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*Corresponding author

David Polak, Department of Periodontology, The Hebrew University-Hadassah Medical Center, Israel

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Case Report

Simplified Flap Approximation Approach for Second-Stage Implant Surgery in The Maxillary Jaw

David Polak*, Tali Chackartchi, Sagi Talmor and Ran Asher

Department of Periodontology, Hebrew University-Hadassah Faculty of Dental Medicine, Jerusalem, Israel

Abstract

Aim: The current publication presents a simplified surgical approach that allows easy adaptation of a flap in the upper jaw in second stage surgery in dental implants.

Methods: A detailed step-by-step description of the simplified flap approximation approach is detailed with a graphical illustration of the surgical principles of the approach. Also, two clinical cases of the method are presented.

Results: The simplified flap approximation approach allows easy flap adaptation that promotes primary healing of soft tissue around implants.

Discussion: The simplified flap approximation approach allows an easy-to-manage surgical flap that optimizes soft tissue healing around implants in the second stage of surgery.

Introduction

It is commonly believed that peri-implant health requires keratinized tissue. An adequate amount of keratinized tissue with a wide biotype correlates with the prosthesis` long-term stability [1-4]. Furthermore, sufficient keratinized tissue masks the superstructure/implant dark shades and results in aesthetic outcomes [5]. On the other hand, the absence of keratinized mucosa around dental implants increases their susceptibility to plaque accumulation and peri-implant inflammation [6]. Intentional surgical flap closure is a prerequisite for proper healing [7]. During implant placement, adapting the flap to the superstructure can be surgically difficult and result in secondary healing. As such, various techniques for tissue approximation exist. These techniques rely on complex surgical manipulation of the buccal flap due to its mobilization. In cases where the incision is extended to the lingual/palatal aspect to preserve keratinized tissue, approximation of the palatal flap to the implant location is essential to achieve primary intestinal healing.

The palatal flap is considered an immobile rigid keratinized tissue. As such, several techniques have been described over the years to allow manipulation of the palatal soft tissue. The original palatal pedicle flap rotated split palatal flap (RSPF) was first described by Nemcovsky in 1999 [8]. The technique uses soft tissue to cover extraction sites following immediate implantation. Other techniques based on the RSPF were thereafter introduced, and include the palatal advanced flap by Khoury and Happe [9], the rotated full palatal flap by Nemcovsky in 2000 [10], the palatal advanced flap by [11], Vascularized interposition periosteal (VIP-CT) flap by Sclar 2003 [12] and modified VIP-CT by [13].

The RSPF [8] consists of a full-thickness flap divided into two flaps: the outer layer that contains the epithelium and underlying connective tissue and the inner layer that contains deep connective tissue and periosteum. A third incision is then made in the inner layer parallel to the two palatal split thickness flaps, which creates a pedicle inner flap that is advanced over the desired location. Khoury and Happe in [9], described a modification of the subepithelial connective tissue graft (SCTG) by restricting the inner layer dissections to one incision which creates a pedicle inner-flap attached to the superficial layer at the anterior side that can be rotated over the defect. In 2002, Goldstein et al. proposed the palatal advanced flap by performing an L-shaped flap with parallel incisions and a width matching the bucco-palatal dimensions of the deficient keratinized tissue gap. The short base of the flap is advanced to the buccal leaving a palatal secondary healing region. This technique is founded on the coronally positioned palatal sliding flap described by Tinti and Parma-Benfenati in 1995. Sclar described the VIP-CT flap in 2003. His technique includes a palatal incision that extends mesial and distal to the recipient site. In the distal aspect, the incision extended to the second premolar, and a subepithelial CT graft was reflected via a single incision to the recipient site.

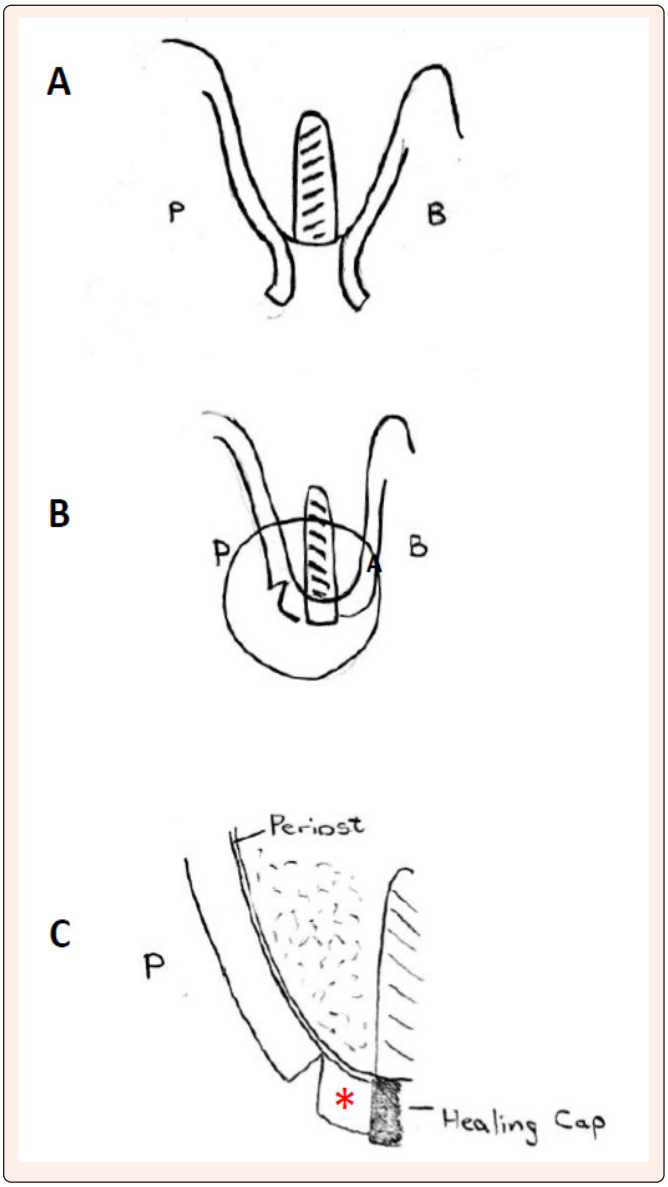
All of the above techniques are biologically sound, albeit technically sensitive and time-consuming. In addition, post-operation complications are more likely to occur, such as bleeding, pain and patient discomfort, bone resorption, sloughing, tissue shrinkage, and exposure to the surgical site [14]. The following paper introduces a simple and fast surgical technique that allows soft tissue manipulation in the upper jaw and can be performed easily and predictably in dental implant surgery.

Surgical Technique

Illustration of the principals of the simplified approximation technique

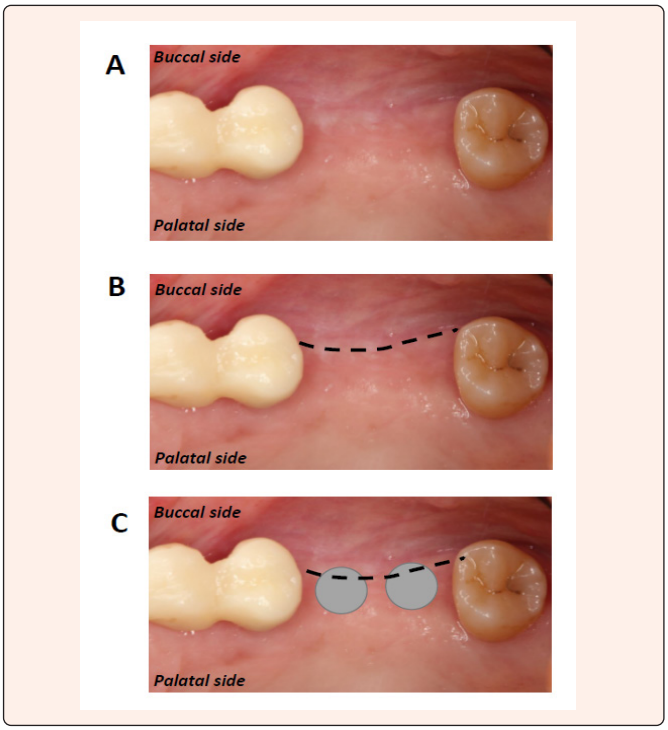
In most cases there is sufficient keratinized tissue at the surgical site, in which a midcrestal incision is made (Figure 1a). However, when there is a lack of keratinized tissue at the peak of the crest, the simplified approach is based on a 'midcrestal' incision is made 2 mm palatal to the "original" midcrestal border (Figure 1b), and only the buccal flap is elevated, leaving the palatal side of the crestal incision attached to the bone. An additional incision is made parallel to the midcrestal incision, 3-5 mm to the palate, and to a depth of 3-4 mm (Figure 1b). The area between the midcrestal and parallel palatal incision is called the 'palatal collar'. The palatal collar gets its blood supply from the underlying periosteum and mesial and distal connection to the palatal tissue and can be mobilized toward the bu'cal flap during suturing (Figure 1c). Suturing of the collar is applied by insertion of the needle into the midway between the midcrestal and parallel palatal incision. After superstructure fitting, flap closure is tested to validate tension-free closure of the site, while the palatal collar (marked with a red `*`) is detached from the

rest of the palatal tissue but retains its blood supply from the intact periosteum (Figure 1c). Following suturing, a gap is created at the parallel palatal incision, which can also be sutured between the collar and palatal side of the incision line. If the gap is wide, or in cases where post-operative bleeding is expected, a hemostasis packing material may be used to fill the gap before suturing.



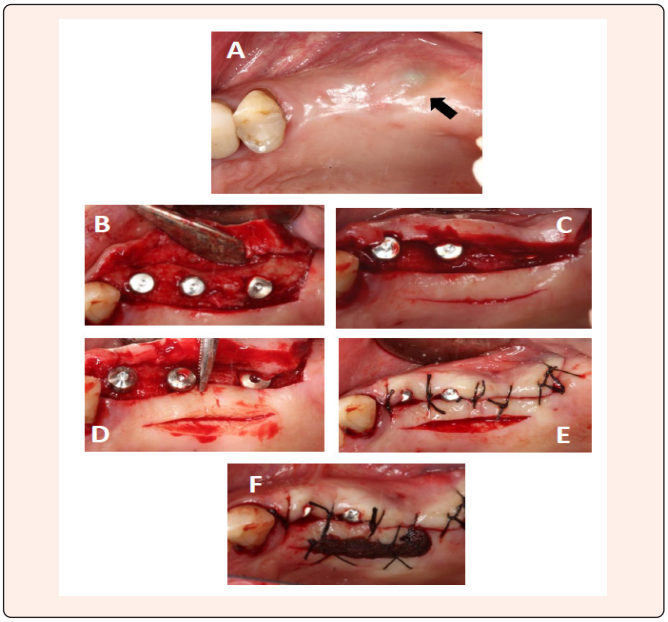
Case illustration of the clinical challenge that is addressed by the simplified approximation technique

The clinical case presented in Figure 2 reflects the challenge in second-stage implant surgery. Clinical examination of the site of the missing second premolar and first morel in the upper jaw showed that there is keratinized tissue at the crest (Figure 2a). but when marking the border of the keratinized tissue (the mucogingival line, marked in broken line (Figure 2b), and marking the optimal position of implants (Figure 2c), one might notice that there will be a risk for the keratinized tissue at the buccal aspect of the implants, which should be corrected at the second stage implant surgery (i.e., implant exposure).



Cases Presentation

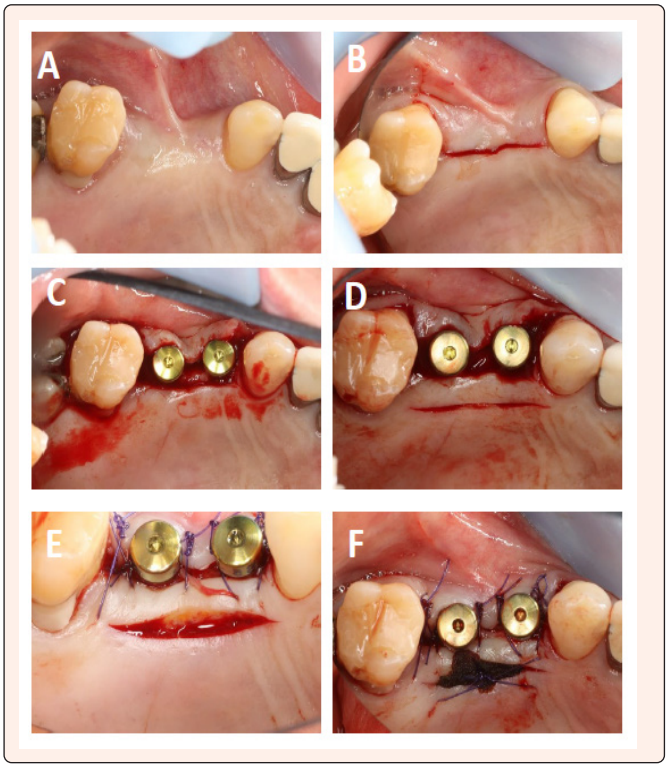
Case 1 presents a second stage surgery of implants at 14-16 teeth sites. One might notice the reflection of the posterior implant (marked in black arrow), which is located at the mucogingival border (Figure 3a). first, at the adjacent teeth of the implants, an intra-sulcular incision was made around tooth #13 at the mesial aspect of the area of interest, a vertical incision at the distal aspect while the midcrestal incision was made at a palatal position perpendicular to the midcrestal line. This was made to allow sufficient keratinized tissue at the buccal aspect of the dental implants (Figure 3b).



After healing caps were placed, a fourth incision was made at the palatal tissue at a distance of 4 mm and a depth of 4 mm, thus creating the palatal collar (Figure 2c). The incision allows the mobilization of the palatal flap and primary closure around the suprastructure (Figure 2e).

An absorbable gelatin sponge (Gelfoam®) hemostatic agent was used at the secondary incision to prevent postoperative bleeding. Sutures were made with 4-0 braided non-absorbable, surgical silk (Ethicon, Somerville, NJ). (Figure 2f).

Case 2 presents a second stage surgery of implants at 14-15 teeth sites. While there is keratinized tissue at the crest, there is a frenulum insertion which is located in the midcrestal region (Figure 4a). First, at the adjacent teeth of the implants, an intra-sulcular incision was made around the adjacent teeth to the implants, and a midcrestal incision was made at a palatal position perpendicular to the midcrestal line (Figure 4b). After healing caps were placed (Figure 4c), an incision was made at the palatal tissue at a distance of 4 mm and a depth of 4 mm, thus creating the palatal collar (Figure 4d). The incision allows the mobilization of the palatal flap and primary closure around the suprastructure (Figure 2e). An absorbable gelatin sponge (Gelfoam®) hemostatic agent was used at the secondary incision to prevent postoperative bleeding (Figure 4f).



Discussion

The need to achieve primary closure after implant surgery and the importance of keratinized tissue width around implants have resulted in numerous surgical techniques aimed at manipulating soft tissue. Most of these techniques relate to the buccal flap which is easily manipulated. However, since keratinized buccal tissue is sometimes scares, other techniques related to the palatal flap were introduced. Such manipulations enhance clinical complexity since the palatal flap is immobile, harbors major blood vessels, and at times results in secondary healing and post-operative discomfort.

Nemkovsky's RSPF which consists of a full-thickness flap divided into two flaps, is technically challenging with the risk of bleeding, pain, and patients` discomfort. Khoury and Happe using the palatal sub-epithelial CT graft pedicle involves a large surgical field to produce a donor site for a graft for a small recipient site (up to two teeth). This approach is surgically challenging and can result in tissue shrinkage and donor site poor healing. Goldstein's palatal advanced flap is also a challenging technique with a large surgical field and intentional secondary healing area with a risk of postoperative bleeding and patient discomfort. Sclar VIP CT flap, as all others, extends over a large surgical field, risking extensive bleeding and graft ischemia, and is technically challenging with limited graft length, color mismatching, and postsurgical graft shrinkage. All the above techniques also increase treatment duration considerably.

The presented technique in the current paper shows a simple approach that allows predictable manipulation of keratinized tissue relocation with primary closure of the flaps around the implants. All cases with this approach lead to predictable primary healing of the flap, without significant side effects, such as bleeding or patient inconvenience. Furthermore, the simplicity of such an approach is fast and does not complicate the surgical procedure. When choosing a surgical technique, some considerations are required: Highly predictable; minimal trauma and invasion; Complete and passive coverage of surgical site; results in acceptable esthetics; and preferably, fast and easy to perform. All the above-mentioned techniques in the introduction fulfill most but not all of the guidelines. The presented simplified flap approximation approach fulfills all the above considerations, with a clear advantage over all others as a simple and easy-to-perform approach. The rationale is to provide the clinician with a simple approach to overcome a clinical dilemma without the need to apply extensive, highly challenging surgical approaches and with a high degree of success, in a predictable manner and with minimal side effects. To the best of the author's knowledge, this case series is the first to address the topic of flap approximation for second stage implant surgery.

Conclusion

The described surgical approach assists the clinician in treating a common everyday practical problem- the need to achieve maximal soft tissue coverage around the implant suprastructure while performing minimal manipulation of the tissue. Other, more complicated manipulations, can prolong the surgery and often lead to impaired outcomes due to technique sensitivity. Applying additional palatal incision can allow adequate mobilization of the palatal tissue to achieve soft tissue adaptation, reducing the risk for bone resorption or bleeding.

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