PINK ESTETICS IN IMPLANTOLOGY

Dr Dipika Mitra*, Dr Priyanka N Potdar, Dr Rohit Shah***, Dr Silvia Rodrigues***, Dr Gaurav Shetty****, Dr Saurabh Prithyani****, Dr Harshad Vijayakar*****

* Professor , **-Postgraduate student, ***- Reader,****- Lecturer, *****- Professor and Head

Department of Periodontology

TPCT's Terna dental college and hospital

Sector-22, Nerul, Navi Mumbai-400706

Email ID's:

drdipikamitra@gmail.com – 9820180406

pnp3289@gmail.com- 9664760130

rohitshah17@gmail.com- 9699860609

silvia.rdrgs@gmail.com - 7709315422

gauravshettypv@gmail.com -9867373605

saurabhprithyani@gmail.com -7208020305

drharshadvijayakar@gmail.com-9820128432

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Corresponding author details:

Dr Priyanka N Potdar.

Post Graduate student.

Dept of Periodontology

TPCT's Terna dental college and hospital

Sector-22, Nerul, Navi Mumbai-400706

ABSTRACT-

Providing an esthetic restoration in the anterior region of the mouth has been the basis of peri-implant esthetics. To achieve optimal esthetics, in implant supported restorations, various patient and tooth related factors have to be taken into consideration. Peri-implant plastic surgery has been adopted to improve the soft tissue and hard tissue profiles, during and after implant placement. The various factors and the procedures related to enhancement of peri-implant esthetics have been discussed in this review article.

Keywords: Dental esthetics, dental implant, gingival surgery

Osseointegration is no longer a possibility but rather a given in implant dentistry today. With this predictability, one can expect a shift into esthetic concerns. As a genuine treatment alternative, implant-supported restorations should conform to the good esthetic outcome of conventional crown and bridge technique or provide a better outcome. The condition of the peri-implant soft tissues appears to be a critical determinant. [1] Soft tissue esthetics in Implantology has been the basis of peri-implant esthetics. To achieve optimal esthetics, in implant supported restorations, various patient and tooth related factors have to be taken into consideration. Peri-implant plastic surgery has been routinely adopted to improve the soft tissue and hard tissue profiles, during and after implant placement.

Good aesthetic finish of implant/restorations requires healthy peri-implant soft tissue at the appropriate location. The relevance of the peri-implant soft tissue seal, the biological width, the keratinized gingival zone and the need for effective plaque control in order to maintain peri-implant soft tissue health needs to be addressed.

Esthetics signifies “natural beauty”, a quality that comes from within. It can be defined as the science of beauty that is applied in nature and in art. 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. This forms the crux of peri-implant plastic

surgery. Peri-implant plastic surgery focuses on harmonizing peri-implant structures by means of hard tissue engineering and soft tissue engineering.

IDEAL REQUIREMENTS FOR ESTHETIC TREATMENT OUTCOME

An esthetic implant restoration is one that resembles a natural tooth in all respects.[2] Both dental and gingival esthetics act together to provide a harmonious smile. The clinician must be aware of the parameters related to gingival morphology, form, dimension, characterization, surface texture and color. The predictability of an esthetic outcome for an implant restoration is dependent on many variables including but not limited to the following:

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.[3]

Tooth position

The tooth needs to be evaluated in three planes of space before it is extracted: Apico coronal, faciolingual and mesiodistal. If there is a tooth with hopeless prognosis positioned ideally or apically and this is extracted, the gingival margin is likely to migrate apically.[4] 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.[5]

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.[6] 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 tooth morphology also appears to be correlated with the soft tissue quality.[7] The triangular tooth shape is associated with the scalloped and thin periodontium. The contact area is located in the coronal third of the crown underlining a long and thin papilla. The square anatomic crown shape combines with a thick and flat periodontium. The contact area is located at the middle third supporting a short and wide papilla. Loss of interproximal tissue in the presence of a triangular tooth form will display a wider black triangle than in a situation when a square tooth is present.

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.[8]

Height and thickness of facial bony wall

Kois et al.,[9] 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. If the total vertical distance of the total dentogingival complex on the mid facial aspect is 3 mm, a slight apical loss of tissue up to 1 mm is anticipated after extraction and immediate implant placement.[9]

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. When the distance was 6 mm papilla was absent 45% of the time and with a distance of 7 mm, papilla

did not fill the space 75% of the time. A difference of 1-2 mm is significant in obtaining soft tissue esthetics.[10]

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. When planning for an ideal three - dimensional implant position, it should be made sure that they are placed in the "comfort" zone. Comfort zones are defined in mesiodistal, faciolingual and apico coronal dimensions.[11]

Mesiodistally, it is recommended that an implant shoulder be placed at least 1 mm from an adjacent tooth. Faciolingually, it's been proposed that the implant shoulder margin should be at the ideal point of emergence i.e., 1 mm palatal to the point of emergence at adjacent teeth. The apico coronal location of the implant shoulder is dependent on a number of factors:

1. The cervical bone resorption morphology, 2. The diameter of the implant, 3. The size discrepancy between the root, 4. The diameter of the implant, 5. The thickness of the marginal gingiva and the proximal tissues. It is suggested that the implant collar be located 2 mm apical to the CEJ of the adjacent tooth if no gingival recession is present and 3 mm from the free gingival margin when it is.[12] Apico coronally, the position of the implant should be approximately 2 mm apical to the mid facial margin of the planned restoration.[13]

SITE EVALUATION

Before planning an implant therapy in an individual, a thorough knowledge about the health and bone morphology of the area is to be considered. Treatment planning must also address hard and soft tissue deficiencies in combination with precision in implant placement. In order to correct the soft and hard tissue deficiencies, understanding of the amount of loss of tissue is necessary and several classifications have been put forward by several authors.

Classification of tissue volume

The first classification of ridge deficiency was proposed by Seibert[14] in 1983 and later modified by Allen [15] in 1985.

Seibert[14] 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[15] further quantified the loss of ridge dimension into mild (3 mm), moderate (3-6 mm) and severe (6 mm).

The Palacci-Ericsson[16] classification system divides implant sites into four classes according to the vertical and horizontal dimensions of tissue loss, respectively.

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.

Classification of bone volume

Lekholm and Zarb[17] described the shape of the residual edentulous ridge in terms of remaining bone volume, with a 5-point classification system from A (intact ridge form) to E (severely deficient ridge form).

This classification lacks specific categorical ridge dimensions and has less detail within categories addressing vertical or horizontal ridge deficiency.

Misch and Judy[18] classified available bone into 4 divisions: abundant, barely sufficient, compromised, and deficient (A-D). Abundant bone is bone volume is greater than 5 mm in width, 10 to 13 mm in height, and 7 mm in length. Barely sufficient bone is 2.5 to 5 mm in width, greater than 10 to 13 mm in height, and greater than 12 mm in length. Compromised bone is less than 10 mm in height, or width (less than 2.5 mm). Deficient bone is generally not amenable to implant rehabilitation.

ESTHETIC ASSESSMENT

The success of a single tooth implant restoration in the esthetic zone depends not only on restored function but also on harmonious integration of the restoration into the patient's overall appearance, especially the peri-implant soft tissue.[19]

To date, no authoritative index has existed for the assessment of peri-implant soft tissue. Belser et al.,[20] indicated that esthetics of peri-implant soft tissues, including health, height, volume, color and contour, must be in harmony with the healthy surrounding dentition. Buser et al.,[21] indicated that patient satisfaction is a key factor in the success of implant therapy, especially in the anterior area.

Jemt [22] introduced a score to be able to assess the papillary volume and the height of interproximal mucosa…..

, this rating is restricted to criteria indicated and disregards the entire peri-implant tissue. and the appearance of the dental restoration. In 2005 two other rating scales in addition to the PES by Fürhauser and colleagues were presented for assessing the esthetics of implant supported single-tooth restorations. These indices aim to allow objective appraisal of the esthetic short and long-term results of various surgical and prosthetic implant records.

Furhauser et al.,[23] introduced an index termed the pink esthetic score (PES) to rate the appearance of the soft tissue in anterior implant restorations. They identified seven distinct soft tissue parameters: 1. The presence or absence of mesial papillae, 2. The presence or absence of distal papillae, 3. The level of emergence of the implant restoration from the mucosa at the facial aspect, 4. Curvature of the line of emergence of the implant restoration from the mucosa at the facial aspect, 5. Facial soft tissue convexity, 6. Color and 7. Texture of the facial marginal peri-implant mucosa. Each of these parameters was rated 2, 1 or 0 with the maximum possible score of 14,

indicating the most esthetic result. The PES allows for more objective appraisal of the short and long term esthetic results of various surgical and prosthetic implant procedures.

1. **Pink esthetic score**

The gingival response to a anterior esthetic evaluation is assessed by the Pink Esthetic Score (PES) from clinical photography according to six variables scored from 0→2:

1. Mesial & distal papillae,

2. Keratinized gingiva,

3. Curvature of the gingival margin,

4. Level of the gingival margin,

5. Root convexity(torque),

6. Scar formation.

1. The mesial and distal papillae are assessed for a complete papilla (score 0), incomplete papilla, (score 1), or absence of a papilla(score 2).

2. The keratinized gingiva is scored by the thick biotype (score 0), thin biotype (score 1) or absence of the keratinized gingiva (score 2).

3. The curvature of the gingival margin, also defined as the line of emergence of the gingival margin, is evaluated as being identical to comparative teeth (score 0), slightly different (score 1), or markedly different (score 2).

4. The level of the gingival margin is scored by comparison to the contralateral tooth in terms of an identical vertical level (score 0), a slight (≦ 1 mm) discrepancy (score 1), or a major (≧ 1 mm) discrepancy (score 2).

5. The root convexity (labial eminence) combines three additional specific soft tissue parameters as one variable: the presence (score 2), partial presence (score 0), or absence of a convex profile in the facial aspect (score 1).

6. The scar formation is scored by the absence of scar (score 0), partial presence (score 1), and apparent presence (score 2).

2). White esthetic score

The white esthetic score can be separated into anteriors segment evaluation and single one from clinical photography. For micro-esthetic, six variables scored from 0→2:

1. Midline,

2. Incisor curve,

3. Axial inclination,

4. Contact area,

5. Tooth proportion,

6. Tooth to tooth proportion.

For single crown, there are also six variables:

1. Tooth form,

2. Mesial & distal outline,

3. Crown margin,

4. Translucency,

5. Hue & Value,

6. Tooth proportion.

For micro-esthetic score:

1. The midline: upper midline equal to lower midline (score 0), midline off <3mm, (score 1), or midline ≥ 3mm (score 2).

2. The incisor curve is scored by smooth curve (score 0), uneven curve (score 1) or missing/ crowding dentition (score 2).

3. The axial inclination, align with standard angulation 5°, 8°, 10° : (score 0), slightly

different: (score 1), or crowding/spacing: (score 2).

4. The contact area, the ratio of the contact area to crown length from central incisor to canine are 50% : 40% : 30% (score 0), unsymmetry of the contact area on right and left anterior segement (score 1), slight prolong of contact area (score 2)

5. The tooth proportion: following 1: 0.8 (score 0), slight too long (score 1), way too long (score 2).

6. Tooth to tooth proportion, following the golden proportion (1.6:1:0.6): (score 0), a slight discrepancy (score 1), missing/crowding: (score 2). White esthetic score for single restoration:

A score of 2, 1, or 0 is assigned to all six parameters. Thus, in case of an optimum implant/tooth restoration, a minimum total WES of 0 is recorded. All six parameters are assessed by direct comparison with the natural, contralateral reference tooth, estimating the degree of match or eventual mismatch. In the case of an optimum duplication of the esthetically relevant features inherent to the control tooth, a minimum WES score of 0 is possible.

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MANAGEMENT OF PERI-IMPLANT ESTHETICS

Peri-implant plastic surgery

A large number of soft and hard tissue procedures have been described to facilitate edentulous ridge augmentation prior to implant placement. A straightforward implant placement can be performed without any additional surgeries; however, at the time of implant placement, minor hard tissue augmentation may be needed to add support to the peri-implant mucosa. In other situations,

soft tissue must be added to enhance the final result and thus facilitate soft tissue handling at second stage surgery.

Surgical considerations

Planning and execution

Implant therapy in the anterior maxilla is considered an advanced or complex procedure and requires comprehensive preoperative planning and precise surgical execution based on a restoration driven approach.[21]

Patient selection

It is essential in achieving esthetic treatment outcomes. During treatment of high risk patients, a general risk assessment (medical status, periodontal susceptibility, smoking and other risks) should be undertaken with caution.[20]

Implant selection

Implant type and size should be based on site anatomy and the planned restoration. Inappropriate choice of implant body and shoulder dimensions may result in hard and/or soft tissue complications such as exposure of metal collar at the implant shoulder junction. To overcome this, the platform switching technique has been developed to preserve or regenerate the inter-implant soft tissue and impede an unsightly metal display. Platform switching can preserve soft and hard tissues and may provide better biological, mechanical, and esthetic outcomes.[24]

Clinical considerations

Single tooth replacement

For anterior single tooth replacement in sites without tissue deficiencies, predictable treatment outcomes, including esthetics, can be achieved because tissue support is provided by adjacent teeth.[20]

Multiple tooth replacement

The replacement of multiple adjacent missing teeth in the anterior maxilla with fixed implant restorations is poorly documented.[20] In this context, esthetic corrections is not predictable particularly regarding the contours of the inter-implant soft tissue

PRE PLACEMENT PROCEDURES

A large number of soft and hard tissue procedures have been described to facilitate edentulous ridge augmentation prior to implant placement. Soft tissue modification before implant placement is advantageous in that proper tissue contours before first stage surgery, increasing the predictability of a satisfying treatment outcome.[25]

Ridge (socket) preservation

About 3 to 4 mm of resorption can occur during the first 6 months after extraction in the absence of intervention.[26,27] The ideal solution to successful ridge preservation is the flapless, atraumatic removal of the hopeless tooth, leaving much of the bony architecture, including thin buccal cortical plate, intact. After extraction socket is curetted, a decision is made regarding the grafting material from an absorbable collagen matrix, autogenous bone, demineralized freeze-dried bone allograft, combinations of growth factors, to a variety of synthetic grafting materials.[25]

Forced orthodontic eruption

The use of orthodontics in erupting hopeless teeth before extraction has been used successfully to augment bone and soft tissue support at future implant sites.[28]

Controlled tissue expansion

This technique was proposed by Bahat et al,[29] that exploited the elastic properties of the gingival epithelium, the tissue is expanded using an inflatable silicon balloon expander to gain adequate soft tissue for primary coverage of subsequent osseous grafts.

Soft tissue grafting

These procedures have been used successfully for many years in periodontics and oral surgery in resolving recession defects around natural teeth and augmenting alveolar ridge contours.[30, 31,32,] The following procedures are designed for use in augmentation of edentulous ridge defects: The roll technique, pouch procedures, interpositional grafts, onlay grafts and combination grafts.[33.34,35]

IMPLANT STAGE 1 AND 2 PROCEDURES

Papilla regeneration technique

This technique was developed to correct deficient interproximal papillae contours between multiple implants at stage 2 surgery and is primarily an esthetically driven procedure. The procedure involves elevating a full thickness mucoperiosteal flap at the palatal or lingual extent of the implant cover screws. Vertical releasing incisions are used to aid in flap elevation, and the incisions are made so as to exclude the papillary tissue of adjacent natural teeth. Semilunar, beveled incisions are then created in the buccal flap extending toward each abutment, beginning with the distal aspect of the most mesially located implant. The pedicles are secured between the abutments using tension-free suturing and are allowed to heal for 4 to 6 weeks before final restoration[36]

POST PLACEMENT SOFT TISSUE MANAGEMENT

All esthetic tissue management should be completed before seating of the definitive restoration in as much post placement esthetic management is severely limited. Post-placement soft tissue modification in this context therefore, consists primarily of hard tissue regenerative procedures or hard or soft tissue respective procedures in an attempt to restore the health of peri-implant tissues.[37]

Vertical defects

If the extent of bone loss is less than 2 mm, the defect can be grafted with autogenous bone or it can be removed through osteoplasty, converting the defect into a horizontal deficiency.[25]

Horizontal defects

The most predictable method of treating horizontal implant defects is through reduction of the soft tissue thickness via apical repositioning. If the horizontal defect extends beyond one half of the implant body, it should be removed. Regenerative procedures using autogenous bone and a barrier membrane to gain height around the implant fixture is indicated only in single- or multiple-implant fixed restorations or when additional bone-to-implant interface is required to withstand the forces exerted on the prosthesis.[38]

MANAGEMENT TRIAD TO INCREASE SOFT TISSUE THICKNESS

In spite of the available surgical techniques, Fu et al.,[39] proposed a guideline that demonstrates possible ways to increase the soft tissue thickness around implants, i.e. the “PDP management

triad": implant position (P), implant design (D) and prosthetic design (P). First, the implant position, and angulation are key determinants in ensuring that an implant supported restoration has functional and esthetic success through an ideal emergence profile. Second, implant diameter and platform design can help prevent crestal bone resorption, which is a great asset in preserving esthetics. Third, the prosthetic design can provide the additional space for soft tissue in growth to create a fuller soft tissue profile.

Provisional and definitive restorations

To optimize esthetic treatment outcomes, the use of provisional restorations with adequate emergence profiles is recommended to guide and shape the peri-implant tissues prior to definitive restoration. It is preferable to place provisional restorations on the implant at the time the restorative procedure is started.[41,42,40] This process will establish a natural and esthetic soft tissue form that will determine guidelines for laboratory fabrication of an anatomically appropriate soft tissue model

CONCLUSION

Though, osseointegration and restoration of function and soft tissue esthetics dictate implant success, the patient's satisfaction is a key element of the success of implant therapy. 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. From existent evidence concerning soft tissue modification around implants, implant plastic surgery should emerge as a distinct sub-discipline of that will continue to develop and expand as dental implants are accepted as a routine treatment for the restoration of function and esthetics.

References -

1) Choquet V, Hermans M, Adriaenssens P. Clinical and radiographic evaluation of the papilla level adjacent to single-tooth dental implants. A retrospective study in the maxillary anterior region. J Periodontol 2001;72:1364–71.
2) Higginbottom FL, Wilson TG. Three-dimensional templates for placement of root-form dental implants. Int J Oral Maxillofac Implants. 1996;6:787–95.
3) Tjan AH, Miller GD. The JG: Some aesthetic factors in a smile. J Prosthet Dent. 1984;51:24–8.
4) Kois JC. Aesthetic extraction site development: The biologic variables. Contem Aesthet Resto Pract. 1998;2:10–8.
5) Tarnow DP, Cho SC, Wallace SS. The effect of inter-implant distance on the height of inter-implant bone crest. J Periodontol. 2000;71:546–9
6) Becker W, Ochsenbein C, Tibbetts L, Becker BE. The alveolar bone anatomic profiles as measured from dry skulls. Clinical ramifications. J Clin Periodontol. 1997;24:727–731. .
7) Jivraj S, Chee W. Treatment planning of implants in the aesthetic zone. Br Dent J. 2006;201:13–23. .
8) D'Addona A, Nowzari H. Intramembranous autogenous osseous transplants in aesthetic treatment of alveolar atrophy. J Periodontol 2000. 2001;(27):148–61. .
9) Kois JC. Altering gingival levels: The restorative connection part I: Biologic variables. J Esthet Dent. 1994;6:3–9.
10) Tarnow DP, Magner AW, Fletcher P. The effect of distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. J Periodontol. 1992;63:886–995. .
11) Spielman HP. Influence of the implant position on the aesthetics of the restoration. Pract Aesthet Dent. 1996;8:897–904.
12) Saadoun AP, LeGall M, Touati B. Selection and ideal tridimensional implant position for soft tissue aesthetics. Pract Periodontics Aesthet Dent. 1999;11:1063–72.
13) Buser D, von Arx T. Surgical procedures in partially edentulous patients with ITI implants. Clin Oral Implants Res. 2000;11:83–100. .

14) 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. .
15) Allen EP, Gainza CS, Farthing GG, Newbold DA. Improved technique for localized ridge augmentation: A report of 21 cases. J Periodontol. 1985;56:195–9. .
16) Palacci P, Ericsson I. London: Quintessence Books; 2001. Esthetic implant dentistry soft and hard tissue management.
17) Lekholm U, Zarb G. Patient selection. In: Branemark PI, Zarb G, Albrektsson T, editors. Tissue Integrated Prostheses. Osseointegration in Clinical Dentistry. Chicago, Ill: Quintessence; 1985. pp. 199–209.
18) Misch CE, Judy KW. Classification of partially edentulous arches for implant dentistry. Int J Oral Implantol. 1987;4:7–13. .
19) Doring K, Eisenmann E, Stiller M. Functional and esthetic considerations for single tooth Ankylos implant crown: 8 years of clinical performance. J Oral Implantol. 2004;30:198–209. .
20) Belser U, Martin W, Belser UC. Consensus statements and recommended clinical procedures regarding esthetics in implant dentistry. Int J Oral Maxillofac Implants. 2004;19:73–4. .
21) Buser D, Martin W, Belser UC. Optimizing esthetics for implant restorations in the anterior maxilla: Anatomic and surgical considerations. Int J Oral Maxillofac Implants. 2004;19:43–61. .
22) Jemt T. Regeneration of gingival papillae after single-implant treatment. Int J Periodontics Restorative Dent 1997;17:326– 33. 27. Jemt T. Restoring the gingival contour by means of provisional resin crowns after single-implant treatment. Int J Periodontics Restorative Dent 1999;19: 20–9.
23) Fürhauser R, Florescu D, Benesch T, Haas R, Mailath G, Watzek G. Evaluation of soft tissue around single-tooth implant crowns: The pink esthetic score. Clin Oral Implants Res. 2005;16:639–44. .
24) Salimi H, Savabi O, Nejatidanesh F. Current results and trends in platform switching. Dent Res J. 2011;8:S30–6. [PMC free article] .

25) Kazor CE, Al-Shammari K, Sarment DP, Misch CE, Wang HL. Implant plastic surgery: A review and rationale. J Oral Implantol. 2004;4:240–54. .
26) Juodzbalys G. Socket morphology-based treatment for implant esthetics: A pilot study. Int J Oral Maxillofac Implants. 2010;25:970–8. .
27) Buser D, Weber HP, Lang NP. Tissue integration of non-submerged implants. 1-year results of a prospective study with 100 ITI hollow-cylinder and hollow-screw implants. Clin Oral Implants Res. 1990;1:33–40. .
28) Salama H, Salama M. The role of orthodontic extrusive remodeling in the enhancement of soft and hard tissue profiles prior to implant placement: A systematic approach to the management of extraction site defects. Int J Periodontics Restorative Dent. 1993;13:312–33. .
29) Bahat O, Koplin LM. Pantographic lip expansion and bone grafting for ridge augmentation. Int J Periodontics Restorative Dent. 1989;9:344–53. .
30) Guirado JL, Yuguero MR, Zamora G, Barrio E. Immediate provisionalization on a new implant design for esthetic restoration and preserving crestal bone. Implant Dent. 2007;16:155–64. .
31) Guirado JL, Ruiz AJ, Moreno G, Marí L. Immediate loading and immediate restoration in 105 expanded-platform implants via the Diem System after a 16-month follow-up period. Med Oral Patol Oral Cir Bucal. 2008;13:576–81. .
32) Hermann F, Lerner H, Palti A. Factors influencing the preservation of the periimplant marginal bone. Implant Dent. 2007;16:165–75. .
33) Cohen ES. Ridge augmentation utilizing the subepithelial connective tissue graft: Case reports. Pract Perio Aesth Dent. 1994;6:47–53. .
34) Kaldahl WB, Tussing GJ, Wentz FM, Walker JA. Achieving an esthetic appearance with a fixed prosthesis by submucosal grafts. J Am Dent Assoc. 1982;104:449–52. .
35) Khoury F, Happe A. The palatal subepithelial connective tissue flap method for soft tissue management to cover maxillary defects: A clinical report. Int J Oral Maxillofac Implants. 2000;15:415–8. .
36) Palacci P, Nowzari H. Soft tissue enhancement around dental implants. Periodontol 2000. 2008;(47):113–32. .

37) Hurzeler MB, Weng D. Peri implant tissue management: optimal timing for an aesthetic result. Pract Periodontics Aesthet Dent. 1996;8:857–869. quiz 869. .

38) Misch CE. Stage II surgery: Uncovery and treatment of healing complications. In: Misch CE, editor. Contemporary Implant Dentistry. 2nd ed. St Louis, Mo: CV Mosby; 1999. pp. 385–95.

39) Fu J, Lee A, Wang H. Influence of Tissue Biotype on Implant Esthetics. Int J Oral Maxillofac Implants. 2011;26:499–508.

40) Chee WW. Provisional restorations in soft tissue management around dental implants. Periodontol 2000. 2001;27:139–47. .

41) Kaiser DA, Jones JD. Provisionalization for a single cementable dental implant restoration. J Prosthet Dent. 1999;81:729–30. .

42) Vogel RC. Enhancing implant esthetics with ideal provisionalization. J Indiana Dent Assoc. 2002;81:11–4. 43. .