

IMMEDIATE IMPLANT PLACEMENT – SMILE DESIGNING

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ABSTRACT:

Background: This article describes about the immediate implant placement and guidelines that increase the thickness of soft tissue around the implants.

Methods: The esthetic dentist should have a thorough knowledge and appreciation of the artistic principles that can be applied to the dentofacial complex and should combine artistic creativity with scientific discretion to effect an appreciable change in the dentition. The smile we create should be esthetically appealing and functionally sound and requires a comprehensive approach to patient care. Appropriate application of principles of smile designing for any restorative work can drastically improve the esthetics of the patients. Nowadays patients do not accept even the shortest period of edentulism.

Results and conclusions: The evolution of one-stage protocol of immediate implant placement into fresh extraction socket with an immediate provisional restoration have served the purpose as it is less traumatic, more time efficient and yields highly predictable esthetic results. This article will describe an interdisciplinary approach to immediate implant placement and smile designing.

Key-words: Dentofacial complex, Smile designing, Immediate implant placement, Immediate provisional restoration.



INTRODUCTION

Smile, a person's ability to express a range of emotions with the structure and movement of the teeth and lips, can often determine how well a person can function in society. Harmonizing an esthetics smile requires a perfect integration of facial composition and dental composition and the dental composition relates more specifically to teeth and their relationship to gingival tissues.^[7] These days the people are very much concerned regarding their esthetic looks as nearly everyone is on a social networking site. So one cannot even imagine to be without teeth for even the shortest period of time. The evolution of one-stage protocol of immediate anterior implant placement

into fresh extraction sockets and sometimes with an immediate provisional restoration placed at the same appointment without compromising implant survival rates have served the purpose for such patients. This protocol requires appropriate diagnosis and treatment planning before initiation of the treatment. Understanding of the objective and subjective criteria related to hard and soft tissues provide an esthetic outcome. The ultimate aim for the implant restoration is to harmonize with the frame of smile, face and more importantly the individual. So, prior to placement of implants, we need to look

upon the diagnostic factors that affect the predictability of peri-implant esthetics.^[8]

Variables affecting the predictability of the esthetic outcome of implant restoration are:

- 1) Patient selection and smile line
- 2) Tooth position
- 3) Root position of the adjacent teeth
- 4) Biotype of the periodontium and tooth shape
- 5) The bony anatomy of the implant site
- 6) The position of the implant.

Correct positioning of the implant requires precision in implant placement in which the most critical surgical strategy is atraumatic tooth removal without flap elevation, and there should be intact buccal plate.^[3]

As tooth extraction leads to dimensional change of height and width of the alveolar ridge, so immediately placing the implant in to fresh alveolar sockets after extraction reduces the amount of ridge width resorption.

For this we need to radiographically examine the bone in which the bone width should be 4-5mm (Figure 1A) and interproximal bone height should be 5mm or less (Figure 1B). In case of mandible the bone length from the alveolar crest to a safe distance above the mandibular canal should be 10 mm.^[9]

After the radiographic examination the implant is placed engaging the palatal wall of the socket. While placing implants, the implant head should be 3mm apical to the imaginary line connecting the

cemento-enamel junction of the adjacent tooth.^[9,10] For an esthetic restoration that is indistinguishable from natural teeth establishing peri-implant soft tissue compatibility with the surrounding gingiva and mucosa is essential. For this, establishing a thick tissue biotype around implants is important because it contributes to the esthetic result of an implant-supported restoration.^[10] A thick biotype is more resistant to recession, is better at concealing titanium, and is more accommodating to different implant positions. There is a guideline that demonstrates possible ways to increase soft tissue thickness around implants, i.e., the "PDP management triad" (Figure 2): implant position (P), implant design (D), and prosthetic design (P).^[10]

(I) IMPLANT PLACEMENT ^[10]:

The gingival zenith is used as a guide for dental implant placement.¹¹ It represents the most apical part of the clinical crown. It also represents both the faciolingual and the mesiodistal location of the crown in relationship to the edentulous ridge. As such, it has a remarkable influence on the morphology of the planned restoration. The gingival zenith affects other objective criteria, including the balance of gingival levels (too inferior or superior), the tooth axis (too distal or mesial), the tooth dimension (too inferior or superior), and the tooth form (triangular becomes ovoid if too inferior). Without the control of the gingival zenith, the clinician's ability to define dental implant esthetics is vastly diminished. At least four factors affect the gingival zenith.^[11]

- 1) Relative location of the tissues to the planned gingival zenith.
- 2) Depth of the dental implant placement.
- 3) Response of the buccal bone and mucosa to the implant procedure and components.
- 4) Prosthodontic management of the gingival zenith architecture.

1) Location of the tissues to the planned gingival zenith.^[11]

Ideally, the planned gingival zenith is symmetric with the contralateral tooth and harmonious with the gingival levels of adjacent teeth. The exact position of the gingival zenith can be determined through diagnostic wax-up which permits the exact determination of the extent of resorption and permits planning to the key esthetic parameters.

2)Controlling the Depth of Implant Placement.^[11]

The ideal depth of the implant placement is suggested to be 3 mm apical to the planned gingival zenith.^[12] The implant/abutment interface should also reside 2 mm palatal to the zenith to ensure adequate thickness of bone and mucosa to support tissue form. This "3:2 rule" (Figure 3) further suggests to the clinician when bone grafting or soft tissue augmentation should be performed.^[13] Controlling the depth of placement is achieved by defining the gingival zenith. Managing the gingival zenith at the time of implant placement sets the stage for ideal anterior single-tooth esthetics.

3)Controlling Peri-Implant Mucosal Architecture.^[11]

Most prognostic indicator of eventual esthetic success through symmetry is gained by evaluation of the connective tissue attachment at the adjacent teeth. Careful assessment using a periodontal probe and diagnostic periapical radiograph are needed. Loss of attachment of greater than 1 mm is clinically discernible and difficult to regenerate. This step is essential because interproximal periimplant mucosal contours (papillae) are greatly dependent on adjacent tooth contours.

Following the diagnostic waxing, it is possible to understand the relationship between the proposed gingival zenith location and the existing mucosa. The relationship of the gingival zenith to the underlying bone can only be determined by bone sounding with a diagnostic template in place or, preferably, by use of volumetric imaging (e.g., Cone Beam Computed Tomography) with a radiopaque image of the gingival zenith in place. This assessment is critical.

4)Prosthodontic management of periimplant mucosal architecture.^[11]

With an implant positioned properly in the alveolus, the control of periimplant tissues is enhanced morphologically by enforcing the remodeling of tissues using properly contoured abutments and provisional crowns. Polished abutments of titanium or zirconia should be sculpted to support the soft tissue form, and thus, the cervical contour of the crown.

Typically, the abutment will possess concave features (Figure 4), with the possible exception being a convexity of the buccal surface. This is particularly important in developing the contours of any provisional restoration for a dental implant.

Morphologic refinement is established using the provisional crown and, again, the submucosal contours should be refined to be more root-like (concave interproximally) to support ideal tissue form. The provisional crown should be highly polished, well adapted to the abutment margin and free of extruded cement.

(II) IMPLANT. DESIGN ^[10]:

The thickness of the facial bone plate provides bony support for the soft tissue. If it is less than 1.8 mm, there will be bone resorption at the crestal margins after the implant is placed. Therefore, smaller-diameter implants can be used in the maxillary anterior area to maintain the facial bone thickness, thereby minimizing peri-implant mucosal recession. Additional soft tissue augmentation can be derived through the use of an implant with a straight or parallel-walled platform (Figure 5) instead of a conical or tapered platform. The advantage of a straight platform over a conical platform is that there is less outward pressure on the peri-implant mucosa; this reduces potential gingival recession and/or remodeling after implant placement. Soft tissue augmentation can also be gained through

the use of implants with platform-switch concept.

Platform switching, (Figure 6) a term introduced by Lazzara and Porter, involves connecting a narrower-diameter abutment to a wider implant platform. This subsequently leads to a horizontal shifting of the implant abutment microgap toward the center of the implants, thus preventing crestal bone resorption and allowing soft tissue ingrowth.^[12] This will thicken the tissue and facilitate papillae formation.

(III) PROSTHETIC DESIGN ¹⁰:

As the implant platform is placed at the level of the crestal bone, connecting a concave abutment and/or crown to the implant will create additional space in which the peri-implant mucosa can proliferate and occupy. Remodeling of soft tissue at the abutment connection level will enhance the emergence profile of the restoration, henceforth giving rise to a better esthetic outcome.

The proposed management triad (PDP) uses basic concepts behind implant position (P), implant design (D), and prosthetic design (P) to mount a three-prong attack on implant esthetics by increasing soft tissue thickness. Modification of the implant position, such as a more palatal and apical placement, will facilitate a more esthetic emergence profile. On the other hand, alterations to the implant and to the prosthetic design will promote soft tissue remodeling and fullness, thus creating a more esthetic restoration.

After the implant placement, it needs to be evaluated in three planes of space [8]:

- **Apico-coronal placement:** It is the most critical aspect. Errors in apico-coronal implant placement can have serious aesthetic and biomechanical implications.

An implant placed too coronally will not allow adequate transition from the head of the implant to the point where the restoration exits from the free gingival margin. The restoration will look short in comparison to the contra lateral tooth.

If an implant is placed too apically with excessive countersinking procedures an unnecessary amount of bone loss will occur. Because this bone loss takes place circumferentially it will affect not only the proximal bone structure but also the height of the facial bone wall and can lead to undesirable soft tissue contours.

- **Mesio-distal placement:** Mesio-distally an implant should be placed 1.5-2 mm from an adjacent tooth.^{8,10,14} Improper mesiodistal positioning of implants can also have a substantial effect on the generation of interproximal papillary support as well as on the osseous crest of the adjacent tooth. Placement too close to the adjacent tooth can cause resorption of the interproximal alveolar crest to the level of that on the implant. With

this resorption comes a reduction in papillary height. Restorative problems exist as well. Poor embrasure form and emergence profile will result in a restoration with a long contact zone and compromised clinical outcomes.

- **Facio-lingual placement:** The amount of bone available should be at least 1 mm greater than the implant diameter on each side. Hence a 4 mm diameter implant would require 6 mm of bone. [4,6] The single implant placed in the maxillary anterior region should be situated palatal to an imaginary line that outlines the curve of the arch formed by the facial surfaces of the adjacent teeth. Implants placed too palatal complicate development of hygienic contours. Implants are often mistakenly placed too facial. This error results in excessive resorption of the supporting osseous structure resulting in a restoration that will appear long in comparison to the contra-lateral tooth.

CONCLUSION:

The smile which we create with the help of an implant restoration should be esthetically pleasing and functionally sound and it requires perfect integration between the restoration, implant position and the peri-implant mucosal tissue, so that we end up providing with an esthetic smile as “The person is never fully dressed without a smile.”

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