Abstract

Scope: To outline the importance of autogenic bone graft addition for correcting bone defects in the frontal and lateral maxillary area, and for achieving outstanding esthetic results in cases of large bone defects. Materials and method: A total number of 478 argumentations has been performed in the implantology and dental clinic of the Emergency Military Hospital Sibiu between 2009 and 2013. Results and discussion: The transversal rehabilitation techniques of frontal maxillary ridges, representing 57.2% of all addressed cases, were the most frequent ones, justifying the fact that the frontal maxillary area, aesthetically sensitive, is of special attention for both patients and specialists. Conclusions: In relation with the magnitude of alveolar bone transversal resorption and soft tissue anatomy, surgical procedures are required for bone addition, for obtaining acceptable aesthetic and functional results. To this end, evaluation of defects and systematization of the suitable addition techniques have been carried out. Keywords: augmentation, transversal defects, gingival biotype, aesthetic evaluation.

1. INTRODUCTION

Along with vertical bone offer in implant rehabilitation of anterior maxillary, the width of the alveolar bone is a clinical factor that should be taken into consideration. If the height of the alveolar bone can be easily determined by a simple radiograph (digital OPT), width is clinically evaluated exclusively by measurements, related to the thickness of the soft tissue or by analyzing digital 3D CT sections or CBCT sections.

Related to the degree of atrophy, addition plasty is needed for obtaining an aesthetic and functional result, optimal for implant insertion.

Growth of the transversal volume can be obtained by autogenic bone graft or by adding a granular substitution material harmonized with the soft tissue grafts.

Plastic additions can be applied in different steps, either before or while inserting implants, or when discovering the implant or after temporal prosthetic restoration.

Application of suitable augmentation techniques and a correct selection of the moment of insertion, along with knowledge on the degree and classification of atrophy of the edentulous maxillary are needed [1].

Several classifications of the hard and soft tissues in the upper-frontal area have been attempted at by periodontal practitioners [2, 3], however, none of them suitable.

The long-term success of an implant is assured by bone quality which, in the frontal area of the maxilla, where the aesthetic impact is important, it can be significantly improved by a good management of the soft tissues [4].

Implantology practitioners have been mainly interested in the evaluation and classification of hard and soft tissue in the anterior area of the maxilla [5]. Thus, Sclar has identified 6 particular defect types of anterior the maxillary sites, where minor or major bone defects, large and small soft tissue defects, associated minor or large defects, may occur.

SCOPE: To assess the importance of autogenic bone graft addition for correcting bone defects in the frontal and lateral maxillary area and for achieving outstanding aesthetic results in situations with large bone defects.

2. MATERIALS AND METHOD

In the Dental Clinic of the Emergency Military Hospital Sibiu, augmentation techniques have been applied between 2009-2013 for optimizing the bone offer for implants, of which more than half (57.3%) were addition plasty, augmentation of the sinus floor (22.5%), the remaining cases being subjected to surgery for vertical
augmentation of the ridge, autogenic bone grafts block, soft tissue grafts and guided-bone regeneration with mixed graft.

The implemented surgical techniques depended on the initial status and atrophy degree, which dictated the therapeutic solutions to be applied. Favorable solutions were met for patients with irretrievable incisors, present on the arch even prior to extractions.

Morphologically, the alveolar bone is large enough, having a vestibular cortical thickness over 2 mm and favorable gingival phenotype, thick and fibrous fixed mucosa and a width of more than 5 mm in the vestibular area. Implants have been inserted immediately after extraction, the quite large space, of over 1.5 mm, that circumscribes the shoulder implants, was filled with a granular 0.5-1 mm graft mixed with autologous bone chips. The soft tissues were easy manipulated by creating elongated or rotated flaps, and free or pediculate connective tissue flaps were applied when the gingival phenotype was unfavorable (4%), namely with the aspect of a thin, transparent gum, under 2 mm thick (Figs. 1-3).

Another category of patients, with previously extracted teeth, showed a sufficient maxillary alveolar crest with the possibility of inserting implants of 3.4-3.8 mm in diameter. Such cases are rare (9.5%), as vestibular cortical jaw resorption occurs rapidly, within 6-8 months losses of 35-40% of the bucco-palatal alveolar bone width being recorded. To ensure primary stability, augmentative measures were needed sometimes.

When the aesthetics was affected, bone contour correction was needed, as well as elongation of the vestibular flaps, repositioning of the muco-periostal flap and wound suture.

When the gingival phenotype was not favorable with a fixed lining width below 5 mm, soft tissue correction was preferred in the second surgical stage - by uncovering the implants, the used technique involving reshaping of the vestibular grooves and expansion of the attached tissues.

In few cases (5.8%), connective tissue transplants or pediculate grafts from the palatal site were needed. Average atrophy cases were most common (47.7%), characterized by the fact that, in spite of the presence of sufficient bone for achieving the primary stability of the implant, this is not sufficient to completely cover the implant, because the cortical bone is too thin - less than 2 mm - and fenestrations or dehiscence may occur, so that the implants had to be placed at a depth of 1-2 mm into the palate cortical bone.

In cases of favorable gingival phenotype, the Bilayer technique was preferred - double stratification (sandwich), grated autogenous bone applied directly onto the surface of the uncovered implant while, for improving the
vestibular bone contour, additional granular xenogeneic grafts (0.5 mm) were applied.

Collagen resorbable barrier membranes have been applied whenever a dehiscence of the vestibular cortical bone occurred.

When the gingival phenotype was not suitable in the secondary stage, that of implant uncovering, the rolled flap technique was applied to correct the vestibular level of the fixed and mobile soft tissue relations.

When the cross-cut atrophy was more pronounced, insertion of implants was not possible (12%), because primary stability could not be assured.

Augmentation is performed in two steps, by employing either xenogeneic granular graft and autogenous bone chips protected by resorbable membranes (4-6 months), or autogenous bone graft harvested from the ascending mandibular rami, fixed with screws and filling in of the periphery with small grained bone. In the second stage, after 6-8 months, the screws are removed, the implants are inserted and, if needed, correction of the vestibular bone contour with small grained bone particles is done. Problems occurred when the bone graft was consistent, not permitting to the soft tissue to cover the entire graft without the need of a fibrous-connective graft.

When resorption is both transverse and vertical, being caused by either trauma or prolonged use of acrylic dentures, reconstruction is extremely complex: double bone block transplant in combination with pedicle connective tissue transplant and implant insertion after 6-8 months. Corrections on aesthetics and gingival contour were done with temporary restoration crowns.

Patients who did not accept these surgical protocols received no removable partial denture, the vestibular defect being rebuilt from previous prosthetic saddles.

3. RESULTS AND DISCUSSION

The augmentation procedures to be applied in various cases are totally different, depending on the degree of atrophy. They may include contouring measures up to measures to stabilize reconstruction of the alveolar process. With the augmentation of the soft tissue, significant aesthetic improvements can be obtained in all stages. Bone block transplants taken over from the mandibular oblique line represent an additional operational stress. Despite the sufficient mobility of the covering muco-periosteal flaps in the augmentation area, as well, and despite an unstressed wound closure, dehiscence is frequently encountered above the bone transplant.

Over time, pre-implant diagnosis and planning and a clear conception of the process, considering the context of very different initial situations, may help to avoid errors. The current trends, recommending immediate or delayed implantation, are understandable, as they may avoid many of the described interventions. In these cases, incongruities can be treated by internal augmentations and, eventually, simultaneously applied corrective measures may create optimal conditions for long-term success.

In all atrophy stages, autogenous bone augmentation materials are preferred.

Particulate bone obtained from either the implantation cavity or the vicinity of the surgical field has proven effective in stages I-III. Therefore, it is only in stages IV-V that bone blocks transplantation is necessary to build up the foundation necessary for subsequent implantation. Autogenous bone transplantation has the advantage of the growth factors and cytokines, which creates prerequisites for regeneration. The receiving region offers favorable conditions as it is normally oxygenated with a partial oxygen pressure of 50-55 mmHg. Autogenous bone grafts taken from the donor site contain osteocompactating cells, islets of trabecular bone, blood clot fibrin and platelets. A few hours after autogenous bone graft insertion, the blood clot platelets degranulate and release the growth factors. Degranulation takes 3-5 days, whereas the growth factors are active in the following 7-10 days [6].

4. CONCLUSIONS

Resorbable bone substitute materials can have an important contribution to correcting contours. Alveolar ridge augmentation using connective
tissue transplantation is a very safe procedure. This adjusts the so-called soft tissue modeling. As to the bone graft, an essential clinical condition for graft integration is its stability.

References