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REVIEW ARTICLE

PERIO ESTHETICS: AN INSIGHT INTO AN IMPLANT DENTISTRY

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ABSTRACT

Morphology of the peri implant soft tissue adjacent the implant component plays a pivotal role in displaying the implant esthetics. Creating an implant restoration that cannot be distinguished from the rest of the natural dentition is the ultimate goal. The ability to preserve the architecture, modify and even improve the soft tissue contours lies in the hands of the periodontists and greatly influence the overall restorative result. The main approach of the periodontist is to establish and accomplish natural soft tissue dimensional architecture without formation of any scar tissue on labial gingival interface and most importantly preserve the interproximal papillae. There are various innovative methods for promoting and preserving the soft tissue profile around the implants. Second stage surgery should be given emphasis and not just thought as a process of uncovering the coverscrew. A whole lot can be done and is an excellent opportunity to give finesse to the soft tissue profiling around implant components. Implant therapy Specially in the anterior maxilla is challenging for the clinician because of the esthetic demands of patients and difficult pre-existing anatomy

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INTRODUCTION

Four potential time points can be differentiated for soft/hard tissue management at the time of implant placement, during healing of the implant, during second stage surgery, and finally at the maintenance phase. The treatment goals of second stage surgery in esthetic zone would include: preservation of the continuity of the keratinized tissue band, avoiding creation of tissue margins that are defective, creating an implant supported restoration that have symmetric contours, post operative stable soft tissue contours.

The factors that would prove critical in predicting the final outcome of the peri implant esthetics would include

- Blood supply for the viability and undisturbed wound healing.(Berglundh *et al.,* 1994)
- Optimal implant positioning especially the axial orientation that would influence the distance from the contact point to the osseous crest. (Gastaldo *et al.*, 2004)
- Tissue biotype which influence the post operative response to trauma. (Gastaldo *et al.*, 2004)
- Platform switching favours biological width development and minimizing the post operative resorption and most importantly optimal distance between the implants and the implant and natural tooth. (Pradeep *et al.*, 2006)

Ever since implants have been used as a treatment option for replacement of missing natural teeth, its results have found to be successful both in term of stability and esthetic outcomes. However, when tooth loss is accompanied by soft tissue and bone loss, it often requires augmentation of the peri‑implant soft tissue or bony site either before or after the placement of the implant.

Ideal requirements for esthetic treatment outcome

Patient's smile line

In an average smile, 75‑100% of the maxillary incisors and the interproximal gingiva are displayed. A high smile line poses considerable challenges when planning for implant supported restorations in the esthetic zone because the restoration and gingival tissues are completely displayed. The low smile line is a less critical situation because the implant restoration interface will be hidden behind the upper lip.

Tooth position

The tooth needs to be evaluated in three planes of space before it is extracted: Apico coronal, faciolingual and mesiodistal. If

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there is a tooth with hopeless prognosis positioned ideally or apically and this is extracted, the gingival margin is likely to migrate apically. A tooth positioned too far facially, often results in very thin or non-existent labial bone. A tooth positioned more lingually would benefit from the presence of an increased amount of facial bone.

Root position of the adjacent teeth

Teeth with root proximity also possess very little interproximal bone; this thin bone creates a greater risk of lateral resorption which will decrease the vertical bone height after extraction or implant placement. In the anterior area of the mouth, the clinician is often confronted with tissue deficiencies caused by various conditions. These conditions can be divided into 2 categories: anatomic and pathologic.

Biotype of the periodontium and tooth shape

Two different periodontal biotypes have been described in relation to the morphology of the interdental papilla and the osseous architecture: The thin scalloped periodontium and the thick flat periodontium. A thick soft tissue biotype is a desirable characteristic that will positively affect the esthetic outcome of an implant – supported restoration because since it is more resistant to mechanical and surgical insults, it is less susceptible to mucosal recession and has more volume for prosthetic manipulation.

The bone anatomy at the implant site

For successful esthetic restoration of implants, the bony housing must have a three dimensional configuration that permits placement of an implant in a restoratively ideal position. Two anatomic structures are important in determining predictability of soft tissues after implant placement. The first is the height and thickness of the facial bony wall and the second is the bone height of the alveolar crest in the interproximal areas.

Height and thickness of facial bony wall

Kois *et al.*., in a survey of 100 patients, classified patients as having high, normal or low crests. This was based on the vertical distance of the osseous crest to the free gingival margin. The greater the distance from the osseous crest to the free gingival margin the greater the risk of tissue loss after an invasive procedure.

Height of bony crest in the interproximal area

The interproximal bony crest plays a critical role in the presence or absence of peri-implant papillae. When the contact point to the bone was 3-5 mm, papilla always filled the space.

Optimal implant positioning

The position, in which the implant is placed, is of utmost importance and the implant should be thought of as an extension of the clinical crown into the alveolar bone. The successful implant surgeon working in the esthetic zone should have a good biologic understanding of tissue response to implant placement, a thorough surgical education enabling performance of precise and low-trauma surgical procedures, and a large patient pool providing sufficient surgical experience with esthetic implant placement (Dhaded *et al.*, 2014). Tissue deficiencies often require bone augmentation procedures such as the guided bone regeneration (GBR) technique, which uses a simultaneous or staged approach to regenerate adequate volumes of bone to allow for implant placement. Soft tissue handling, precise implant placement in a restorative - driven 3-dimensional approach, and follow-up procedures represent a variety of challenges for the implant surgeon (Dhaded *et al.*, 2014).

Objective criteria for dental esthetics and the implant scenario

- Gingival health
- Gingival zenith
- Interdental closure
- Interdental contact location
- Tooth axis
- Basic features to tooth form
- Relative tooth form
- Relative tooth dimension
- Tooth characterization
- Surface texture
- Color
- Incisal edge configuration
- Lower lip line
- Smile symmetry
- Midline and occlusal plane orientation.

At least four factors affect the gingival zenith. First is the relative location of the tissues to the planned gingival zenith. Second is the depth of the dental implant placement. Third is the response of the buccal bone and mucosa to the implant

procedure and components. Fourth is the prosthodontic management of the gingival zenith architecture. The location of the gingival zenith should be symmetrical with the contralateral tooth and in harmony with the adjacent teeth

Factors controlling Buccal Periimplant tissues

- Initial presentation (Seibert classification)
- Implant position capability (relative to planned gingival zenith)
- Bone formation and resorption at the implant
- Peri-implant mucosa integration
- Character of the implant abutment interface
- Inflammation
- Local factors (plaque, etc.)
- Patient factors (biotype)
- Abutment form
- Submucosal contour of the provisional crown
- Bone modeling/remodeling
- Potential adjacent tooth eruption

The first classification of ridge deficiency was proposed by in 1983 (Seibert, 1983) and later modified 1985. (Allen, 1985) Seibert divided ridge deficiencies into three classes, with a Class I defect describing the apico coronal loss of ridge contour, Class II, buccolingual, and Class III, a combined loss of both apico coronal and bucco‑lingual dimensions. Allen further quantified the loss of ridgedimension into mild (3 mm), moderate (3-6 mm) and severe (6 mm). The Palacci‑Ericsson classification system divides implant sites into four classes according to the vertical and horizontal dimensions of tissue loss, respectively. (Palacci‑Ericsson *et al.*, 2001)

Vertical loss

Class I: Intact or slightly reduced papillae;
Class II: Limited loss of papillae (less than 50%);
Class III: Severe loss of papillae; and
Class IV: Absence of papillae (edentulous ridge).

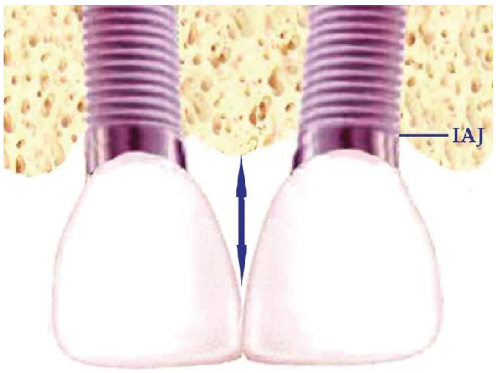
Horizontal loss

Class A: Intact or slightly reduced buccal tissues;
Class B: Limited loss of buccal tissues;
Class C: Severe loss of buccal tissues; and
Class D: Extreme loss of buccal tissue, often with a limited amount of attached mucosa.

Interdental papilla height

Simultaneous removal of multiple adjacent teeth in the anterior maxilla leads to a labial bony plate collapse as well as a flattening of the interproximal bony scallop, resulting in implant restorations with missing interimplant papillae. It is well known that bone resorption and soft tissue retraction occur following tooth extraction (Carlsson GE). Systematic reviews demonstrate that the alveolar ridge undergoes a mean horizontal reduction of 3.8 mm and a meanvertical reduction of 1.24 mm within 6 months after tooth extraction (Hämmerle CH, 2012). Immediate implant placement alone does not prevent bone remodeling and bone resorption, 3 and clinical trials have focused on soft tissue recession that may occur after immediate placement.(Kan *et al.*, 2003) While the use of nonresorbable xenograft biomaterial may partially compensate buccal bone resorption,6-8 bone peak loss between two implants is not prevented (Nevins, 2006).

When the distance between two implants is less than 3 mm, development of a normal papilla is impaired and bone resorption may occur. (Tarnow, 2000) In situations where sufficient space for a papilla is present, a maximum of 3.5 mm papilla height is achieved. Any more ambitiousapproach of papilla preservation or papilla creation between two implants is at high risk of failure. On the other hand, in case of a single tooth replacement, the papilla level can be maintained by the proximal periodontium (bone and soft tissue) of the adjacent teeth (Choquet *et al.* 2010).



The use of remaining roots was widely implemented during the 1970s to restrain bone crest resorption. After 10 years of observation, submerged roots have maintained the alveolar process under removable prosthesis (Howell, 1970). Formation of a new attachment may occur over submerged sectioned teeth (root submergence technique, RST. (Bowers, 1989) In a periodontally healthy patient, the volume of the buccal tissue can be stabilized and esthetics can be maintained by using bone substitutes and connective tissue grafting, although no technique can guarantee the preservation of a papilla bone peak between two implants. Within the esthetic zone, it is a challenge to restore two adjacent implants. Success is not predictable due to a high risk of failure, especially at the papilla level. (Kan, 2009) The concept of the socket-shield technique, in the esthetic zone, to obtain a predictable result in implant therapy is well known. The authors' proposed approach was the retention of the buccal root fragment of an extracted tooth in combination with immediate implant placement. This approach allowed the buccal cortical bone to be successfully preserved.

Soft Tissue considerations

The functional and esthetic success of implant treatment depend not only on the quality of the restoration but also on the final aspect of the contour and stability of the marginal gingiva and the proximal papilla in harmony with the adjacent teeth (Rompen *et al.*, 2003). Gingival biotype also plays an important role in tissue levels achieved around implants, therefore these graft can enhance gingival margin stability and improve tissue management throughout the restorative treatment phase. An adequate zone of attached gingiva may also be necessary around implants to conceal the implant collar

and the abutment / restoration interface interproximally (Saadoun and Touati, 2007). Soft tissue grafting can be one of the treatment of choices for thickening implant tissues at implant placement, to treat gingival recession and augment the keratinized gingiva. Autogenous and allografting material have been used to augment the gingival dimensions. A connective tissue graft, a thick biotype with large amount of attached keratinized gingiva is treatment of choice in many cases for treating gingival recession or for thickening periimplant tissues around implant (Langer, 1985). A thick biotype with a large amount of attached keratinized gingiva will have greater resistance to traumatic or inflammatory recession, whereas a thin biotype is more susceptible to periimplant recession induced by the resorption of the thin labial cortical plate. The use of connective tissue graft converts a thin gingival biotype into a thick one. (Saadoun *et al.*, 2004)

Hard tissue consideration

Autologous bone augmentation to rebuild compromised alveolar ridge contour prior to implant placement allows for favorable three-dimensional implant positioning to achieve optimum implant esthetics. The buccal cortical plate of the alveolar process may be resorbed after or even prior to tooth extraction due to inflammatory disease or trauma. Consequently, bone augmentation procedures to rebuild deficient ridge contours are mandatory to enable dental implant placement (Von Arx and Buser, 2006). Autogenous bone still represents the gold standard in ridge augmentation procedures and can be harvested either intraorally from the chin, mandibular ramus and maxillary tuberosity or extraorally from the iliac crest. (Cordaro, 2002)

It is well established that peri-implant soft tissue appearance is dependent upon the underlying bone topography (Bianchi & Sanfilippo 2004) and that the shape of buccal bone defects has an influence on the development of gingival recession (Kan *et al.*. 2007). Sufficient bone volume, favorable threedimensional implant positioning, and stable peri-implant soft tissue conditions are considered prerequisites to achieve long-term implant esthetics (Buser *et al.*. 2004; Grunder *et al.*. 2005; Chen and Buser 2009). This surrounding framework of hard and soft tissues must either be preserved at the time of extraction or subsequently regenerated so that the implant‐supported restoration emerges out of the gingival tissue similar to that of an adjacent natural tooth. Healing abutments guide the healing of the soft tissue in the desired form after placement of the implant in single‐stage surgical protocols or after implants have been uncovered in two‐stage surgical protocols (Misch, 1993).

Prosthetic consideration

A customized Healing abutment is mandatory to create an optimum Gingival architecture. Gingival aesthetics become more critical in patients who have a high lip line or a gummy smile. As every anterior maxillary tooth is unique, prefabricated healing abutments are unlikely to yield an ideal result in terms of tissue support and guided soft tissue healing. Despite their efficacy, it is often impossible for any prefabricated healing abutment system to compensate for the infinite variations in gingival topography that maybe encountered intraorally. When an impression is obtained at the initial placement of the implant, a better control over gingival contour is observed, making the restorative procedures more predictable. A customized healing abutment fabricated on the cast thus obtained helps in shaping the peri‐implant tissues in a natural contour (Biggs, 2001).

The impression coping should have the same gingival dimensions as the healing abutment so that there is no gap between the impression coping and the walls of the gingival cuff.(Lazzara, 1993). The fabrication of a customized impression coping is not time intensive but is critical to the final aesthetic outcome, as it allows the exact transfer of soft tissue architecture that has remodelled around thecustomized healing abutment (Harshakumar, 2013). The pink drape forms an important esthetic component in surgical reconstructive dentistry and in implant dentistry in particular. A perfectly osseointegrated implant restoration with ideally matched shade may still be unesthetic if gingival esthetics are marred by recession or change in color. Preoperative assessment of gingival biotype, "thin" or "thick," is commonly considered to be an important parameter for esthetic success or failure (Stanford, 2005). The visual distinction between "thick" and "thin" biotype is difficult to make and subject to interpretation. As a consequence, it may not be a suitable predictive parameter of the esthetic outcome of implant restorative and surgical procedures. However, the quantitative assessment of crown dimensions can be performed more reliably and could become a future norm to predict outcomes of implant restorative and surgical procedures (Patil, 2013).

Conclusion

The implantological rehabilitation of the esthetic zone is one of the most demanding and Complex treatments due to the necessity to obtain an optimum esthetic result. The peri-implant health is primarily determined by the sound crestal bone levels, and the associating biological factors responsible for the soft tissue health, i.e factors governing the gingival margin health, peri-implant papilla and ascorrectly said by the of the 3rd European workshop on periodontology and implant dentistry that the function of peri-implant zone is to act as a protective seal to maintain homeostasis of the internal environment in response to challenges from the external environment.

REFERENSES

Allen, E. P., Gainza, C.S., Farthing, G. G., Newbold, D. A. 1985. Improved technique for localized ridge augmentation: A report of 21 cases. *J Periodontol,* 56: 195‑9.

Berglundh, T., Lindhe, J., Jonsson, K., Ericsson, I. 1994. The topography of the vascular systems in the periodontal and peri-implant tissues in the dog. *J Clin Periodontol*, 21:189-93

Bianchi, A. E. and Sanfilippo, F. 2004. Single-tooth replacement by immediate implant and connective tissue graft: a 1-9-year clinical evaluation. Clinical Oral Implants Research, 15: 269–277.

Biggs, W. F., Litvak, Jr A. L. 2001. Immediate provisional restorations to aid in gingival healing and optimalcontours for implant patients. *J Prosthet Dent*., 86: 177‑80.

Bowers, G. M., Chadroff, B., Carnevale, R., *et al.* 1989. Histologic evaluation of new attachment apparatus formation in humans. Part II. *J Periodontol*; 60: 675-682.

Buser, D., Martin, W. and Belser, U.C. 2004. Optimizing esthetics for implant restorations in the anterior maxilla: anatomic and surgical considerations. *The International Journal of Oral & Maxillofacial Implants* (Suppl), 19: 43–61.

Carlsson, G. E., Bergman, B., Hedegård, B. 1967. Changes in contour of the maxillary alveolar process under immediate dentures. A longitudinal clinical and x-ray cephalometric study covering 5 years. *Acta Odontol Scand*; 25: 45–75.

Choquet, V., Hermans, M., Adriaenssens, P., Daelemans, P., Tarnow, D. P., Malevez, C. 2001. Clinical and radiographic evaluation of the papilla level adjacent to single tooth dental implants. A retrospective study in the maxillary anterior region. *J Periodontol*; 72: 1364–1371.

Cordaro, L., Amade´ , D.S. and Cordaro, M. 2002. Clinical results of alveolar ridge augmentation with mandibular block bone grafts in partially edentulous patients prior to implant placement. *Clinical Oral Implants Research*, 13: 103–111

Dhaded, S., Khan, M. A. 2014. Anterior Implant Esthetics. Guident: Your Guide on the path of Dentistry, 1: 10-19.

Gastaldo, J. F., Cury, P. R., Sendyk, W. R. 2004. Effect of the vertical and horizontal distances between adjacent implants and between a tooth and an implant on the incidence of interproximal papilla. *J Periodontol*; 75: 1242-1246.

Hämmerle, C. H., Araújo, M. G., Simion, M. 2012. Evidence-based knowledge on the biology and treatment of extraction sockets. *Clin Oral Implants Res*., 23(Suppl 5): 80–82

Harshakumar, K., Deepthi, V. S., Ravichandran, R., Prasanth, V. 2013. Customized healing abutment for enhancing pink aesthetics in implants. *Journal of Dental Implants*; 3: 172-177.

Howell, F. 1970. Retention of alveolar bone by endodontic root treatment. Mexico:Seminario Annual del Grupo de Estudios Dentales USC, 23 May.

Kan, J. Y., Rungcharassaeng, K., Morimoto, T., Lozada, J. 2009. Facial gingival tissue stability after connective tissue graft with single immediate tooth replacement in the esthetic zone: consecutive case report. *J Oral Maxillofac Surg*; 67(Suppl 11): 40–48.

Kan, J. Y., Rungcharassaeng, K., Umezu, K., Kois, J. C. 2003. Dimensions of peri-implant mucosa: an evaluation of maxillary anterior single implants in humans. *J Periodontol*; 74: 557–562.

Kan, J.Y., Rungcharassaeng, K., Sclar, A. and Lozada, J.L. 2007. Effects of the facial osseous defect morphology on gingival dynamics after immediate tooth replacement and guided bone regeneration: 1-year results. Journal of Oral and Maxillofacial Surgery, 65(Suppl): 13–19.

Langer, B. *et al.* 1985. Subepithelial connective tissue graft technique for root coverage. *J Periodontol*, 56: 715-720.

Lazzara, R. J. 1993. Managing the soft tissue margin: The key to implant aesthetics. *Pract Periodontics Aesthet Dent*; 5: 81‑8.

Misch, C. E. 1993. Contemporary Implant Dentistry, 3rd ed. 31.

Nevins, M., Camelo, M., De Paoli, S., *et al.* 2006. A study of the fate of the buccal wall of extraction sockets of teeth with prominent roots. *Int J Periodontics Restorative Dent*; 26: 19–29.

Palacci P, Ericsson I. Esthetic implant dentistry soft and hard tissue management: London: Quintessence Books; 2001.

Patil, R., Brakel, R. V., Mahesh, K., Putter, C., Cune, M. 2013. An Exploratory Study on Assessment of Gingival Biotype and Crown Dimensions as Predictors for Implant Esthetics Comparing Caucasian and Indian Subjects. *Journal of Oral Implantology*; 308-315.

Pradeep, A. R., Karthikeyan, B. V. 2006. Peri-implant papilla reconstruction: Realities and limitations. *J Periodontol*., 77: 534-44.

Rompen E *et al.*. Factors influencing marginal tissue remodeling around implants. Pract Proced Aesthet Dent 2003; 15(10): 754-761.

Saadoun, A. P. *et al.* 2004. Current trends in implantology: Part II: Treatment planning, aesthetic considerations and tissue regeneration. Pract Proced Aesthet Dent., 16(10): 707-714.

Saadoun, A. P., Touati, B. 2007. Soft tissue recession around implants: is it still unavoidable?- Partt II. Pract Proced Aesthet Dent; 19: 81-87.

Seibert JS. Reconstruction of deformed, partially edentulous ridges, using full thickness onlay grafts. Part II. Prosthetic/ periodontal interrelationships. Compend Contin Educ Dent 1983; 4: 549‑62.

Stanford, C M. 2005. Application of oral implants to the general dental practice. 7,4m *Dent Assoc.,*136:1092-1100.

Tarnow, D. P., Cho, S. C., Wallace, S. S. 2000. The effect of inter-implant distance on the height of inter-implant bone cr est. *J Periodontol*; 71: 546–549.

Von Arx, T. and Buser, D. 2006. Horizontal ridge augmentation using autogenous block grafts and the guided bone regeneration technique with collagen membranes: a clinical study with 42 patients. Clinical Oral Implants Research; 17: 359 –366.

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