A modified approach to horizontal augmentation of soft tissue around the implant: omega roll envelope flap. Description of surgical technique

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Abstract

Objective. The flap’s design, as applied to implant surgery procedures for implant-prosthetic therapy, takes inspiration from the roll technique of Abrams (1980) and subsequent modifications.

This article describes a modified flap design for the correction of horizontal alveolar mucosa defects in implant-supported rehabilitation with one-stage and two-stage approach. The omega roll envelope flap (OREF) is a roll flap combined with a modified pouch technique. The goal of this type of flap design is to correct localized horizontal alveolar ridge defects and augment peri-implant soft tissue thickness.

Design. OREF is a flap technique that avoids harvesting autologous connective tissue from another donor site by using the supracrestal connective tissue of the implant surgical site. The proposed technique allows for increased horizontal buccal soft tissue thickness during implant-prosthetic rehabilitation.

Discussion. The OREF technique is practical for one- and two-stage implant approaches, and when it is applied with an immediate non-functional loading procedure, this technique can optimize surgical and prosthesis chair times.

This technique has shown advantages as maximizes the amount of connective tissue that can be rolled within the buccal flap. The OREF technique can be applied with a one-technique can be applied with a one-stage or two-stage implant-prosthetic approach.

Key words: dental implant, surgical flap, wound healing

Introduction

Tooth absence often involves defects in soft tissue and hard tissue thickness. A localized alveolar ridge defect hinders the correct placement of prosthetic implants and may create aesthetic and hygienic maintenance problems (1).

The aesthetic results of a therapeutic approach are crucial considerations for the patient and the dentist.

This is also relevant to the hygiene maintenance of implant prosthetic rehabilitation. The goal of peri-implant plastic surgery is the correction of a defect (1) to achieve harmony between all peri-implant component (2) and the adjacent soft and hard tissues (3).

Different soft tissue augmentation procedures have been developed to correct localized alveolar ridge defects and achieve adequate soft tissue thickness (4).

In 1980, Abrams (5) proposed the “roll technique,” which is a soft tissue management technique performed during the second stage of implant surgery that allows for the correction of small horizontal defects and improves the buccal soft tissue.

According to this technique, a bevelled buccal flap is raised and carried palatally. The flap is then “rolled" under the buccal mucosa. Flap mobility is achieved by two vertical incisions extended to the buccal mucosa for alveolar release (6).

The modification introduced by Scharf et al. for localized alveolar ridge augmentation consists of preparing a trapdoor to reflect and preserve the epithelium of the connective tissue pedicle that will be used to cover the donor site (7). The technique involves vertical buccal release incisions to allow for flap mobility (6). Giordano et al. (2011) modified (6) the Abrams roll technique to preserve the interproximal papillae, and although they did not perform papillary intrasulcular incisions, flap mobility was achieved through two vertical crestal incisions at 1.5 mm away from the adjacent teeth to respect the integrity of each papilla. When the second surgical stage for implant exposure was undertaken, a U-shaped flap design was performed with a horizontal incision performed at the maximum palatal perimeter of the implant and the subsequent partial thickness (6,8).

Saade et al. (2015) proposed a modification of the original pouch roll technique for use during the placement of a non-submerged implant or during the second stage of a submerged implant to augment marginal gingival thickness on the buccal side and improve the aesthetics of single or multiple implant prosthetic rehabilitations (8). The intrasulcular incision was continued interproximally along the teeth to the palate site, and it was followed by a horizontal incision. A semilunar or circular incision was performed at the
palatal side, and pedicle deepithelization was performed. Horizontal mattress sutures were placed to ensure intimate tissue contact with the folded “trapdoor” (8).

This article describes a new flap design for the correction of horizontal alveolar mucosa defects in implant-supported rehabilitation with one-stage and two-stage approaches (9). This new technique avoids a connective tissue graft from another autologous donor site; therefore, it can be considered minimally invasive. The omega roll envelope flap (OREF) is a variant of the central-crest incision and the roll envelope flap technique (REF) (5,10) with involvement of the contiguous sulcus of neighbouring teeth (11,12).

The OREF technique is a variant of the paramarginal and/or palatal crest incision, although it does not use the pedicle from the palatal side of the residual ridge.

Alveolar localized defect correction with an increase in the volume and quality of the peri-implant soft tissue yields improved aesthetic and hygienic maintenance by avoiding food impaction (Fig. 1).

**Design: surgical procedure**

An initial incision is performed with a circular scalpel or mucotome approximately 0.5-1 mm into the soft tissue perpendicular to the central residual ridge in the central part of the crest based on the ideal implant position and optimal implant-prosthesis rehabilitation plan. The minimum diameter of circular initial incision is 3.4 mm (Fig. 2). Then, a micro-blade is used to revise and deepen the semicircle on the palatal portion at full thickness. The full-thickness incision extends with the sulcular incision to the adjacent mesial and distal teeth following the buccal paramarginal direction without elevation on the palatal side of the flap.

The result is a flap design reminiscent of the Greek letter omega (Ω) (Fig. 3).

The minimum size of soft tissue required to handle this type of flap is 6.4 mm.

With a small and anatomical periosteal elevator, the incision is reviewed, and the full-thickness flap is elevated in the buccal direction (Fig. 4).

When required, an implant and/or secondary component is placed according to the international protocol (6) and the Declaration of Helsinki and Good Clinical Practice (13) (Fig. 5).

Simultaneously, guided bone regeneration (GBR) can be performed if necessary to increase the hard tissue depending on the type of bone defect (14).
If a second implant-prosthetic component is planned, it can also be connected (15).

The buccal flap is elevated with a surgical tweezer, and the circular part of the initial incision performed with the mucotome is deepithelialized with a micro-scalpel blade (Fig. 6). In this way, the circular portion of the connective tissue above the central crest is exposed and enveloped in the vestibular portion of the flap (Fig. 7).

The semicircular incision is extended to facilitate the envelope of connective tissue to obtain a buccal connective pedicle of at least 2 mm. If necessary, the connective pedicle can be stabilized with a “U” stitch (7) (Fig. 8).
The suture technique is performed with 6-0 monofilament polypropylene non-absorbable suture materials to facilitate optimal wound healing (16) (Fig.9). The surgical emipapille are sutured to the anatomical emipapille. The interproximal areas of the implant are sutured as suggested by Cortellini & Tonetti. The suture technique consists of a single modified internal mattress suture for both the mesial and distal pseudo-papillae (17, 18). The needle is passed from the outer surface within the vestibular flap through the interproximal area and then passed from the inner surface through the palatal or lingual flap. The suture is then brought back to the vestibular side by passing the needle through the palatal and vestibular flaps. At this point, the needle is passed through the loop of suture wire on the lingual side and finally brought back to the starting point on the vestibular side, where it is tied (19, 20).

The buccal flap is repositioned at its same original level to avoid any additional tension in the healing area (21, 22). The interdental suture ensures a tight fit of the flap, and if necessary, mesial and distal single stitches can be performed.

Discussion

According to Araujo and Lindhe (2005) (23), the crest of the buccal bone wall consists solely of bundle bone. The bundle bone is resorbed and replaced with woven bone, and this modelling results in a substantial vertical reduction of the buccal crest.

Alveolar ridge collapse after tooth extraction is a common occurrence and limits the bone available for implant placement. Horizontal and vertical bone resorption is more extensive in the first year after tooth loss, with ridge volume reduction reaching 60% after 2 years (8).

Additional procedures are necessary to recover lost tissue and achieve satisfactory functional and aesthetic results and hygienic maintenance (8, 24).

The OREF technique is practical for one- and two-stage implant approaches, and when it is applied with an immediate non-functional loading procedure, this technique can optimize surgical and prosthesis chair times.

This technique has advantages compared with other modified roll techniques because it maximizes the amount of connective tissue that can be rolled within the buccal flap, thereby increasing the soft-tissue thickness.

The OREF technique shows immediate soft tissue healing with stable aesthetic improvement of the peri-implant mucosa. The flap procedure allows us to gain adherent mucosa around the implant prosthetic rehabilitation with stable outcomes during follow-up.

The technique causes minimum post-surgical pain and improves aesthetics by reducing the buccal soft tissue concavity with faster wound healing by primary intention.

Localized alveolar defect correction achieves an aesthetic and hygienic maintenance improvement that avoids food impaction. The roll flap procedure reduces infection risk and reduces cost and chair time (4, 25) because the procedure can be performed immediately with a one-stage approach.

By avoiding the harvesting of autologous connective tissue from another donor site and using the supracrestal connective tissue pedicle, the OREF technique improves soft tissues thickness and mobilizes keratinized mucosa around the implant-prosthesis reduces the invasiveness and morbidity for the patient.

With this new flap design, the complications of healing are reduced because the palatal connective pedicle is not used and the terminal vascularization of the central crest mucosa is not interrupted because a palatal incision is not performed.

The stability of the soft tissue during implant-prosthesis rehabilitation lasts for at least 2 years, and we plan to continue the follow-up evaluation over the long term to investigate the procedure’s outcomes.

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Fig. 9. Occlusion view of the suturing technique with 6-0 monofilament polypropylene non-absorbable suture.
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