Peri-implant soft tissue recessions

By Dr. André P. Saadoun, D.D.S., M.S.

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Introduction

A beautiful aesthetic result is difficult to obtain with implants in the anterior areas, both the alignment of the gingival margin and the presence of papillae are essential elements in resolving aesthetic implant problems to achieve an harmonious smile. These two soft tissue entities, however, are closely related to the patient’s biotype and to the quality/quantity of underlying structural alveolar bone.

The peri-implant gingiva, particularly if it is narrow, with a thin-scalloped biotype, inevitably retracts six months after implantation of the biologic space (Small and Tarnow, 2000)

The process of soft and hard tissue healing must be understood and incorporated into a carefully coordinated sequence of therapy. It is also important to identify complications and clinical mistakes and their implications on the final aesthetic outcome (Saadoun et al, 1999).

How, then, should soft tissue recession (bone and gingiva) around an implant be prevented or treated?

Prevention of peri-implant recession

Marginal bone loss of 1 mm in the first year following the abutment connection, followed by loss of 0.2 mm per year, were among the criteria defined for implant success (Albrektsson et al, 1986).

Saving a few teeth of a millimetre of bone around an implant does not increase the longevity of the implant, and should be done only for aesthetic reasons. To prevent or to decrease peri-implant bone resorption and consequent gingival recession following implant restorations in the anterior zone, several strategies have been suggested, which are explained in detail in the following points.

1) Implant design and diameter

The design of the collar of the implant should stabilize the crestal bone by bringing the roughened surface right up to the platform, and the threads/microgrooves as close as possible to the platform, with no divergence of the collar walls.

The thread position of the implant determines the effective level of remoulding after loading, and this is perhaps even more important than the position of the implant abutment microgap (Rompen et al., 2005).

Placement of the implant platform 1.5 mm above the bone, helps to minimize bone loss as the biological space around the implants is established on the collar (Lezly Miller, 2003).

2) Implant placement and extraction timing

To make the best choice between different alternatives of implant placement, a precise pre-surgical diagnosis is necessary in order to evaluate the gingivo-osseous parameters, to determine the optimal moment to extract the tooth and place the implant, and to decide whether implant placement and loading should be immediate, early or delayed (Saadoun and Landsberg, 1997).

Orthodontic treatment is the best solution for patients who wish to limit the surgery required for the placement of implants to a single session, and to enhance the hard and soft tissue profile prior to extraction and implant placement (Salama et al, 1993).

5) Flap design

On healed site the limited flap design minimizes interproximal bone and papilla loss. Many flap design have been described for healed sites, some raising the total interproximal papilla with su- cular incision around adjacent teeth, others using midcrest/palatal crest incision with sulcular envelope flap and, finally, tissue punch flap recommended in large amount of keratinized gingiva.

Flapless approach using tissue punch procedure has many advantages: less trauma to the bone and disturbances to the soft tissue stability, reduction of pain and oedema, and less post-surgical information.

Immediate implant placement after extraction is usually a flapless surgical procedure, the extraction being done using a periosteum to minimize traumatic damage to the hard and soft tissues.

4) Tridimensional implant placement


The tridimensional criteria for implant placement in the aesthetic zone are:

- Mesio-Distal: 1.5-2.5mm between implant and adjacent tooth

- Bucco-Lingual: 1.5-3.0mm between implant and adjacent tooth

- Bucco-Lingual: 2.5-3.5mm from the cervical height of contour of the adjacent teeth to the buccal surface of the implant platform.

- Bucco-Lingual: 2.5-3.5mm apical to the buccal gingival margin depending on the biotype

Therefore, if immediately post extraction implant placement is indicated, the osteotomy must be performed against the palatal wall to prevent any damage to the remaining (and usually thin) buccal cortical bone (Testori, 2003).

5) Connective osseous grafts

An autogenous bone and xenograft with a membrane is used to gain buccal thickness knowing that bone resorption/gingival recession always occurs after extraction/implant placement.

Gingival biotype plays an important role in determining tissue levels achieved around implants. A thin biotype is generally more susceptible to peri-implant recession, induced by the resorption of a thin labial cortical plate. The use of osseous and connective grafts converts a thin gingival biotype into a thick gingiva (Mathies, 2006), which can enhance gingival marginal stability and simplify tissue management during the restorative treatment phase.

6) Abutment and restoration

Optimal aesthetics will be promoted if the final abutment is installed at the time of implant placement, and left in place undisturbed, throughout the final restorative phase, avoiding disturbance of bone and soft tissue architecture.

Fig. 1: Deformed ridge following traumatic extraction (right view)

Fig. 2: Deformed ridge following traumatic extraction (central view)

Fig. 3: Deformed ridge following traumatic extraction (left view)

Fig. 4: Implant insertion after flap elevation

Fig. 5: Bis-Oss graft combined with PRP particu-lates

Fig. 6: Implant and graft covered with PRP membrane

Fig. 7: Coronally advanced flap (frontal view)

Fig. 8: Coronally advanced flap (left view)
(Rompen et al, 2003). Disconnection and reconnection of the abutment disrupts the biologic zone, inducing the junctional epithelium to migrate apically beyond the implant-abutment junction until it can adhere again. This often results in marginal bone loss, particularly in cases of thin gingival biotype.

It is important to minimize the bacterial contamination in and around the implant-abutment junction. The seal provided by an abutment of locking-tapered design has been demonstrated to be optimal in this respect, in vitro (Dibart et al, 2005).

Implant abutments of gold or glazed ceramic should be avoided. Only titanium or zirconium abutments are recommended because hemidesmosomes have been shown to attach to them (Touati and Guez, 2002).

In order to retain soft and hard tissue around the implant-abutment connection, the transmucosal aspect of the implant abutment should not be oversized and divergent, but rather narrow and concave in order to induce thickening and immobilization of the peri-implant tissues, thus increasing the interface between the implant and the soft tissue, and creating an "O-ring connective tissue". This will ensure the long-term stability of the biological width (Rompen et al, 2007).

Beneath the restoration, the concave abutment should provide maximum space to the soft tissue and clearly avoid a flared geometry. Its submerged profile should be negative to avoid compression of and to allow maximum thickness and stability of the soft tissue, as well as more room for the biologic width (Touati 2004). On the buccal aspect, the emergence profile of both the provisional and the final restorations should be flat or concave (under-contoured), to minimise pressure-induced apical migration of the gingival margin.

Design of final crowns to comply with the following "norms" will go a long way toward optimising papillary form (Salama et al., 1999; Elian et al., 2002):

- Distance from interdental bony crest to contact point between natural crown and implant-borne crown: 4.5 mm
- Distance from inter-implant bony crest to contact point between two implant-borne crowns: 5.4 mm
- Distance between bony crest and connection point between an implant-borne crown and a pontic: 5.5 mm

7) Occlusal trauma

It has been proven that an excessive occlusal load during
function can cause the loss of peri-implant bone (Misch et al., 2003). The control of horizontal, trans-axial forces on an implant during the first months of function is a determining factor in reducing stress in the crestal zone, in enabling bone adaptation, and in minimizing crestal bone loss (Legall et Saadoun, 2002).

Conclusion
The essential prerequisites for an optimally aesthetic implant restoration should always remain a careful, precise, comprehensive, biologically and prosthetically-based diagnosis, as well as the choice of the most appropriate implant materials, most conservative, and least traumatic treatment techniques, aimed at conserving, and where necessary, augmenting gingival and bone to achieve a successful outcome.

References

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