Success *vs.* Failure Rate of Implant Treatment Correlate with Structural Aspects of Prosthetic Restoration

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Oral implant-prosthetic rehabilitation has opened a new era in modern dentistry becoming a trend among patients, sometimes without taking into account the possibilities and limitations of this technique or eventual failure. This study aims at analyzing and quantifying the decisional factors having a role in the success-failure rate for implant therapy, focused on the implications of structural analysis and design of implant-prosthetic rehabilitation.The clinical and laboratory evaluation of a batch of 85 edentulous patients to be rehabilitated by prosthetic implant, made to quantify essential factors that can lead the implant-prosthetic therapy to success or failure, special attention being paid to structural aspects of implant-prosthetic rehabilitation. In implantology, the success in therapy involves a careful and detailed preprosthetic treatment plan, the three-dimensional optimal application of implant, soft tissue management, the use of bone augmentation techniques and the ability to use various prosthetic components. In terms of functional rehabilitation it must be complementary to the aesthetics and vice versa, too. Compliance with the protocol of surgical and therapeutic observance of all therapeutical principles in choosing the type of implanto-prosthetic restoration are items

Key words: ceramic biomaterials, zirconia, augmentation, prosthetic implant rehabilitation

The treatment of the partial edentulous involves an application of artificial substitutes in the oral cavity, in order to restore the continuity of morphological dental alveolar arches and stomatognat system functions disturbed by the state of edentulous. To achieve this goal, it is necessary to obtain a perfect congruence between all stakeholders as clinics, materials and technology involved in producing gnatoprosthetic appliances[1,2].

Currently, the treatment of edentulous patients experienced impressive improvements in terms not only functional but also aesthetical, social interrelations and self-esteem as a result of implant therapy.For this reason, the modern implatology is considered the treatment of the century and allows to advance in the new millennium [3,4].Any aesthetic restoration requires imagination, talent and understanding of all dental-facial relationship that will influence the success of the treatment[5,6].

Currently, the treatment by dental implants has expanded considerably.This treatment can not be based on chance but on the right information, understanding the patient's problems, the recognition of the necessary treatment alternatives and the selection of the most important needs of the patient.The correct insertion of the implant is essential, involving the creation of a surgical intraosseous defect and the placement of the implant body [7,8].

Oral implant-prosthetic rehabilitation has opened a new era in modern dentistry becoming a trend among patients, sometimes without taking into account the possibilities and limitations of this technique or eventual failure [9,10].The continuous development of technologies in dental practice and the introduction of new biomaterials creates the premises of oral rehabilitation that meets both the aesthetic and functional criterion.

Experimental part

This study aims at analyzing and quantifying the decisional factors having a role in the success-failure rate for implant therapy, focused on the implications of structural analysis and design of implant-prosthetic rehabilitation.The clinical and laboratory evaluation of a batch of 85 edentulous patients to be rehabilitated by prosthetic implant, made to quantify essential factors that can lead the implant-prosthetic therapy to success or failure, special attention being paid to structural aspects of implant-prosthetic rehabilitation.

Results and disscusions

In implantology, the success in therapy involves a careful and detailed preprosthetic treatment plan, the three-dimensional optimal application of implant, soft tissue management, the use of bone augmentation techniques and the ability to use various prosthetic components [11, 13]. In terms of functional rehabilitation it must be complementary to the aesthetics and vice versa, too.

The ultimate objective of the treatment by dental implants must have a perfect prosthetic result to simulate the appearance of natural teeth. Physician's responsibility is to review the treatment options and to use the best strategy working to provide a favorable long-term prognosis.Implantation technique consists, however, in a consultation and a treatment plan properly conducted by the medical team.

The management of the reduced partial edentulous:the absence of dento-periodontal units from the arch is due to factors either congenital or the result of complications of dental caries and periodontitis which in time led to their extraction. Prosthetic treatment of a missing tooth is not an axiom, but in many situations the prosthetic rehabilitation of partial edentulous is not wanted to improve esthetics, masticatory function, phonetics and sometimes to avoid a worsening of the dental arches. Generally, the absence of tooth resorption is followed by the absorbtion of the alveolar bone, which exacerbates the scarcity of the tissue.

Osseointegration: Branemark's experimental studies led to the discovery of purely commercial titanium. Applying the pure titanium at the level of prepared osseous

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site one could realize a strong link, the phenomenon beeing lately described as osseointegration (fig.1).

Fig.1.Practical aspects of implants osseointegration

Nowadays, the factors that influence osseointegration are well known.A number of systemic and local factors were identified as being associated in obtaining the osseointegration interface.

Local factors are reprezented by the material, composition and the structure of the surface, temperature, contamination, initial stability, bone quality, immediate and delayed loading of the implant.

For a long time it was considered that osseointegration is achieved only in the case of very high purity titanium (Ti CPTI purely commercial or 99.75%), this material still standing as this phenomenon. But it is known that other materials can form close links with the bone (especially zirconium and certain ceramics as hydroxyapatite).

The composition and surface structure: The surface structure of the implant influences cell behavior. It has been found that the surfaces of microstructural changes in the direction and distribution of cells favoring the anchorage of the initial implant into the bone.

The increased temperature: The increasing of the temperature in excess of bone during surgery can lead to death of cells and denaturation of the collagen fibers. Because of this phenomenon osseointegration can not be completed. For this reason it is important that the implant site beeing prepared by controlling the thermal trauma.

Contamination: implant site contamination of organic and inorganic debrids could jeopardize the attainment of osseointegration. Necrotic tissues, bacteria, chemicals and debrids obtained by milling may have adversely effects.

Initial stability: when implanted applied perfectly in the osteotomy site, the phenomenon of osseointegration could achieve much better.The bone volume as a single factor does not influence osseointegration, but has a role in the application of dental implants.

Immediate loading: there are a number of studies indicating that immediate loading of the implant after its placement results in the formation of a fibrous capsule.

Delayed loading :Studies have shown that excessive mechanical forces applied on a dental implant can result in destruction of osseointegration interface (Albrektsson, 2000). Overloading can occur as a result of bruxism, in patients' increased occlusal force, but also because of the superstructural design of the implant.

Ceramic materials are inorganic, nonmetallic, nonpolimerice manufactured by compacting and sintering at high temperatures. These can be divided into metal oxides and other compounds.

Ceramic oxides have been introduced in surgical implantation devices because they are inert to biodegradation, are resistant over time due to their physical properties such as color and minimal electrical and thermal conduction, and have a wide range of specific elastic properties. In many cases, however, low flexibility and the property of being brittle were translated as drawbacks or limitations (fig.2).

Fig. 2. Practical aspect of implanto-prosthetic mettalo-ceramic rehabilitation

The alumina ceramics and zirconia-based produce contact osteogenesis, so around the implant it will be filed with lamellar bone, mechanically durable.

Thus, the forces of compression, torsion and bending are more than the strength of the compact bone compact three to five times.

These properties, combined with high modulus of elasticity, especially with fatigue and breaking forces, resulting in design specialized demands of these classes of biomaterials.

Ceramic based on aluminum oxide is different essentially from metals. Thus, aluminous ceramic implants have a very high hardness, which allows further editing only with diamond tools under running water, and a compressive strength far beyond that of the metallic implants. It has been reported that this material shows a contact with the bone and soft tissues similar to those seen in implants of titanium and can be used to produce implants or as a coating material.

The interface consists of a proteoglycan layer that is thicker than titanium (300-500 or 200-400). However the amount of bone formed during a period between 1 and 6 months post-implantation (rabbits) did not differ from the titanium implants and the zirconium .

Zirconium can be used successfully in both the infrastructure of fixed ceramic prosthesis, thus replacing metals and in manufacturing prosthetic implant abutments(fig.3).

Fig.3 Practical aspects of zirconia abutments

Zirconium proves its great applicability in complex oral rehabilitation being found both in the prosthetic implant abutments and infrastructural ceramic prosthetic.

While most reports in the literature on immediate restoration of the dental implants focuses on replacing a single tooth in the areas of aesthetic interest, however, they presented reports on restorations limited on dental implants in accordance with the procedures for lifting the maxillary sinus.

Maxillary sinus augmentation, to replace the lack of sufficient height of the posterior maxilla bone was well documented in the literature. The usual procedures involve creating a osteotomy on the side of the jaw, the osteotomy infrastructure allowing the access to the sinus cavity.

After an evaluation of the sinus membrane, the sinus cavity is ready to receive the grafting material.The implants can be left simultaneously or not with the procedures for implementing the sinus graft.

It was noted that the conventional healing time was between 6 and 8 months if the implant was performed in accordance with the maxillary sinus lifting procedures. The time needed for healing (about 12 to 16 months) is required if the procedure is first done with the sinus grafting and then the implant placement is done, as the bone regeneration was completed.

Recent techniques of local distribution of growth factors to improve the healing phase, the completion of substitutes graft (Platelet Rich Plasma) caused a decrease of the healing time before one could make the final restoration in less than 5 months[14] .

In an effort to shorten the surgical and prosthetic time of the patient treated with implant, completing the minimizing of the number of procedures that allow the gum tissue to mature around the implant placed in the posterior jaw, the placement of immediate restorations of the dental implants in connection with procedures of sinus lifting was performed.

A not traumatic surgical is required for an immediate implant placement related to sinus plasty. A special care should be taken to maintain the bone plate and bone vestibular interdental existent. It is very important that, in cases of sinus plasty, if the side wall of osteotomy way is supported to preserve sinus membrane.

The preparation of effective work area must preserve the integrity of the alveolar ridge, the post extraction socket, sinus cavity and posterior maxillary ridge. By removing any granulomatous tissue in connection with periodontal fibers that may be present in the surrounding alveolar bone it is mandatory and also providing an interface between bone and implant.

Creating an access path to the maxillary sinus is performed as follows: after an incision in the edentulous ridge space or a circular incision at a recent extractions or dental site reflects a muco-periosteal flap.

Access into the sinus is now total and the procedure for dental implant osteotomy appropiate placement was initiated, following the standard protocol for implant.

The autogenous bone graft is usually considered the best material available. It is osteoconductive, osteoinductive and osteogenic. One of the disadvantages of autogenous bone is the need for a secondary surgical step to strengthen the bone tissue. Many of these techniques need complex surgical procedures and add significant morbidity and surgical time.

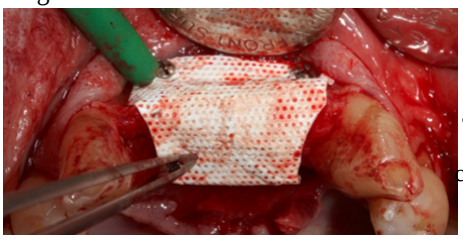

Fig. 4. Practical aspect of augmentation with xenograft and collagen membrane

Other options include the use of materials and xenograft or alloplastic graft with or without the use of various regenerative barriers(fig.4). All have been well documents. In addition, there is a consensus, although autogenous bone graft is desirable for sinus graft, the procedure was as successful as when it was applied with a layered approach using autologous bone from the surgical area.

The neautogenous grafting material should be compatible with the host tissue. Some materials rely on a vehicle reconstitution of the granular form (fig.5).

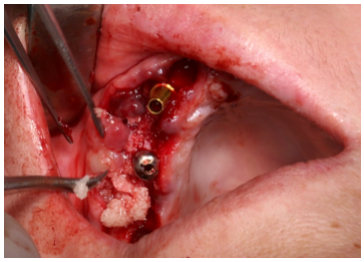

Fig.5. Introducing addition bone material

Selecting abutments support is accomplished by using the transport mechanism of the implant (temporary abutment) or as a reserve blunt (which can be used as a blunt end). Incorporating a surgical guidance system used by the author allows the reserve stump preparation anticipated in the dental lab. This eliminates intraoral preparations of abutments (which cause micro vibration and heat).

For the success of the prosthetic implant reconstruction it is not enough the balance of the periodontal tissue of the outstanding natural pillars healing around the implant and recently inserted. Equally important or evenmore important are the design, biostatics and biodynamic final prosthetic restoration.

From the point of view of support infrastructure (implants), one distinguishes an exclusive aggregation on implants, and a mixed one (on implants and natural teeth). Aggregation of fixed bridges are completed by cementing or screwing.

Cementation can be done both on natural pillars, and on artificial ones while screwing is practiced exclusively on the artificial pillars of the implants.

Fixed restorations with implant support, besides launching new prosthetic solutions edentation have determined the emergence of new possibilities for fixing the artificial pillars, namely, by screwing.

Screwdriving processes were known in traditional prosthetics but not the actual size of the prosthetic implantology, when substructures can always be mobilized on poles, cleaned, modified or reoptimized.

Note that this kind of prosthetic restorations changed the printing technology, too, in fixed prosthetics and mixed prosthetic aggregations borrowed from deployable prosthetic a number of damping devices.

In prosthetics implantology, endoosseous/endobone implants that are fixed with artificial pillars (traditional prosthetic dental abutments) are known as infrastructure and proper prosthetic restorations are called superstructures.

Usually, superstructures are made by pouring metal framework.

Designing a superstructure on the implants must take into account not only the shape and size of the tooth replaced, but the possible lack of substance (bone and / or soft tissue), which usually must be masked/hidden. In this respect, in the case of a fixed restoration with implant support, there are three possibilities:

The achieving an *extension* of the veneering material gum, pink, in the area;

Absent soft tissues that are not restored;

Conclusions

What contributes to long term implantar success? contribution of modern radiological techniques of evaluation, sailing soft, implantation techniques as key contributors to success with the balance tilting to reduce the rate of failure;

Compliance with the protocol of surgical and therapeutic observance of all therapeutical principles in choosing the type of implanto-prosthetic restoration are items.

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