Masterclass in Clinical Practice

Dental Implants

with

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Two stage implant placement: Exposure and management of soft tissues for optimal aesthetics and function.

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Introduction

Although two stage implant placement is now the exception and not the rule, it remains a protocol that is essential when:

- no primary stability is possible at time of implant placement,
- dentures are placed and implants need to be protected during the integration period,
- contour/bone augmentation is done at time of implant placement,
- and in patients where healing may be impaired and extended healing periods may be required.

The techniques for implant exposure are however identical to doing a one stage implant placement and surgical procedures for development of ideal soft tissue contours therefore apply to both, two and one stage implant surgery. The moment you place the healing abutment, tissue will need to be developed to obtain the optimum tissue contour.

The techniques we will cover in this Masterclass apply to both maxilla and mandible implant placement but are more important within the anterior maxilla where aesthetic demands are higher and the need for soft tissue development crucial for success.[1] It is not enough to achieve integration of the implant without ideal soft tissue contours.

Few cases will have enough volume of fixed gingiva for a stable result and soft tissue development will be necessary for most. This can be achieved with or without the introduction of additional soft tissue through grafting. Most cases have only a slight bone and/or soft tissue defect on the facial aspect and often a small modification to the standard exposure/placement procedure is all that is required to fix this.

We will re-visit the importance of fixed gingiva around implants as this dictate what techniques we use for exposure or placement and will be of great importance not only in the aesthetic outcome but also the functional success.[1, 2]

Although the punch-exposure technique was popular many years ago, it is our believe that no situation justifies discarding soft tissue when exposing or placing single or multiple implants within the anterior maxilla so we do not recommend that, but will briefly cover it.

The standard healing abutment is round which does not conform to the shape of a tooth. In the past we had to customize healing abutments to shape the gingiva in a correct manner to mimic tooth anatomy in the transgingival zone, especially important in the anterior maxilla. A welcome new development is the anatomical healing abutments that are available now. A tooth is very rarely round like most healing abutments, and in the anterior maxilla, a triangular shape is a valuable tool in creating the correct anatomy after exposure or placement of implant (Figure 1).

The video demonstrates advanced surgical procedures as well as some more basic procedures.

Importance of keratinized tissue around implants

Soft tissue management around dental implants has become an inevitable topic in contemporary implant dentistry. The importance of soft tissue stability is essential toward achieving satisfying functional

Figure 1: Triangular shape of the gingiva opening for the lateral incisor. Notice the flat facial surface which shows a correct anatomical shape for the tooth, which the round healing abutment will not provide. On the right is a commercially available anatomically shaped healing abutment (Megagen®, Seoul, Korea)

Figure 2: Mid-crestal full thickness incision (indicated by yellow lines) should ideally be in middle of implant (indicated by darker circle), connecting with intra-sulcular incision, but also trying to place enough keratinized tissue on buccal aspect of future tooth as a priority.

Figure 3: Mid-crestal H-shaped full-thickness incision with a slightly diverging lines buccal. This is done when a mid-crestal incision is required but the papillae adjacent to implant are ideal and should therefore not be included in the incision. If the incision is planned correctly, sutures may not be necessary as the healing abutment will hold the small buccal and palatal flaps up and the gingiva will form around the shape of the healing abutment. This is where anatomical healing abutments with a triangular shape rather than round will be more effective in creating a correct gingival contour.

and aesthetic outcome long-term. Furthermore, stable soft tissue around dental implants is important for appropriate maintenance of oral hygiene. So, the question raised is how to properly manage soft tissues and achieve long-term stability.

Unlike natural dentition, soft tissues around dental implants provide less of an anatomical barrier due to lack of inserting fibres attaching to the implant/abutment. This results in absence of seal between transmucosal part of the implant and oral environment, especially in case of mobile alveolar mucosa. Thus, the importance of having the sufficient keratinized tissue around the implant has been stressed in several studies.[3, 4, 5] The increased biofilm accumulation, greater patient discomfort, mucosal recession, and an increased risk for developing peri-implant diseases are all associated with lack of keratinized tissue width around dental implants.[5, 6]

Therefore, certain soft tissue augmentation procedures were proposed to increase the amount of keratinized tissue, which was well explained in one of the previous Master Class articles by Andre van Zyl and Inus Snyman *(The importance of keratinized tissue around dental implants. Vol 12 No. 4. International Dentistry - African Edition)*. In this article, we deal with different dental implant exposure techniques, which may itself contribute in keratinized tissue build-up, without need for further procedures.

Available techniques in the second stage dental implant surgery

Implant exposure procedures are case sensitive, skill demanding and require meticulous planing to preserve or improve the soft tissue architecture and can greatly influence the outcome, especially in the aesthetic zone. Implant exposure techniques can be divided into excisional and incisional depending on the characteristics of the soft tissue overlying the implant.

Excisional techniques

In cases with enough keratinized tissue, thick gingival biotype, and optimal implant positioning; less demanding excisional techniques can be employed to remove and even discard tissue above the dental implant:

• *Benhart's minimal invasive technique*

This describes a minimally invasive technique performed with one vertical incision on the crest overlying the implant, followed with round incision about 1-3 mm to mark the tissue to be excised. Next, a blunt instrument is used for stretching the tissue to remove the cover screw and placement of healing abutment.[7]

• *The keyhole access expansion technique*

The following procedure starts with the excision of a small portion of soft tissue above the implant, followed by firmly stretching the hole using a micro-periosteal elevator like the Buser or smaller dissecting instrument such as a micro-raspatory for few minutes. Eventually, the opening will enlarge sufficiently to access the cover screw and replace it with healing abutment. The advantages of this procedure are minimal soft tissue trauma, minimal bone exposure and straightforward performance.[8] Care should be taken not to overstretch the soft tissue with the healing abutment as this may lead to necrosis.

Figure 4: When a healing abutment is placed with a mid-crestal incision- the gaps between the facial and lingual flaps cannot be closed without modification of the incision. By performing the Palacci flap- two small finger flaps can be mobilised as shown in yellow and flaps moved into the embrasure spaces as shown by blue and red arrows. This will then fill the void, protect the underlying bone, and provide soft tissue for interdental papillae.

Figure 5: The Palacci flap has been mobilized and the flap will be moved towards the embrasure space as shown by yellow arrow. On the right image the buccal finger flap has been moved towards the embrasure space and fills the space completely.

Figure 6: Final suturing with embrasure spaces filled with the finger flaps and no open spaces interdentally. This type of flap can only be done if enough width of gingiva is available.

• Simple soft tissue punching and laser trimming

Soft tissue punching implies the circular excision of keratinised mucosa over the implant using either scalpel, tissue punch, diamond bur or laser. Even though considered as an easy-going procedure, it must be noted that it is a blind and a skill sensitive procedure. Inadequate performance of excision could jeopardize the labial contour and cause unnecessary loss of keratinized mucosa, resulting in aesthetic failure.

Incisional technics

Incisional techniques could be subdivided into ones with or without tissue transfer. So called "non-transfer" incisional techniques are very simple, usually consisting of "X" or "+" incisions over the cover screw. Typically, a small crestal incision is done to identify underlying implant, afterwards a cross type incision is added to allow placement of the healing abutment. These techniques can be utilized only if enough keratinized tissue is available. On the other side, incisional techniques with tissue transfer are generally more demanding, requiring use of micro-instruments and a skilled practitioner.

We will go through some of them:

• Mid-crestal incision with and without Palacci flap (Finger flaps)

Mid-crestal incisional technique itself is probably the most used technique for implant exposure/placement (Figures 2-3).

It comprises of slightly palatal/lingual positioned crestal incision that continues with small buccal releasing incisions (if needed) and elevation of full thickness flap. Placing the healing abutment, will push soft tissue toward buccal direction, resulting in bulkier look of soft tissues. Palacci and Nowzari[9] introduced a modification of this technique to restore papilla like tissue around implants. This involves a small semilunar bevelled incision on the buccal side recreating a scalloped shape mimicking gingival contour around the natural tooth. This way, a small pedicled finger flap is prepared and then rotated to fill the inter-implant or implant-tooth gaps and sutured in place (Figures 4-6).

• U-shape exposure with a roll-in flap

The roll-in flap is essentially a u-shaped incision with the attached part on the buccal side (Figures 7-9). The video demonstrates two roll-in exposures. The procedure itself is very simple and easy to perform but removing the epithelium from the part to be rolled in is the important skill. On the one hand the full thickness of epithelium should be removed and on the other not too much tissue must be removed that will thin the flap and destroy valuable connective tissue below the epithelium.

Grafting new tissue into the implant site at time of exposure or placement of implants

• The vascularized inter-positional periosteal connective tissue (VIP-CT) flap / Pedicle graft from palate for extra tissue around maxillary implants:

The VIP-CT graft from palate was described by Anthony Sclar in 2003 and his textbook gives an excellent description of the technique.[10] Even though the book is now more than 20 years old, it is still an excellent guide on how to perform this surgery. The VIP-CT requires surgical skill which is outside the scope of undergraduate training. Postgraduate surgical training and/or surgical experience is required

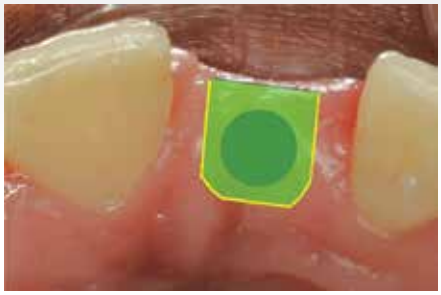

Figure 7: U-shape full-thickness incision is outlined in yellow and the part that will be de-epithelialized is in green. Always try to visualize the position of the implant as depicted with the darker circle. The small flap will be folded in on the black line shown buccal.

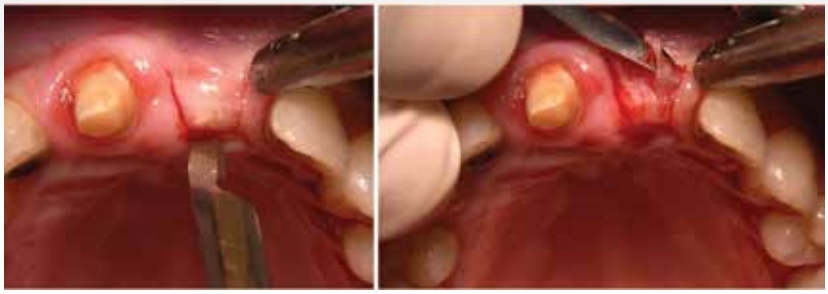

Figure 8: U-shape exposure outline is cut full thickness on the left with the epithelium dissected off on the right image. Note the bleeding surface when epithelium is removed. The incision is always larger than implant diameter as the healing abutment will be of a larger diameter than implant- thereby filling the opening completely.

Figure 9: The u-shape has been flipped in and shows a slight convexity where previous there was a concavity. Two single sutures are enough in most cases to hold the flap in position as shown on the right.

as complications during and after the procedure may be expected. This graft has excellent blood supply as it remains attached to the palate through a pedicle. This allows for the tissue to be placed around implants with low risk for necrosis. In the video a case is demonstrated where a VIP-CT is taken from palate to augment tissue between 2 central implants.

- ***Connective tissue graft to enhance soft tissue contour during implant exposure/placement***

When exposing or placing an implant in the anterior maxilla, a small defect can be augmented by harvesting a connective graft immediately adjacent to the implant site in the palate. This area is already anaesthetized when placing or exposing the implant and a graft can be harvested as shown in the video. A pouch is prepared in a similar manner as for the roll-in flap. The stabilizing suture is placed from buccal into the pouch and through the free connective tissue graft, whereafter it is placed from within the pouch back through the buccal tissue and the graft pulled into the pouch. Closing sutures are then placed to attach the buccal flap to palatal as seen in the video.

- ***Epithelialized palatal graft for papillae augmentation***

This graft is taken from the retro-molar area in maxilla or alternatively from hard palate soft tissue. As this is a free graft, it has the risk of necrosis and should be used with caution. In the video a case is shown of using this graft to augment inter-implant papillae, similar to the VIP-CT case. The inter-implant distance is important as the blood supply of the inter-implant bone is the major source of blood supply to the graft. Implants do not have periodontal ligament blood supply- which is a major blood supply around natural teeth. This means the graft may slough due to inadequate blood supply. The graft should be placed in the recipient site as fast as possible to minimize the time it is disconnected from its blood supply. The graft will fail if a blood clot forms between the recipient bed and the graft or if the graft is moved in the first 2 days. The graft is fed with plasma circulation in the first

few days so close adaptation is necessary between graft and the underlying bone. Sutures are important in keeping the graft tightly adapted to the underlying bone. A liquid diet is recommended during the 1st 2 weeks post-operative to prevent movement of graft during mastication.

Clinical Tip: The graft should show signs of pink/purple areas within 7-10 days. If it has a white uniform colour, it may indicate a dead graft that has failed. This may be accompanied by pain.

Conclusion

The goal in the second stage dental implant surgery should not be only the simple exposure of the implant surface to get access for consecutive prosthodontic procedure, but also to create healthy fixed gingiva around dental implants. In cases with unfavorable soft tissue conditions, implant exposure procedures can be used to change the soft tissue situation and stabilise the soft tissue support for the implant/s and provide long-term stability. Once again, preoperative planning of each individual case is crucial to get satisfactory results. Several factors should be considered, including implant positioning, gingival biotype and the presence and width of keratinized tissue. The location of the surgical site (anterior or posterior) also determines an appropriate exposure technique. The implant exposure procedures, especially incisional techniques with transfer or grafting new tissues, requires postgraduate training and specific surgical instruments. Many dentists perform dental implant surgery but a self-assessment is recommended to determine your skills and more complex cases should be reffered to a specialist. The ITI SAC classification tool may help in this decision tree process.

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