ALLOPLASTIC GRAFT USED FOR ALVEOLAR RIDGE RECONSTRUCTION

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Keywords: *alloplastic graft, bone reconstruction,in-bone implant*

Abstract: *An essential part for the success of prosthetic implant reconstruction is played by the quality and quantity of the bone present at the site of implant insertion Nowadays, the treatment of choice for faulty bone ridges is considered to be the bone reconstruction supported by implants. In our case, we followed with the help of images and through conventional methods, the osseointegration of intrabone implants inserted in an alveolar ridge which had been previously reconstructed with an alloplastic graft.*

Cuvinte cheie: *grefă aloplastă, reconstrucție osoasă, implant intraosos*

Rezumat: *Un rol esențial în succesul reabilitării implantoprotetice îi revine aspectului calitativ și cantitativ al osului la locul insertiei implanturilor.Tratamentul de elecție al crestelor osoase deficitare este considerat astăzi reconstrucția osoasă susținută de implanturi. În cazul nostru, am urmărit imagistic, prin metode convenționale, osteointegrarea implanturilor endoosoase inserate în creastă alveolară reconstruită cu grefă aloplastă*

SCIENTIFIC ARTICLE OF BIBLIOGRAPHIC SYNTHESIS

As is well known, biomaterials are defined as "any substance or combination of substances that can be used during a clearly defined period of time, as a whole or a part of a system that treats, speeds up or replaces a tissue, organ or function of the human body " (Williams 1992, quoted by 1).

Thus, the science of biomaterials was born, with a rich vocabulary of new medical and scientific terms, which have the purpose of defining the interaction between a living organism and a material.

General Data

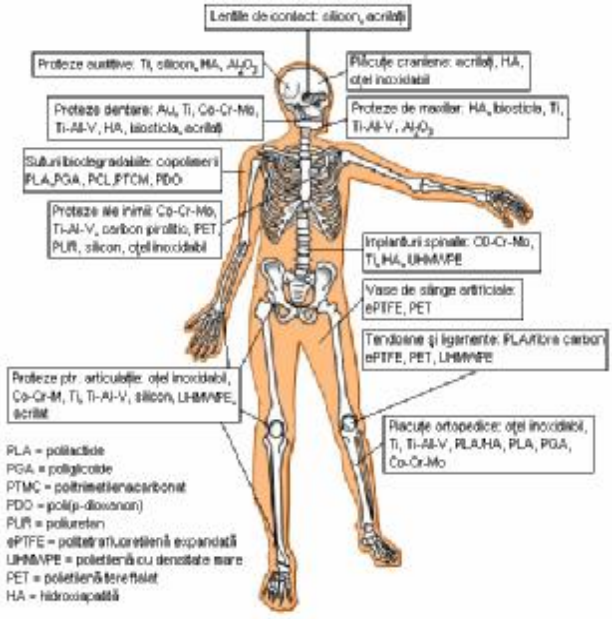
Orthopedics, plastic surgery, oftalmology, maxillo-facial surgery, cardiology, urology, neurology and virtually all branches of medicine, utilize over 400 different biomaterial products and 10% of their medical activities require the use of this materials for : diagnosis, prevention and therapy (Fig. 1.).

Biomaterials are also defined as lifeless materials, used in different medical fields, including oral implantology. Biomaterials must be compatible from a biological, mechanical and functional point of view with the surrounding internal environment and must lead to an interaction with the biological systems in the place where they are used. These are synthetic materials, designed with the porpoise of obtaining a favorable biological response within the body, used for the bone reconstruction in oral implantology, a porpoise for which they must be easily adaptable to as many as possible clinical and laboratory technologies.

Thus, during the evolution of oral implantology, a large number of materials were used for the construction of the dental implants and for various surgical techniques used in bone reconstruction. Out of this, only a small number of those materials, with certain mandatory proprieties and who proved themselves in the long run, were noted.

Biomaterials must meet a number of special conditions to ensure the formation of bone tissue. Inside the body's environment, these biomaterials stimulate the process of new bone formation within the receiving bone layer and at the same time they also affect the process of resorption (2.3)

Figure no. 1. Applications of biomaterials in medicine (1)



But, to reach the favorable biological response within the body, in the interaction with the biomaterial used in oral implantology, it must fulfill several conditions. Such as :

- in the first place, this materials must not cause harmful reactions, like a type of infection, a toxic reaction, an allergic reaction, a reaction to a foreign body or a chemical reaction, inside the human body

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- must have the ability to interact favorably with the alveolar bone and with the epithelial, peri-implant area, which is the barrier to the oral cavity
- must have favorable properties, of both structure as well as surface
- must tolerate the forces present at the level of the alveolar bone, under complex mechanical and chemical conditions
- it can be sterilized (4).

Biomaterials can also be classified by the way they act inside the body, namely: bioinert, biotolerated and bioactive.
But, over time, research in the field of biomaterials has revealed several of their desirable properties. Thus, in the early days of their use in all medical fields, the concept of "bioinert material" was deemed ideal. But this concept refers to the fact that the biomaterial does not react with the body's environment. In fact, it forms a mechanical bond with the bone. This class of materials includes titanium, tantalum, aluminum oxides, etc. (5)

Subsequently, after further histological, chemical, physical and biomechanical research, including the concept of osseointegration, a "biotolerated material" is considered to be "favorable". Thus, in this class fall the following materials, commonly used in dental medicine, namely: ceramics, Co-Cr-Mo alloys , methyl polymethacrylate, etc..

But the discovery of the osteoforming, stimulating role of some biomaterials has led to the founding of the "bioactiv material" concept. Specifically, these biomaterials are : hydroxylapatite, calcium phosphate TCP, bio-vitroceramics, bioglass, certain polymers and composites, in this class we can also find absorbable materials.

Thus, as many professionals of oral implantology are saying, we can consider that the types of biomaterials currently used for bone reconstruction are: hydroxylapatite, beta tricalcium phosphate, polymers, composites, bioactive glasses, calcium sulfate, etc..

Based on the principles of guided bone regeneration, biomaterials are used in the implanto-prosthetic rehabilitation, especially for the reconstruction of deficient alveolar ridges, both for those at the maxilla and those at the mandible (2).

Oral Implantology, due to its scientific precepts, techniques and specific materials, as well as the specific instruments used, has now become a basic specialty of modern dentistry (6). An essential part for the success of prosthetic implant reconstruction is played by the quality and quantity of the bone present at the site of implant insertion.

Specifically, after the tooth extraction, dimensional changes in the alveolar height and width occur, changes demonstrated both clinical and radiological. The goal of oral implantology is to actually restore normal form and function, aesthetic comfort, phonation and the health of the edentulous stomatognathic system, regardless of the existing bone atrophy and supply. The restoration of deficient bone volume is actually the condition for a favorable prognosis in oral implantology (8). But, the todays treatment of choice for deficient bone ridges is considered to be bone reconstruction with the help of dental implants. In practice, for the reconstruction of bone matter, the following types of materials are used : autograft, allograft, xenoplastic and alloplastic graft. In this case, we refer to an alloplastic graft, an synthetic material which stimulates the formation process of new bone and at the same time it also affects the process of resorption (9, 10).

In our case, we have pursued, with the help of imagistic and conventional methods, the osseointegration of intrabone implants inserted in an alveolar ridge, which had been previously reconstructed with an alloplastic graft (1).
During the course of performed treatments, I have encountered situations which required the grafting of bone matter with alloplastic material, from which we selected a case, which we will present with the help of imagistic methods.

The case depicts a female patient, age 36, who came to the center of dental medicine for the restoration of existing edentations, with either classical methods or dental implants, taking into account the existing bone matter present at this level.

During the examination of the orthopantomography, we can observe an existing apical inflammatory process at the level of the upper left first premolar (2.4), with significant loss of bone matter, as well as an reduction in available bone in the lateral maxillary area, due to a lowered sinus floor (Fig.2)

Figure no. 2. Preoperative orthopantomography

From the data obtained through anamnestic examination, in conjunction with imagistic examination, but also with the patients agreement, a preimplantation treatment plan and an implanto-prosthetic rehabilitation plan, has been determined, insisting especially on the part of reconstructive surgery at this level.

Specifically, we performed a partial ablation of the prosthetic work, the extraction of the upper left first premolar (2.4), with the restoration of the bone defect by adding, as well as the lifting of the sinus floor with an alloplastic graft, by using the "open sinus lifting" technique

Figure no. 3. Immediate postoperative orthopantomography. We can observe the "filling" of the post-extraction bone defect (the upper left first premolar was extracted)

After the healing period of the bone defect, which was a result of the dental extraction, we moved on to the lifting of the left maxillary sinus floor, through a classic intervention of open sinus lifting. During the same session with the sinus lifting, 3 dental implants have been inserted. The actual surgery was performed with the "open sinus lifting" technique, which is comprised of the osteotomy of the sinus wall, the separation of the mucosa, the insertion of the biomaterial in the newly created space, followed by the insertion of the 3 dental implants and finally realizing the suture (Fig. 5.)

Figure no. 4. Control orthopantomography at 6 months

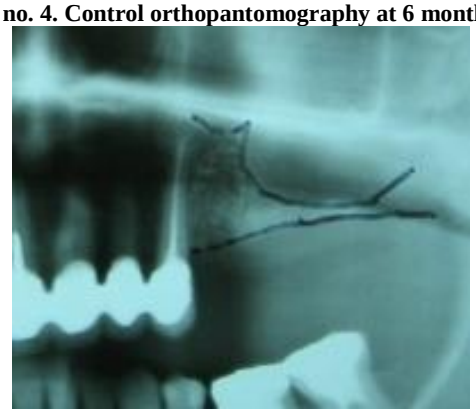
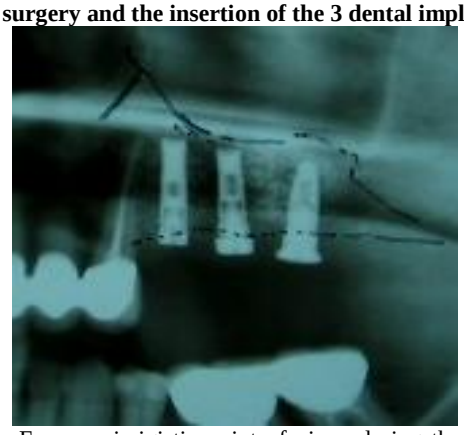


Figure no 5. Orthopantomography after the „open sinus lifting" surgery and the insertion of the 3 dental implants

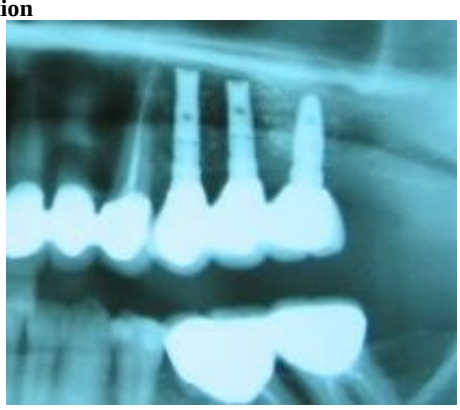


From an imigistic point of view, during the medical examination performed 10 months after the "sinus lifting" intervention, followed by the insertion of dental implants, we can observe around the latter osteocondensation and no bone resorption. After revealing the dental implants (the removal of the mucosa cover with the help of the circular scalpel), we observed their rigidity, the lack of painful symptoms at testing as well as an peri-implant mucosa without any inflammatory signs. Following this evaluations, we considered this dental implants as integrated into the bone and we continued to the phase of prosthetic restoration (Fig.6,7).

Figure no. 6. Control orthopantomography at 10 months.

In this case, the alloplastic graft was not only used to fill the immediate post-extraction bone defect, but also to elevate the sinus floor. After the completion of the bone enhancement, during the sinus-lifting surgery and after the insertion of the dental implants, immediately after surgery, the X-ray revealed a reduced bone-implant contact. Later, around the dental implants, a mature bone was formed, able to withstand occlusal forces.

Figure no. 7. Orthopantomography after the prosthetic restoration



CONCLUSIONS

In conclusion, we appreciate the fact that through the extraction of teeth, the alveolar process transforms into the alveolar ridge. During these transformations and later, at the level of the alveolar ridges, both, for the upper jaw, as well as for the lower jaw (for the mandible), processes of bone resorption and atrophy occur, which imprint certain features to the resulted prosthetic fields.

Specifically, during a first phase, depending on the degree of alveolar ridge resorption and atrophy, but also depending on the presence of remaining teeth in the arch, the treatment of choice was the standard prosthetic treatment, by fixed prosthetic restorations (prostheses conjunction, usually dental bridges) or by mobile and movable prosthetic restorations (adjoint prostheses, usually partial acrylic prostheses, total prosthesis or frame prostheses). Thus, modern treatment options, in the cases of bone atrophy, consist of the rehabilitation of atrophied alveolar ridges, reconstruction techniques using the addition and augmentation of bone, followed by implanto-prosthetic rehabilitation.

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