

REVIEW ARTICLE

Esthetics and Implant: A Review

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ABSTRACT

The advent of Osseointegrated implants in dental field and their established long term success pattern has offered an alternative approach to treat edentulous patients. Implants have been successful treatment modality in the current era. The advent of this revolutionary procedure has been used for rehabilitation of the edentulous patients with long term success results. The quality and quantity of bone was considered to be a major factor in the implant placement. 5-11With the use of Guided Tissue Regeneration (GTR) and with the advent of new bur systems (Ossedensification burs) even the implantation procedures at compromised sites has given a high success rate. 1 Placing an implant in compromised site has become a challenging task and here we have to consider not only the success rate of an implant but the esthetic consideration and these aesthetics aspects includes the course of alveolar ridge, The course and state of health of the mucosa, The crown margin, The crown form, The inter-dental spaces, The occlusal surface and the incisal edge, the lip support and the smile line.

Keywords: Implants, Osseo integration, Guided tissue regeneration, Aesthetics.

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INTRODUCTION

Mimicking the natural shades and the complex forms are very difficult to reproduce with artificial substitutes.^[1] Although material science had led to advancement of newer materials, there is no scientific method for measuring the harmony.^[1] Attempts have been made to establish rules based on various scientific evidences and clinical trials. Various checklist and protocols have been developed to help the practitioners and the dental technician, while taking the patient's wishes into account, to prepare an optimal prosthesis.^[2,3] This article considers the esthetic aspects of implant-supported crowns and fixed partial dentures.

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The advent of osseointegrated implants in dental field and their established long-term success pattern has offered an alternative approach to treat edentulous patients. The wide array of implant systems available with good track record has enabled the dentist to choose from an extensive range of stable implants for a particular edentulous region. The dentist in his attempt to restore has to strive to maintain the delicate balance between the function, esthetics, and health of the peri-implant tissues. At no point any of these concerns can overrule the others and hence every step in case selection, planning and execution of implant restorations will be crucial deciding factors in the outcome of the treatment.^[4]

The following headings will discuss the various esthetic aspects that have to be taken into consideration before placement of an implant:

- The course of alveolar ridge.
- The course and state of health of the mucosa.
- The crown margin.
- The crown form.
- The interdental spaces.
- The occlusal surface and the incisal edge.
- The lip support.
- The smile line.

THE COURSE OF THE ALVEOLAR RIDGE

Implants have been successful treatment modality in the current era. The advent of this revolutionary procedure has been used for rehabilitation of the edentulous patients with long-term success results. The quality and quantity of bone were considered to be a major factor in the implant placement.^[5-11] With the use of Guided Tissue Regeneration (GTR) and with the advent of new bur systems (Ossedensification burs) even the implantation procedures at compromised sites has given a high success rate.^[12]

The technique of guided local tissue regeneration has the following applications:

1. Filling bone defects before the implantation procedure^[13] [Figure 1].
2. Initial increase of ridge width, with secondary implantation.^[14,15]
3. Increase of ridge width with immediate implant placement.^[16-18]
4. Direct submucosal implantation.^[19,15]
5. Direct transmucosal implantation.^[20,21]

These techniques have been described with and without the use of transplant material in combination with barrier membranes. Results of a clinical study by Andresson *et al.* indicate the possibilities for implants using GTR in narrow ridges.^[18]

The Mucosa

When a tooth is extracted, the anatomic-physiologic basis for true gingival papillae is eliminated following the cement-enamel junction.^[22] In the visible region, this will diminish the esthetics as the natural course of the gingival is lost. Remodeling of papilla has been achieved in some cases by 3 years following placement of the supra-structure.^[1,22] The metal portion of the implant may show through narrow ridges with thin biotype mucosa, leading to esthetic failure. Ridge augmentation should be considered for the cases with such result outcomes.^[1,22]

Connective tissue transplantation can be performed to correct the implant display. Plastic surgery procedures have also been described to reconstruct papillae, but there has been no information regarding the predictability of the procedure till now.^[23,24] Missing papillae may be fabricated using gingival-colored ceramic when large tissue has to be reconstructed. Ceramic veneering and resin veneering are the other treatment options.^[23,24]

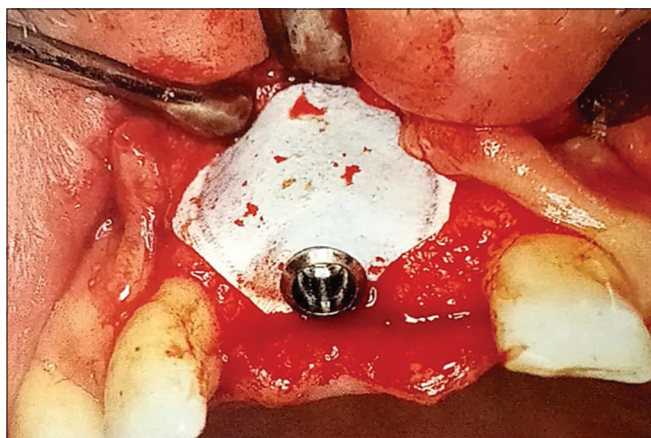


Figure 1: Barrier membrane adapted around the bone defect after implant placement



Figure 2: First signs of peri-implant inflammation should lead immediately to increased oral hygiene status

DEGREE OF INFLAMMATION OF MUCOSA

Reddening, edematous changes, bleeding in response to probing, pus formation, livid blue discoloration, and spontaneous bleeding are the signs of peri-implant infection [Figure 2]. These factors affect the osseointegration of the implants and also affect the esthetics in the visible region. Early symptoms and signs can be reversed with chlorhexidine rinses and gels and with regular follow-up and visits. In some instances, hyperplastic tissue can be removed surgically. The need for antimicrobial therapy is associated with submucosal bone tissue loss. Guided bone regeneration can also replace the lost bone.^[18,25,26]

THE CROWN MARGIN

The main dilemma as prosthodontist we come across in rehabilitating the teeth in the esthetic region is how to avoid the visible metal margins and simultaneously avoiding the formation of niches for bacterial colonization. The demand of esthetics can be met by placing the implant component below the level of mucosa. Esthetic demands of implants can be met by placing the primary implant components below the level of mucosa, thus concealing it^[27,28] [Figure 3].

Clinical reality requires acceptance of specific challenges, and this can be overcome by

- Setting the implant below the margin.
- Using standard cone or titanium, full body of the ITI system using custom abutment system.
- Slightly overcontouring with an overlapping, covering veneer that can be acceptable in accessible regions.
- Maintenance of optimal oral hygiene program.
- A regular recall system.

These measures are intended to maintain the peri-implant tissue in a steady state.^[29,30]

Crown Form

Diameter of an implant does not correspond to the diameter of the natural tooth and because of this reason rehabilitation of single missing tooth in the anterior segment is a tedious task. The circular cross-section of implants also fails to mimic the emergence profile created by the natural tooth. Sufficient interocclusal space is necessary for the design of natural crown preparations.^[31-33]

Interdental Space

Implant should not be placed too close to each other or to adjoining natural teeth. Specific rules of thumb apply to various implant systems. Desired position of the implant is checked in mouth through template and the



Figure 3: Ceramic crown cemented on natural tooth 21 and on an implant in 23

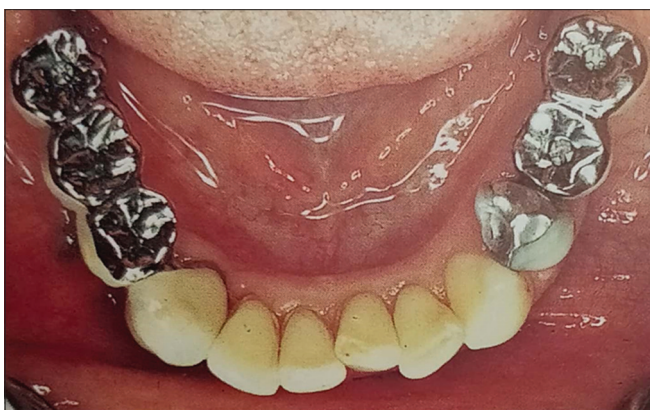


Figure 4: Restorations were screw-mounted on to implants due to lack of interdental space



Figure 5: Sufficient interdental space and a treatment plan envisioning a cemented fixed reconstruction

interdental spaces must be designed in such a way that it permits access to oral hygiene, and it should not affect the phonetics and esthetics.^[34,35]

OCCLUSAL SURFACES AND THE INCISAL EDGES

Occlusal surfaces and incisal edges are similar to that of the natural dentition. The choice of materials depends on esthetics requirements and space availability [Figures

4 and 5]. The site of penetration of occlusal screw may interfere with esthetics in screw-mounted suprastructures. The interference with occlusal screw can be corrected by placement of resin or even a ceramic inlay.^[34,35]

Lip Support

The lost tissue must be built to provide a proper lip support, profile, function esthetics, and phonetics. Bar-mounted reconstructions and acrylic-veneered Branemark prosthesis can be used for ideal lip support suprastructures. Technical imagination and bone reconstruction procedures had played a major role in replacing missing hard and soft tissue, thus providing promising esthetic results.^[1]

Smile Line

Smile line is a decisive factor in evaluation of the patients' esthetics. A thorough evaluation, wax mock-ups, recording the information digitally all will provide additional information for the proper design of the suprastructure.^[36]

CONCLUSION

All these factors explained above describe the complexity of planning and executing implant suprastructures, particularly in the visible region. A team of competent care providers is required to achieve the desired result, and poor communication can have bizarre consequences. Finally, it must be mentioned that a conventional approach must be considered in every case, and in some cases, such approach can provide optimal esthetic results with a procedure simpler than implant placement.

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