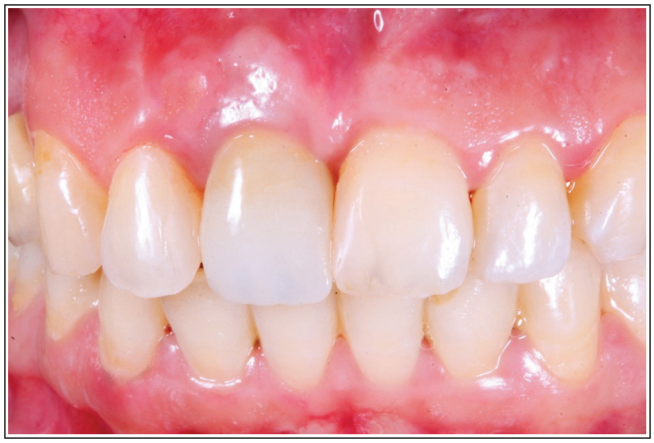

Figure 6: Intra oral frontal view showing stable outcome after 1-year follow-up period

Discussion

Modifications of hard and soft tissue commonly occur after tooth extraction. Satisfactory esthetic outcome usually requires the amendment of peri-implant soft or hard tissue defect.

Coronal advancement of the flaps is one of the most successful and predictable surgical approaches for root coverage especially when combined with a connective tissue graft,[15,16] and thus has been considered as the gold standard in a root coverage.[14,15]

This combined approach has also been reported to be suitable in the management of soft tissue dehiscences around implant (peri-implant soft tissue dehiscences) which are relatively common,[17] especially in areas

with a thin peri-implant soft tissue phenotype, lack of keratinized mucosa, and buccally placed implants all affecting the esthetic outcomes negatively.[14] Thin mucosa has been associated with the discoloration of the per implant soft tissues.[18,19] In another study, the esthetic satisfaction of patients was found to be adversely affected by the absence of keratinized mucosa.[20,1] Moreover, the thickness of the mucosa was found to have an important influence on marginal bone level stability.[21]

The procedure described in the present study treating isolated soft tissue dehiscence around implants completely solved the vertical and horizontal peri-implant soft tissue defects. The improved soft tissue thickness buccally actually masked the implant and renovated a proper emergence profile. Both flap design and graft type were crucial for attaining this outcome. The CTGs performed in this case were obtained by the de-epithelialization of free gingival grafts,[22] which resulted in denser and steadier connective tissue, less susceptible to shrinkage, and nearer to bone full of glandular and fatty tissue.

The stability of the CTG resulted in the increased thickness of soft tissue buccally even more than the CTG thickness at surgery time, implying that de-epithelialization did not only affect the graft stability but also caused an additional increase in thickness over time.

Vertical incisions might injure blood vessels supplying the flap and frequently result in unpleasant noticeable scars.[17] The absence of those incisions is advantageous and is even more valuable when palatal or coronal shift of the surgical papillae is indicated to approach the de-epithelialized papillae in the midst of adjacent teeth and implant abutment. Obtaining a wide envelope-shaped flap disconnected any muscle insertion so that the surgical papillae would reach the palataly moved de-epithelialized papillae passively.

Consequently, a substantial improvement in patient satisfaction with the esthetic outcome was accomplished. This excellent result was not only caused by the surgical procedure but it was also greatly affected by the modifications of the prosthetic components. As reducing the implant abutment provided broader connective tissue beds in-between the implant and neighboring teeth for the surgical papillae and the graft,[11] increased the volume and width of the peri-implant soft tissues, and enhanced blood interchange between the graft and the overlying flap papillae. The increased width of peri-implant soft tissue and the opportunity of extending de-epithelialization palataly permitted for accurate flap stability in spite of placing the CTG coronally. Thus, the graft was totally covered throughout healing period which reduced resorption and contraction of the graft and also improved the esthetics by preventing the appearance of posthealing scar.

Additionally, reducing proclination of abutment may have prevented the marginal soft tissue from shifting apically. Placing the new interim crown 4 months after surgery allowed the interdental papillae to grow properly with conditioning interdental soft tissue.

Conclusions

Within the limitations of this study, it revealed the possibility of fully restoring severe horizontal and vertical defects of soft tissue around implant and at the same time attaining great patient fulfilment via combined prosthetic and mucogingival approach; nevertheless, long-term preservation of this successful outcome needs to be monitored.

Acknowledgement

Not applicable.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Author contributions

A.H.: Conceptualization; Methodology; Project administration; and Writing—original draft.
D.Gh.: Writing—review and editing.

Ethical policy and institutional review board statement

The BUE faculty of dentistry Research Ethics Committee had reviewed and accepted the proposal in line with the Helsinki Declaration of 1975. Reference number: 22-020.

Patient declaration of consent

Written informed consent was obtained from the patient.

Data availability statement

All clinical data and photos are available upon request.

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