Dental Implants Aesthetic Complications

author_ Abdelsalam Elaskary, Egypt

_Treatment complications can range from fracture of the prosthetic components till reaching the failed condition, however, the complications that are of concern in this chapter is the possible complications in the aesthetic zone, that involves the possibility of failure due to aesthetic reasons. An implant with successful osseointegration can still fail if the final prosthesis doses not provide the optimal required esthetics. Failure to achieve proper esthetics could be due to several reasons, some of which are untreatable. The esthetic outcome of an implant-supported restoration is affected by four main factors: (1)implant placement, (2)soft tissue management, (3)bone grafting considerations, and (4)prosthetic considerations, The possible treatment complications in the aesthetic zone can be divided according to the reason of the occurrence:

_Technical reasons

This is concerned with the etiological reasons of implant failures or complications, which are failure due to host factors, surgical placement, implant selection, and/or restorative problems. It usually occurs as a result of implant In a wrong place (Fig. 1) or implant misplacement (e.g., placement of the implant in an infected socket, pathological lesion, or immature bone previously augmented or placement of a contaminated implant in the osteotomy), infection or soft tissue complications, lack of biocompatibility, excessive surgical trauma, and/or lack of primary stabilization of the implant, or after immediate loading or at the time of the second stage surgery. This could be due to excessive torque during abutment connection when inserted into grafted or D4 bone. It probably happens because of an insufficient bone contact surface area with the implant and possibly because of poor surface treatment of the fixture.

_Biological reasons

That involves; the bacterial invasion of the peri-implant tissues that results in soft tissue inflammatory changes and rapid bone loss. This condition was termed peri-implantitis and was defined by Meffert[1], (Meffert RM 1992) as the progressive loss of peri-implant bone as well as soft tissue inflammatory changes. This definition implies that both bone loss and soft tissue inflammation occur together as a result of bacterial invasion. On the other, Tonetti and Schmid[2] (Tonetti MS, Schmid 1994), divided the host's reaction to bacterial invasion into two groups: peri-implant mucositis, which implies that the inflammatory changes are localized only to the surrounding soft tissue, and peri-implantitis (Fig. 2) in which the reaction affects the deeper soft tissues and

Fig. 1_Implant miss placement shows soft tissue discrepancy.
Fig. 2_Sever peri-implant bone loss due to retrograde peri-implantities.
Fig. 3_Exfoliation of bone graft material from the soft tissue indicating the failure of the bone graft and the need for re-grafting.


Fig. 1

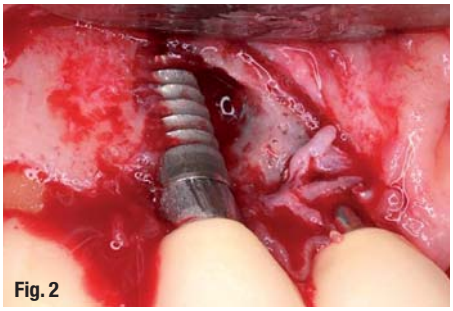
Fig. 2


Fig. 3


Fig. 4


Fig. 5


Fig. 6

surrounding bone. The latter explanation may be based on the concept that the tissues surrounding a functioning oral implant can be divided into two distinct anatomical compartments, both with well-defined functions. These are the soft tissues, which can seal the implant from aggression of exogenous bacteria, and bone, which plays the supporting role for the implant[3] (Esposito M, Hirsch J-M, Lekholm U, et al.1998).

_Personal factors

As the overall clinical success dental implant rely on cooperation among a dental team that involves the patient as well. Each member has his or her own role for certain stages of treatment. The poor clinical skills of the clinician might lead to the failure to obtain a reasonable aesthetic result; also the well-trained laboratory technician contributes to the long-term success of dental implant therapy both esthetically and functionally.

_Tissue deficiency

Soft or hard tissue loss can be a detrimental factor for the success of dental implants (Fig. 3), As Krekeler et al.[4] (Krekeler G, Schilli W, Diemer J. 1985) suggested a relationship between implant failure and the absence of an adequate band of keratinized mucosa surrounding the abutment. This suggested relationship was based on the ability of the keratinized mucosa to withstand bacterial insult and ingression. Also, supporting this concept, Tonetti and Schmid[2] (Tonetti MS, Schmid 1994), stated that the late failures that occur as a result of peri-implantitis (infectious etiology) occur because of defective function of the soft tissues. Therefore, the marginal peri-abutment tissues should constitute a functional barrier between the oral environment and the host bone by sealing off the osseous fixture site from noxious agents and thermal and mechanical trauma.[4] Gingival loss leads to continuous recession around the implant with subsequent bone loss. This will lead to a soft tissue type of failure. On the contrary, Strub et al.[5] (Strub J Gaberthuel T, Grunder U 1991) stated that the keratinized mucosa or dental plaque does not seem to be related to implant failure but that its presence might facilitate the patient's hygienic procedures. (Fig. 4) However, in the aesthetic zone, the relationship between the available keratinized mucosa and the overall success of the implant supported prosthesis is of great values. The most common soft tissue complication would be the soft tissue marginal recession (Fig. 5) or discrepancy, which might be influenced by many factors such as:

1) biocompatibility of the trans-mucosal components, as the adhesion of the junctional epithelium and connective tissue is possible only on highly biocompatible materials.

2) Repeated removal and placement of the abutment leads to cell tear and biological width disruption, because the repeated unscrewing the abutment mechanically disrupts the cellular attachment mechanism and might lead to apical migration of the cells.

3) Loosening of the Implant interface connection forms a gap that harbors bacteria that can invade the surrounding tissues, the further long term screw losing activates bone loss and apical tissue migration.

4) A muscle pull on the implant site might lead to a continuous steady gingival recession as it happens around natural teeth.

5) The location of the implant-abutment connection in relation to the gingival level, as it is suggested that when the location of the implant–abutment connection above the gingival level, the gingival recession and its inflammatory gingival response is highly reduced.

6) Shear loading beyond reasonable limits can destroy the marginal bone crest leading to non-interlocking implant surfaces which subsequently leads to gingival recession.

7) The location of the smooth collar of the implant in relation to the bone level might induce bone resorption due to the less bone affinity to smooth surfaces which might lead to the possible migration of the attachment apparatus.

8) The continuous pressure induced from a removable prosthesis might lead to gingival recession.

9) Premature delivery of the final prosthesis (min two months) has proven to lead to post insertion gingival recession as the soft tissue should reach a stable remodeling status prior to final crown insertion.

10) The amount of osseous contouring in the second stage surgery might stimulate further bone resorption that initiates gingival recession.

11) The geometry of the implant diameter in relation to the size of the abutment used that might influence bone levels via platform switching.

Fig. 4_Keratinized tissue deficiency.
Fig. 5_Post loading soft tissue recession.
Fig. 6_Wound sloughing due to smoking.


Fig. 7

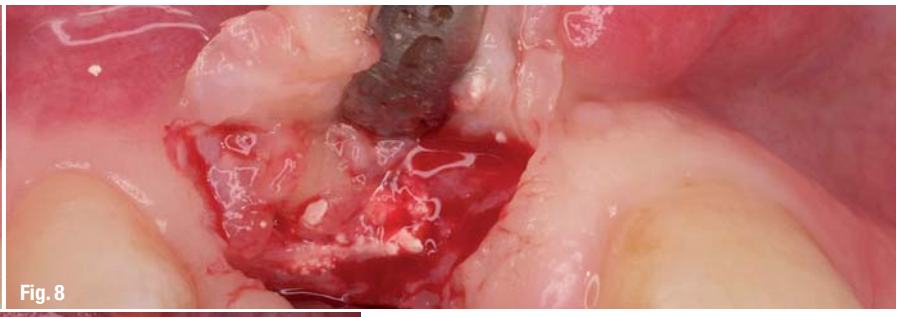
Fig. 8


Fig. 9


Fig. 10

Fig. 7_Failed implant in the aesthetic zone due to improper biomechanical reasons.
Fig. 8_The case post implant removal and 4 months post grafting.
Fig. 9_The soft tissue status post grafting, note the blue line that indicates the excess soft tissue and bone regenerated.
Fig. 10_The case restored.

12) The use of alcohol disinfectants for the healing abutments might lead to cell death or the peri-implant tissues and to further recession. On the other hand the loss of the Supporting alveolar bone leads to serious treatment complications, Adell et al.[6] (Adell R, Lekholm U, Rockler B, 1981) stated that marginal bone height depends on both proper marginal stress distribution and adequate function of the marginal soft tissue.

_Systemic factors

Systemic factors that might lead or potentate treatment complications are plenty:

1)Osteoporosis is a common oral bone disease that influences implant placement, the problem arises from the unbalance between the rate bone resorption/formation process with emphasis on resorption, the cortical plates become thinner, the trabecular bone pattern more discrete & advanced demineralization occurs, it affects females twice than males , especially after the menopausal period in females. It does not constitute an absolute contra indication for dental implants, but it influences the treatment path.

2) Smoking is increasingly cited in the literature as a risk factor in soft tissue healing[7] (Wakley GK, Baylink DJ, 1988), periodontal health[8,9], (Bergström J and Preber H. 1994) (Grossi SG, Zambon J, Mcchtei EE, 1997) and implant therapy. Speaking about smoking, several controversial points of views are being made to relate smoking to dental implant failure; the modern science has proven that there is a potential increased risk of smoking on the long and short term success of dental implants (Persson L, Bergström J, Gustafsson A, 2003) (Fig. 6).[10]

3) Patient's psychological ability to commit to long term Treatment and maintenance programs must be an integral part of the examination and selection process. During the consultation, the clinician should determine whether the patient is psychologically capable of making the necessary long-term commitment. For example, phobic or highly anxious individuals may have low pain thresholds and refuse to present for treatment follow-ups. On the other hand, patients whose dental complaints stem from somatization disorders will probably not be satisfied with the results of implant therapy (Melamed BG 1989).[11]

4) Diabetes mellitus does not directly affect the failure of dental implants. A Consensus expressed that the placement of implants in patients with metabolically controlled diabetes mellitus does not result in a greater risk of failure than in the general population;[12] but a group study stated that diabetic patients experience more infection in clean wounds than non-diabetics (Goodson WH, Hunt TK 1979).[13] The liability of infection is probably due to thinning and fragility of the blood vessels so as to alter blood supply. In conclusion, current surgical opinion is that patients with well-controlled diabetes (below 250 mg/dl) probably do not encounter inordinate operative risks, while patients with poorly controlled diabetes or high risk patients (more than 250 mg/dl) may frequently experience wound failure (Smith RA, Berger R, Dodson TB. 1992).[14] Therefore, poorly controlled diabetic patients present more difficult management problems and postponement of the surgery is recommended until better control is achieved.

5)Alcohol consumption is detrimental to the success of the dental implantology procedures (Sampson HW, Perks N, Champney TH, 1996) (Spencer H, Rubio E, Indreika M, Seitam A, 1986)[15,16], because it contributes negatively to osteoporosis, osteopenia. This statement is supported by the studies that suggested that alcohol intake leads to a negative bone balance effect and progressive bone loss (Lindholm J, Steinlche T, Rasmussen E, et al. 1991)[17] this in turn may lead to insufficient bone volume for application of dental implants. A study (Bombonato K, Brentegani G, Thomazini A, et al. 2004)[18] that evaluated the possible effect of alcoholic beverage administra-

tion on reparative bone formation around hydroxyapatite tricalcium phosphate implants inside the alveolar socket in rats confirmed that a significant delay in reparative bone formation was detected in the alveolus of alcoholic rats by a histometric differential point counting method.

_Biomechanical & loading factors

Biomechanical, over loading and parafunctional habbits are all critical factors that matter to the long term success of the implant supported restorations in the aesthetic zone is the improper application of the cantilevers within any prosthetic design (English CE, 1993) (El Askary AS, Meffert RM, Griffin, 1999) (El Askary AS, Meffert RM, Griffin, 1999).[19-21] For partially edentulous patients, it places offset loads to the implant abutments and results in greater tensile and shear forces on cement or screw fixation especially when the number of implant used for support is diminished. Many problems can be associated with cantilevers supported by dental implants. Such problems include fracture of the prosthesis (Rangert B, Gunne J, Sullivan DY, 1991)[22], de-integration (Lekholm U, Adell R, Brånemark P-I, 1985)[23], and bone fatigue (Johns RB, Jemt T, Heath MR, et al, 1992).[24] If any given three units prosthesis is supported by two implants and has a cantilevered tooth, the bending moment may be twice that of a prosthesis in which both ends are supported. With occlusal forces acting on the cantilever, the implant becomes a fulcrum and is subjected to axial, rotational, and torsional forces.

_Discussion

The ideal implant treatment plan is based on the patient's needs, desires, and financial commitment. Within the scope of this review, the different reasons for implant failure and its contributing factors should be addressed, It seems that overloading the implant (traumatic occlusion, bending moments, and excessive cantilevers) and parafunctional habits are considered to be primary factors for biomechanical implant failures. On the other hand, cross infection from periodontally involved teeth into implant sites is a factor in the biological aspect of implant failures. Failure of dental implants has, in general, multi-factorial dimensions and could be due to a single factor or a combination of more than one. Proper data collection, patient feedback, and accurate diagnostic tools will help to point out the reasons for failure (Figs. 7–10)._

_contact implants

Dr Abdelsalam Elaskary
Alexandria, Egypt
E-mail: askary@askaryimplants.com