

Vestibular Incision Sub-Periosteal Tunnel Access Technique around Dental Implants in the Aesthetic Zone

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Introduction: Since the early days of the discovery of dental implants, there has been a substantial paradigm shift from placing implants in edentulous ridges to rehabilitating the most complex cases in the aesthetic zone. In the initial periods the main focus was solely concentrated on the quality and quantity of the hard tissue however passing of time has evidently revealed that soft tissue has a significant importance especially in the aesthetic zone. The advent of many complications along with dental implants in this area draw attention of most clinicians regarding the importance of the soft tissue. The use of reliable techniques to improve the aesthetic outcomes in the aesthetic zone is an important clinical aid to advance the results over time. There has been many different surgical techniques in the literature, which so far there has been no adequate reason to prove one of the treatment approaches the most effective and predictable. **Case Report:** Vestibular sub-periosteal tunnel access (VISTA) approach has been used in three clinical cases in order to enhance the quality and quantity of soft tissue around dental implants in the esthetic zone. **Results:** This technique had an advantage of having the incision line in a remote area from the marginal mucosa which supports preserving the integrity of this critical area during the surgical procedure. **Conclusion:** VISTA technique is a viable technique for soft tissue enhancement around dental implants especially in the aesthetic zone where both the quality and quantity of the soft tissue play an important role for the long term prognosis of the implants.

Keywords: Vestibular Sub-Periosteal Tunnel Access; Aesthetic Zone; Soft Tissue Enhancement

Introduction

In the early days of implant dentistry, most clinicians had focused solely on the quality and quantity of the available bone. As the time passed, it has been understood that soft tissue has played a paramount role in the long-term success and survival of a dental implant particularly in the aesthetic zone.

Soft tissue grafting procedures are increasingly performed for a number of indications in conjunction with dental implant therapy (3). Major clinical indications include recession coverage, gain of keratinized tissue, and augmentation of soft tissue volume (4). These periodontal and peri-implant plastic surgical procedures have been recommended to establish short-and long-term favorable biological, functional, and aesthetic outcomes.

The surgical techniques reported in the literature and analyzed in a review by Mazzotti (5) can be categorized into different groups: Coronally advanced flap with or without (envelope coronally advanced flap) vertical releasing incisions supplemented by connective tissue graft, envelope flap/pouch/tunnel techniques with connective tissue graft or

collagen matrix, submerged techniques with or without connective tissue graft, pedunculated connective tissue graft, free gingival graft and multiple surgical approaches in different surgical steps.

Recently, the vestibular incision subperiosteal tunnel access (VISTA) technique has been introduced by Zadeh (2) which has been stated to have beneficial impacts since the integrity of the marginal mucosa will be preserved while the incision line has been placed in a distant zone from it.

Case Report

The VISTA technique initiates with a vestibular incision in a remote area far from the targeted zone which mainly located on the facial aspect of the implant in the aesthetic area. This incision placed primarily on the non-attached mucosa beyond the mucogingival line with a slight extension on the attached mucosa. Then, a subperiosteal tunnel created, exposing the facial osseous plate. The tunnel should be made in a full thickness mucosa.



Figure 1. A) Tooth #21 with internal resorption; B, C) Extraction and immediate implant placement; D) CTG from tuberosity; E) Vestibular incision with sub-periosteal tunnel access toward the facial of the implant, CTG fixation and platelet derivative added; F) 3 weeks post-operative; G) 2 years post-operative

which means the instrument should always be in contact with the underlying bone during the tunnel formation. This tunnel will be extended at least one to two teeth/implant beyond the site requiring soft tissue augmentation so as to mobilize mucosal margins and facilitate coronal repositioning.

Moreover, the subperiosteal tunnel can be extended interproximally without making any surface incisions through the papilla. The entire flap mobilized and coronal advancement of the mucosal margin will be established without implementing any extra trauma over this area. The next step will be fixation of the advanced flap which can be done with either bonded or sling sutures. After the stabilization of the flap the connective tissue graft (CTG) harvested either from the palate or tuberosity. In order to stabilize graft, the suture needle



Figure 2. A) Pre-operative; B) 2 years post-operative

penetrates from outside of the flap at the targeted area toward inside and bring out from the vestibular incision. Then the needle will hold the CTG in two anchored points and return back from the vestibular incision toward the targeted area, this time from inside the flap toward out and fixation will be done. Finally the vestibular incision will be sutured.

The following clinical cases demonstrate how this technique helps the clinicians enhance the quality and quantity of soft tissue around dental implants in the esthetic zone in different clinical scenarios;

Case 1. Extraction and immediate implant placement with provisionalization

Case 2. Soft tissue enhancement during the second stage procedure

Case 3. Extraction and immediate implant placement along with soft tissue coverage of the adjacent dentition.

Case 1

A 26 year old female has been referred owing to internal resorption on tooth #12. Tooth diagnosed as hopeless. Due to the quantity and quality of the available bone based on cone bone CT scan evaluation, it has been decided to perform the extraction, immediate implant placement and provisionalization in one session.

Figure 1 has shown the sequence of the procedure, tooth #21 extracted with minimal trauma in order to preserve the facial bone, irrigation and curettage done, osteotomy site prepared, implant placed with the primary stability of 35 N/cm. Due to the quantity of the bone and preservation of the facial bone, no flap raised. Connective tissue graft (CTG) harvested from the tuberosity, adapted to the site. Then a vestibular incision made on the distal of tooth #22 in a remote area from the targeted facial of #21. A sub-periosteal tunnel made toward the facial aspect of implant, CTG shifted from the tunnel and fixated with 4-0 vicryl suture. The reason for the soft tissue graft is that it has been shown that CTG in single, immediately placed and provisionalized implants leads to less recession of the peri-implant soft tissue at the mid-buccal aspect, irrespective of the gingival biotype (6).





Figure 3. A) Fractured crown tooth #22; B) implant placed; C) 3 months post-operative

Sutures removed 2 weeks later and final prosthesis delivered after 8 weeks. Post-operative evaluation at 3 weeks and 2 years have shown near perfect pink esthetic score (PES) (7) from all the different aspects (Figure 2).

Case 2

A 57 year old male referred due to the fracture on the crown of tooth #22, because of the location of the fracture and crown to root ratio, tooth diagnosed as hopeless.

Tooth #22 extracted, curettage and irrigation done, osteotomy prepared and implant placed. Guided bone regeneration has done on the facial gap using xenograft. Referring to lack of primary stability, it has been decided to proceed with two stage approach (Figure 3).

4 months later, during the second stage surgery, a semi-lunar incision made at the crest and a vestibular incision made disto-apical of tooth #21. A sub-periosteal flap made toward the facial of the implant, CTG harvested from the tuberosity, transferred through the tunnel and got secured to the facial aspect of the implant with chromic gut suture (Figure 4).

Sutures removed after 2 weeks and final prosthesis delivered 6 weeks later. 18 month's post-operative evaluation presented the success of the therapy (Figure 5).

Case 3

A 43 year old female visited with the chief complaint of gum recession. Multiple unsuccessful attempts have been done to cover the attachment losses with restorative materials. All the restorative materials removed, considering an imaginary cemento-enamel junction (CEJ) based on the shapes of the crowns and comparison with contralateral arch. Tooth #25 found unrestorable due to severe caries.

Tooth #25 extracted, curettage and irrigation done, osteotomy site prepared and implant placed with 30N/cm primary stability. In order to enhance the soft tissue around implant as well as performing root coverage procedures, two vestibular incisions made on distal of #25 and distal of #21, sub-periosteal tunnel made, CTG harvested from the palate, shifted from the incisions toward the facial of teeth #21,22,23,24,26 and implant #25. Flap coronally advance using bonded sutures. Sutures stayed for 3 weeks then removed. Full crowns delivered 6 months after the surgery (Figure 6).

Post-operative evaluation one and half later showed complete root coverage over teeth and thick biotype soft tissue around the implant (Figure 7).

Discussion

To evaluate the available soft tissue, a clinician should take two important elements into consideration:

- 1- Quantity or the tissue biotype
- 2- Quality or the availability of keratinized tissue

A thin tissue biotype was identified as a risk factor for mucosal recession (7-11). In a review, Chen & Buser (12) reported that immediate implant placement in sites with a thin biotype had a higher frequency of recession of >1mm compared with sites with a thick biotype.

According to Nisapakultorn *et al.* (13), soft tissue biotype was the most significant factor in determining the buccal marginal mucosal level. Therefore, sites with a thin tissue biotype are at greater risk of mucosal recession compared with sites with a thick biotype.

One could speculate that the connective tissue thickness in the transmucosal area should be at least thicker than the inflammatory infiltrate induced by subgingival plaque or toothbrushing trauma. As the inflammatory infiltrate occupies an area of approximately 1-2mm, (14) a minimum soft tissue thickness of 2mm is advised to prevent soft tissue dehiscence at the implant-supported crown.





Figure 4. A) Semi-lunar incision; B) Vestibular incision; C) Sub-periosteal tunnel, D) CTG fixation



Figure 5. A) Peri-Operative; B) 18 months post-operative

In addition to biotype, it has been suggested that the keratinization of soft tissues may affect the implant stability (15-17).

In a retrospective clinical trial, Zigdon & Machtei (17) examined 63 functioning dental implants and found more recession in mucosa that was less keratinized. They concluded that these findings were of special importance in the aesthetic zone, where thin, narrow bands of keratinized tissue may lead to greater mucosal recession.

Similar results were found by Schrott *et al.* (16) while analyzing data from a five-year prospective multicenter trial. In patients maintaining good oral hygiene and receiving regular maintenance therapy, implants with a reduced width (<2mm) of peri-implant keratinized mucosa were more prone to buccal soft tissue recession over a period of five years.

Recently, Rocuzzo *et al.* (15) in a 10-year prospective comparative study, showed that implants not surrounded by keratinized tissue were more prone to plaque accumulation and mucosal recession than implants surrounded by keratinized tissues.

A systematic review and meta-analyses (18) investigating the effect of keratinized mucosa on implant health concluded that the absence of an adequate band of keratinized mucosa around endosseous implants was associated with greater

mucosal recession, as well as plaque accumulation, tissue inflammation, and loss of attachment.

In contrast, Bengazi *et al.* (19) evaluated the position of peri-implant soft tissue margins after the insertion of fixed prostheses and found that a lack of keratinized mucosa and greater mobility of the peri-implant soft tissues at the time of bridge installation were poor predictors of soft tissue recession occurring during the two years of follow-up.

Despite some discrepancy, most of the recent literature seems to indicate the presence of buccal keratinized tissue as a key factor in improvement of plaque control and minimization of mucosal recession at implant sites, even though the critical width of keratinized tissue value has not yet been clarified (5).

Moreover, another controversial issue would be the need for the surface keratinized tissue versus having a thick biotype without the surface keratinization. This is another question that should be answered.

Soft tissue grafting procedures are increasingly performed for a number of indications in conjunction with dental implant therapy (1). Major clinical indications include recession coverage, gain of keratinized tissue, and augmentation of soft tissue volume (20). These peri-implant plastic surgical procedures have been recommended to establish short-and long-term favorable biological, functional, and aesthetic outcomes.

Most studies assessing the use of a CTG in combination with immediate single implant placement and provisionalization are case series. They concluded that a connective tissue grafting procedure, with proper 3D implant positioning and bone grafting of the implant-socket gap, can minimize mid-buccal mucosa recession (21).

The yet performed RCTs showed that a CTG resulted in fewer mid buccal marginal level changes also showed a better Pink Esthetic Score when applying a CTG (22).





Figure 6. A) Hopeless #25 and attachment loss on #22,23,24,26; B) Restorative materials removed; C) #25 extracted and implant placed; D) VISTA technique applied and CTG harvested and adapted to the site; E) Flap coronally advanced using bonded sutures; F) 3 weeks post-operative; G) 6 months post-operative; H) 18 months later

The minimally invasive VISTA approach along with CTG has a number of advantages for the soft tissue enhancement around dental implants. The vertical incision that is located in a far zone to the targeted area reduces the possibility of traumatizing the marginal mucosa. Additionally subperiosteal dissection reduces the tension of the mucosal margin during coronal advancement and maintaining blood supply to interdental papillae and maintaining the anatomical integrity of the interdental papillae by avoiding papillary reflection (2).

In VISTA technique, coronal advancement of the margin with augmented membrane or graft and securing the gingival margin in fixed stable position to prevent relapse in earlier stage of healing gives better results. This rigid fixation of the mucosal margins introduced with the present coronally anchored suturing technique minimizes micromotion of the regenerative site (2).

An important technical difference between the VISTA and other tunneling approaches and more classical techniques of soft tissue augmentation is the degree of coronal advancement of the mucosal margin advocated during the procedure (2).



Figure 7. A) Pre-operative; B) 18 month post-operative

Conclusion

An array of treatment options exists for soft tissue regeneration and enhancement around dental implants specially in the aesthetic zone. Inferior aesthetic outcome could impact our patients in many different aspects such as social problem along with biological issues.

Vestibular incision sub-periosteal tunnel access technique is a viable technique for soft tissue enhancement around dental implants specially in the aesthetic zone where both the quality and quantity of the soft tissue play an important role for the long term prognosis of the implants.

In this approach, the fact that the initial vestibular incision placed in a remote area from the targeted implant, prevent the excessive manipulation of the marginal mucosa as the most critical area which results in less inflammation at this site. Also the application of bonded sutures- if possible- will secure the graft and minimize the micromovement which result in a superior healing.

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