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SOFT TISSUE AUGMENTATION AROUND DENTAL IMPLANT

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Abstract
This method can potentially be used to correct and enhance soft tissue quality around any implant. Further research involving histological analysis is going to be required to compare types of implant site augmentation, to verify what is truly the best method. (Tavelli et al.2021)
The aim of this paper is to present a clinical method to augment the buccal soft tissue contour around a maxillary anterior implant. This technique involves a rotated split-thickness flap to create a buccal shelf of keratinized tissue which is then covered with an acellular dermal matrix allograft. This can lead to more predictable tissue thickness and aesthetic results in the maxillary anterior region. A case report is used to demonstrate this method.
In pursuit of satisfactory aesthetic results in implant dentistry, the soft tissue surrounding an implant-supported crown must be given ample consideration. Many approaches towards augmenting the peri-implant soft tissue have been discussed in the dental literature. They range from the use of specially designed implant healing abutments to the complete surgical creation of a soft tissue bed utilizing subepithelial connective tissue grafts.

Keywords: Dental implants, soft tissue augmentation, aesthetic outcomes, stability, success

1. Introduction
Each of these categories will be discussed as they pertain to each specific procedure mentioned in the subsequent sections of this article.
(i) Provisionalization - whether or not the procedure results in a visible change in the mucosa. (ii) Soft tissue grafting source - autogenous, allogeneic, xenogeneic, synthetic. (iii) Type of procedure - edentulous site preparation, onlay graft, subepithelial connective tissue graft, free gingival graft, pedicle graft. (iv) Relationship to the implant - procedures to augment tissue can be done when placing the implant, at second stage surgery, at abutment placement, or around an already functioning restoration. (v) Necessity of membrane barrier - some procedures require a membrane to be placed over the graft, others don't. (Fickl et al.2021)

The plethora of procedures which can be used to augment soft tissue at dental implant sites can be quite confusing to the clinician who is trying to determine the best way to help their patient. The various procedures can be categorized based on the following: (Chai et al., 2020)
Dental implants are a highly predictable and successful therapy for the replacement of missing teeth. However, esthetic and functional outcomes of implant-supported restorations are predicated on the presence of adequate volume and type of peri-implant tissues. Soft tissue augmentation around dental implants often requires a combination of procedures aimed at achieving the proper architecture, i.e., width and height of keratinized tissue and the zone of attached tissue. Frequently, clinicians are confronted with the absence of adequate attached and keratinized tissue in esthetically demanding areas. In the past, soft tissue defects of this nature often resulted in compromised esthetic outcomes. Recently, patient and professional demands for predictable esthetic outcomes have placed greater emphasis on procedures to augment soft tissues at dental implant sites. This has led to the development of myriad soft tissue augmentation procedures which can be done alone or in combination with hard tissue augmentation. The aim of this article is to provide an overview of various soft tissue augmentation procedures which can be done around dental implants. It is intended to be a helpful resource for clinicians who are interested in learning about these procedures and for patients who are considering this type of therapy. (Avila-Ortiz et al.2023)

2. Importance of Soft Tissue Augmentation

This section reviews the 'Natural Contours' and outlines the biological width and its importance in the seal between the transmucosal aspect of the implant and the overlying restoration. Changes in the crestal bone profile due to endosseous implants will lead to an alteration of the soft tissue contours over the underlying bony support. The primary and secondary gingival contours could be lost and the symmetry of the papillae between teeth be disrupted. Flaring or recession of the soft tissue margin often occurs when an implant is restored with a crown, veneer or fixed partial denture. With the current practice of using submerged healing and uncovering procedures, it is almost impossible to maintain the contours of the pre-treatment soft tissue because the tissue is displaced or lost during the first uncovering procedure. Thus, the clinician is faced with the dilemma of achieving the original gingival contours. If success is achieved, only a mild amount of success, the clinician is faced with the fact that bisque try-in to assess the emergence profile, and subsequent changes in prosthetic designs will cause the soft tissue to be displaced and recovered again. The maintenance of the papillae is an important consideration to the clinician. Ideal soft tissue contours provide positive contact areas which are essential for favourable long term prognosis of the implant restoration. It has been shown that a deficient amount of interproximal gingiva can lead to food impaction, resulting in loss of bone support and/or ceramic fractures around the edges of the restoration. (Gracis et al., 2023)

3. Techniques for Soft Tissue Augmentation

3.1. Free gingival grafts Similar to the situation for augmentation of soft tissues surrounding teeth, free gingival grafting can be considered the most straightforward means of increasing the thickness of keratinized tissue. The disadvantages of creating a second surgical site and the unpredictable graft survival in areas of high shear stress may be somewhat offset by the relatively low morbidity for the patient and the minimal difficulty for the clinician. Roccuzzo et al observed an increase in buccal soft tissue thickness over submerged dental implants using free gingival grafts harvested from the patient's palate. The procedure was effective in increasing buccal mucosa thickness; however, the color of the grafted tissue more closely resembled that of palatal mucosa. (Abou-Arraj et al.2020)
Soft tissue grafting has been described as a technique that is considered to be somewhat unpredictable in that the quality of the results can vary from poor to excellent. There is much truth to this assertion with regards to specific techniques used and the many pitfalls encountered in attempting to augment peri-implant soft tissues. Techniques for soft tissue augmentation are numerous and varied. Each has its own set of advantages and disadvantages as well as a specific clinical niche in which it could be considered the most appropriate means of treatment. Although a specific technique has not been proven to be superior in all clinical situations, use of a connective tissue graft to augment peri-implant

soft tissues has been suggested as a technique with high predictability for root coverage procedures. The summary that follows will give a brief outline of various techniques which can be utilized for soft tissue augmentation around dental implants.

4. Complications and Risk Factors

Implant fixation, it is difficult for additional implant placement in the vicinity, as the second implant placed may interfere with the path of final prosthesis. If the second implant is required to be placed, this is not only costly, but increases the treatment time and can be easily avoided if initial implant placement and RST was adequate. This then leads to the problem of try to replace an implant in a new site after failure due to inadequate RST. It has been shown that the success rate of a second implant placed in the same sites as failed implants is less that when the same implant site is used. This is thought to due the fact that the RST at the attempt site was inadequate and there will be minimal bone growth after removal of the failed implant. Placement of the second implant in a new site can cause damage to the labial plate during attempted entry of the implant, due to lack of reference point and bone thinning after the first implant placement. This is problematic in terms of both functional and aesthetic considerations. Finally, if implant therapy has caused dehiscence or fenestration of the labial plate of bone, it is extremely difficult to correct this defect with guided bone regeneration or other surgical procedures, and this can affect the overall success of an implant. All these factors can mean that additional surgery or implant placement has unsatisfactory results and can further complicate the situation for both the clinician and patient. (Oh et al., 2020)

5. Future Perspectives

It is accepted and understood that the ideal method to managing soft tissue after tooth loss is to prevent its recession. Especially during the first 12 months after extraction, 50% or more of the labial plate thickness can be lost on the maxillary anterior teeth making the requirement for any further augmentation techniques any more complex. From GBR to free soft tissue grafting, these methods are aim to compensate for this loss and GBR is already proving to be very successful when used with immediate post-extraction implants. From the previous section we have learned that allogenic/alloplastic membrane barriers and connective tissue grafts seem to be the most effective means by which to revive the labial aspects of the ridge. If the rationale of GBR is to maintain as much space as possible underneath the membrane in order to enhance bone formation, whilst hinder epithelial migration in the coronal direction, it is now apparent that the soft tissue generally will follow the respective increase in bone volume. By using GBR methods alone, healing with significant bone gain on the labial aspect can still result in a compromised ridge form due to lack of adequate soft tissue support, and with the majority of implant cases this leaves an aesthetically undesirable result. 61 As previously discussed, the use of soft tissue grafts (predominantly autogenous) can be utilised simultaneously or after GBR procedures to potentially increase the rate and amount of bone formation, specifically where the intent is to build up both hard and soft tissue for future implant placement. This has been seen again in animal studies, using various grafts to attempt to grow thicker and a more dense band of tissue before placing the implant. (Thoma et al.2022)

6 conclusions

•6.5 Dissemination of Information •It is clear that many studies on bone and implant outcomes are not providing details of the subsequent soft tissue dimensions around teeth and implants and therefore further work needs to be done to collaborate hard and soft tissue outcomes. (Monje et al.2023)

•6.4 Clinical implications •This review highlights the need for careful 3-dimensional planning or implant placement and possibly delayed loading where the thickness of facial mucosal tissue is at risk. (Jensen et al.2023)

•6.3 Future research •The issues raised in this review need to be addressed in future research in order to improve soft tissue outcomes around implants.

•6.2 Unanswered questions •A number of points are raised in this review in relation to the effects of tissue thickness and the types of membrane on guided bone regeneration and their effects on the resulting soft tissues around dental implants.
•6.1 Gaps in current knowledge •The current evidence suggests that due to the unpredictable nature of mucosal tissue.

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