

CLINICAL RESEARCH

The buccal pedicle flap technique for periimplant soft tissue boosting

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Abstract

A healthy and adequate band of keratinized periimplant mucosa is key to long-term biologic and esthetic success. Yet in about one-third of implant patients, its formation requires connective tissue graft procedures. Such procedures may be considered impractical for patients who need retreatment of failures, those who are not willing to go through multiple surgical steps, or those receiving multiple

implants that would thus involve multiple connective tissue grafts. This article introduces the buccal pedicle flap technique, a new surgical approach for boosting the soft tissue around dental implants without connective tissue grafting. The technique is a minimally invasive surgical approach that can be performed as one-stage or two-stage surgery and can be applied in anterior and posterior areas as well as at single and multiple adjacent implants. (*Int J Esthet Dent* 2019;14:18–28)



Introduction

Despite the high success rates of osseointegrated implants, the periimplant mucosa response is not clearly understood and is often difficult to achieve and maintain over time. Various factors are crucial for predictable long-term periimplant soft tissue stability, including the biologic width, the biotype of the mucosa, the papilla height, and the mucosal soft tissue level as well as the amounts of soft tissue volume and keratinized tissue. While the biotype of the mucosa is congenitally set, many other parameters can be influenced to some extent by the treatment itself.¹

It is well known that connective tissue is present in the implant mucosa although it is not directly on its surface. In the periimplant tissues, there is a higher proportion of collagen and fibroblasts arranged parallel to the surface of the implant. Collagen fibers form a collar that gives consistency and tonicity to the mucosa.¹ This interaction between the tissue and the titanium implant surface is essential – as it is in teeth – to inhibit the apical migration of the junctional epithelium, thus preventing bone loss.¹ In fact, a minimal thickness of the soft tissue collar is needed for the mucosa to be stable over time,^{1,2} and to allow for the maintenance of proper oral hygiene.³



Fig 1 Buccal pedicle flap in the anterior region. The incision starts from the lingual aspect of the edentulous crest but without raising the papillae. Two parasulcular incisions on the mesial and distal line angle are then connected to the first horizontal incision.



Fig 2 Buccal pedicle flap in the anterior region. A partial thickness flap is gently raised starting from the distal and mesial line angle by using a microelevator Tabanella 2.

According to the literature, the formation of this necessary soft tissue collar requires connective tissue graft procedures for about one-third of inserted implants.⁴⁻⁶ While this approach is certainly appropriate, it may be considered impractical in the following cases:

- Patients in need of retreatment of failures.
- Patients unwilling to go through multiple surgical steps.
- Patients receiving multiple implants and in need of multiple connective tissue grafts, which would substantially increase the invasive nature of the treatment.

This article introduces the buccal pedicle flap technique, a new surgical approach for boosting the soft tissue around dental implants. The technique is a minimally invasive surgical approach that can be performed as one-stage or two-stage surgery and can be applied in the anterior and posterior areas as well as at single and multiple adjacent implants.

Surgical technique

A horizontal incision starts from the lingual aspect of the edentulous crest. Two parasul-

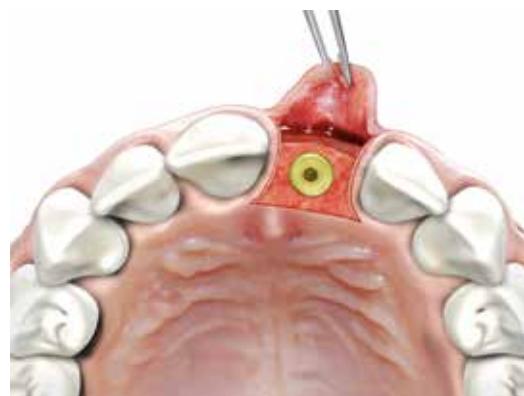


Fig 3 Buccal pedicle flap in the anterior region. The partial thickness flap extends beyond the mucogingival line to enable high flexibility during its repositioning.

cular incisions on the mesial and distal line angle are then connected to the first horizontal incision (Fig 1). A partial thickness flap is then gently elevated by using a universal sharp microelevator (Tabanella Universal Bone File, Tabanella 2; Hu-Friedy), starting from the lingual to the buccal side and passing the mucogingival line so that the pedicle flap can be flexible (Figs 2 and 3). Buccal cutbacks can also be executed to release the flap, if necessary. Healing abutments with a concave profile are then connected to the implant platform. The pedicle flap is positioned buccally to the healing abutments (Fig 4), and stabilized by 6.0 polypropylene single interrupted sutures on the mesial and distal vertical incisions. Horizontal or reinforced horizontal mattress sutures are then utilized to push down the tissue



Fig 4 Buccal pedicle flap in the anterior region. The buccal pedicle flap is sufficiently flexible to be easily stabilized on the concave portion of the healing abutment.



Fig 5 Buccal pedicle flap in the anterior region. Horizontal mattress sutures are positioned mesially and distally to the healing abutment to stabilize the flap and create the dead space that will promote tissue formation through granulation. Single interrupted 6.0 sutures then fix the flap on the mesial and distal minor vertical incisions.

between the dental implant and the teeth or between multiple implants (Fig 5). A slight overlapping of the buccal pedicle flap is needed to create dead spaces because the presence of buccal wrinkles allows the de-

sirable tissue volume to be easily obtained and the granulation process to start. The flexibility of the flap is imperative to obtain the V-shaped aspect of the pedicle mesially and distally (Figs 5 and 6).

Fig 6 Buccal pedicle flap in the posterior region at two adjacent implant sites. In case of two (or more) adjacent implants, the incisions are longer, and the lingual horizontal incision runs slightly more buccal in order to create the pseudopapillae.

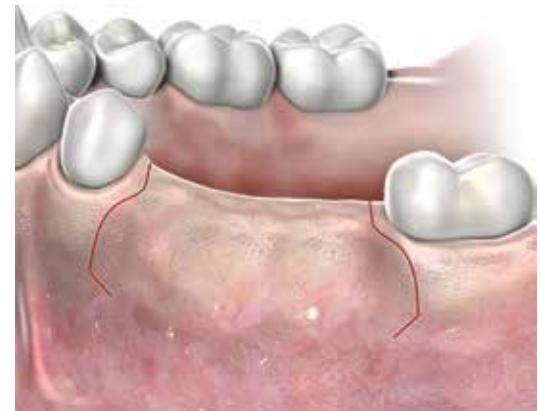
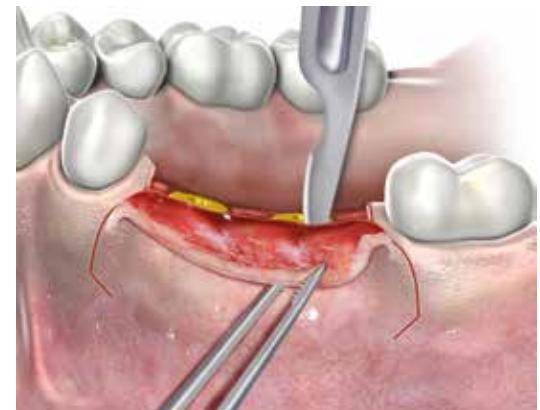
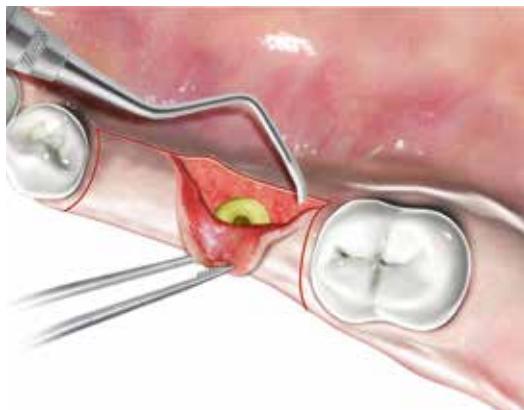


Fig 7 Buccal pedicle flap in the posterior region at two adjacent implant sites. Sharp dissection starts mesially and distally.



The lingually exposed connective tissue is left to heal by secondary intention healing. A natural bridge of the soft tissue from buccal (coronal) to lingual (apical) forms spontaneously, thus allowing a biomimetic result to be obtained. An illustration of this technique at a posterior position and with two adjacent implants is shown in Figures 6 to 10.

Case presentation

A 61-year-old patient presented with a severely atrophic ridge due to multiple endodontic failures (Figs 11 and 12). After raising the buccal pedicle flap, the buccal thickness of the periimplant mucosa was measured with a caliper (40 mm-long Straight Castroviejo Caliper; Hu-Friedy) using the implant platform as a point of reference. Measure-



Fig 8 Buccal pedicle flap in the posterior region at two adjacent implant sites. The mucogingival line is passed with the 15C blade, avoiding any kind of flap perforation.

ments were taken mesially, distally, and medially to the implant platform, and averaged 1, 1, and 2 mm, respectively. After allowing the tissue to heal for 8 weeks, the mucosal thickness was measured again with the same caliper. A periodontal probe (North Carolina 15 UNC color-coded probe; Hu-Friedy) was used to register the amount of



Fig 9 Buccal pedicle flap in the posterior region at two adjacent implant sites. The more the flap is extended, the higher its flexibility. Slight overlapping of the tissue on the buccal side is desirable because it creates buccal wrinkles that allow for increased tissue volume and the initiation of the granulation process.

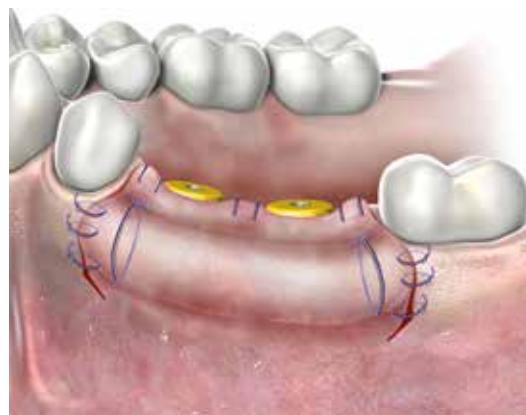
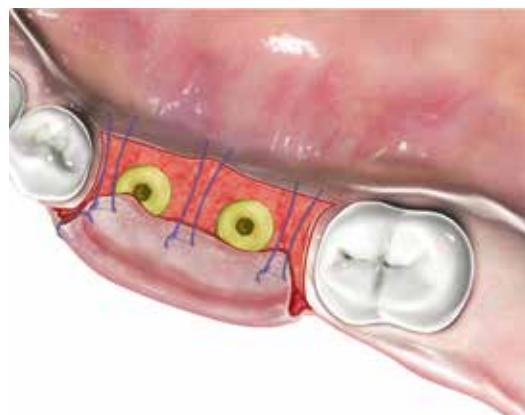


Fig 10 Buccal pedicle flap in the posterior region at two adjacent implant sites. Horizontal mattress sutures are positioned mesially and distally to each implant.

Fig 11 Clinical view of multiple implant sites treated with the buccal pedicle flap.



Fig 12 Before and after the buccal pedicle flap technique.



buccal keratinized tissue as well as the height of the soft tissue collar, from the implant platform to the free mucosal margin before and after the buccal pedicle flap. These measurements revealed a significant increase in tissue thickness: 3 mm on the mesial, 3 mm on the medial, and 4 mm on the distal side. The patient reported no pain or postoperative discomfort. Postoperative medications were not needed. After 1 week of healing, a natural slope of about 10 degrees connected the buccal (coronal) with the lingual (apical) aspect.

Fig 13 Preoperative clinical view prior to the buccal pedicle flap technique, adjacent to a tooth with a reduced periodontium and mucogingival deformities.





Fig 14 Occlusal view showing high frenum insertion, buccal concavity, and poor quality and quantity of keratinized mucosa. The buccal pedicle flap starts with a horizontal palatal incision and two parasulcular incisions. The adjacent papilla is preserved.



Fig 15 A partial thickness flap is raised.



Fig 16 Occlusal view showing before and immediately after the buccal pedicle flap. The keratinized mucosa is shifted buccally, creating a dead space underneath the flap.

Discussion

The buccal pedicle flap technique is an easy and minimally invasive surgical approach that can be performed as one-stage or two-stage surgery. It can be applied in posterior (Figs 13 to 18) and anterior (Figs 19 and 20) areas as well as at single and multiple adjacent implant sites. The proposed technique is based on the concept of an apically positioned flap, but there are some important differences compared with the traditional approach: mainly, the flap has to be very flexible in order to gain volume. This flexibility is achieved by performing a partial thickness flap that extends beyond the mucogingival junction by using vertical incisions that do not approach the neighboring papillae as well as by adding cutbacks.

A periimplant soft tissue boosting should be performed on each inserted dental implant to create a sealing of the implant platform, thus creating tissue stability. A mucosa adherence on the titanium abutment¹ will then create an isolated area where it is unlikely for bacteria penetration to occur. The buccal pedicle flap technique allows a significant periimplant soft tissue augmentation by translating the palatal connective

tissue toward the vestibule. There is no limit in terms of the amount of connective tissue that can be moved toward the buccal side when the technique is utilized in the maxilla. In the mandible, the anatomical limitations are dictated by the residual keratinized mucosa left on the lingual aspect of the edentulous crest. The residual keratinized tissue should never be less than 2 mm in order to avoid periimplant lingual soft tissue recessions. The final thickness of the healed mucosa is influenced by the flap design and can be easily predicted. Furthermore, the buccal pedicle flap allows for the gentle repositioning of the mucogingival junction, which is commonly shifted toward the crest after guided bone regeneration procedures. This is also the main advantage of the buccal pedicle flap technique compared with

Fig 17 Occlusal view: before and after the buccal pedicle flap technique.



the roll flap technique. In fact, the latter technique is not effective for repositioning the mucogingival line because of the absence of vertical incisions, cutbacks, and an extended partial thickness flap. The buccal pedicle flap approach simplifies the mucogingival grafting techniques to apically reposition the flap after guided bone regeneration, thus avoiding connective tissue grafts (see Figs 7 and 8).

Fig 18 Lateral view: before and after the buccal pedicle flap technique.



Fig 19 Single-implant site showing mucogingival deformities after the traumatic extraction of tooth 13 and implant and graft failure.

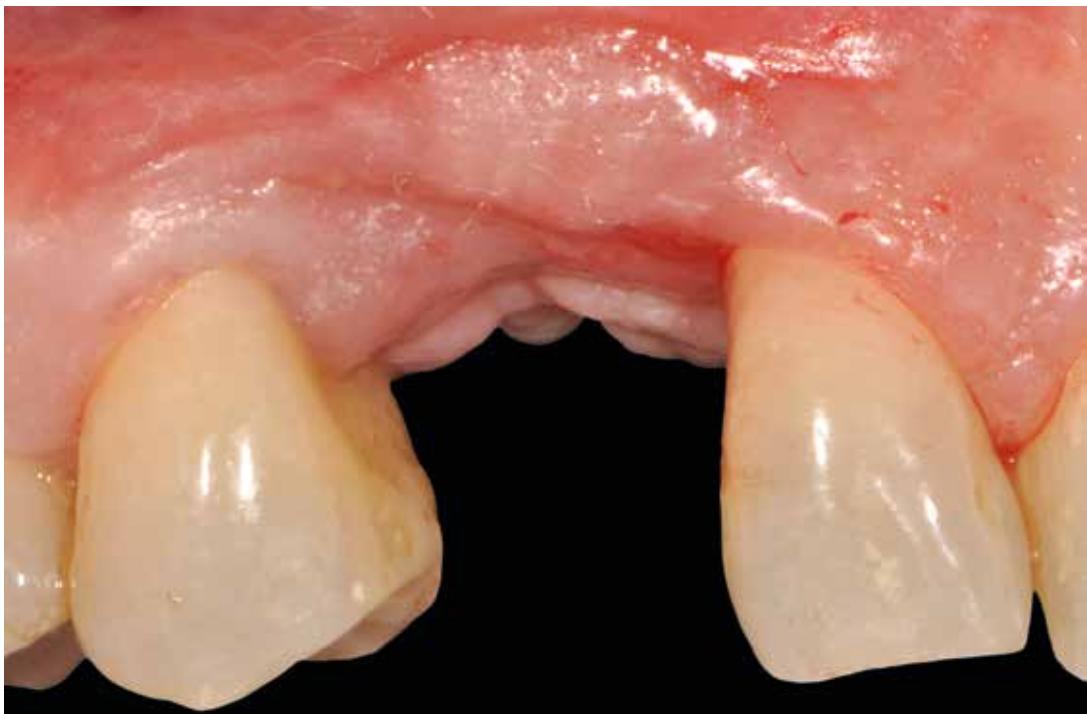




Fig 20 Four years after the buccal pedicle flap technique.

Major advantages of the buccal pedicle technique are its minimally invasive nature and its applicability in every anatomical area. Furthermore, it can be performed as either one-stage or two-stage surgery, and is feasible at single and multiple adjacent implants. Another advantage is that the technique can create a natural-looking buccolinguinal slope of about 10 degrees of angulation (see Figs 21 and 22) that is very well tolerated by the soft tissue. Such a slope not only supports cleaning procedures, but also enables a natural esthetic result on the vestib-

ular aspect because the buccal mucosal level is more coronal compared with the lingual side. At the same time, the buccal pedicle flap technique does not create a pseudopocketing⁷ around the endosseous implants and thus achieves sealing against bacterial ingressions.

Finally, possible drawbacks of the technique may be related to the amount of tissue that can be augmented, which is in turn related to the capability of dead space maintenance underneath the pedicle. However, this aspect can easily be predicted by using



Fig 21 Two weeks after the buccal pedicle flap technique: a step is visible between the buccal and palatal aspect.

Fig 22 After 4 weeks, a natural slope connects the buccal and palatal aspect.

interrupted sutures to stabilize the wrinkles toward the buccal aspect and by avoiding excessive thinning of the flap.

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