

AUGMENTATION TECHNIQUES OF THE NARROW EDENTULOUS RIDGES

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Abstract: Objectives: The paper aims at illustrating the ways of improving the narrow edentulous ridges, using the bone splitting technique through the classic methods; the degree of implant integration by the use of this technique; the success rate of the inserted implants both in the maxillary and in the mandible after the use of the classic bone splitting technique. Material and Method: The study has been done on a group of 62 patients with termino-terminal maxillary and mandible edentations, who have come to the Clinic of Oral Implantology from the Military Hospital in Sibiu for oral rehabilitation. They have benefited from an implanto-prosthetic treatment after the implant insertion in a bone split through classic methods. Results: Three years after the insertion, the term of mandible bone-integration has varied from 5-6 months and in the maxillary from 8 to 10 months, the success rate being of 98,3%. Conclusions: The capacity of bone integration of the implants in the split bone depends on the integrity of the bone walls resulted after the splitting, the quality of the bone surface surrounding the implant as well as on the primary stability of the inserted implant.

Keywords: bone splitting, osteotomy

Rezumat: Obiective. Lucrarea urmărește: evidențierea modalităților de îmbunătățire a creștelor edentate înguste folosind tehnica despicării osoase prin metode clasice; gradul de integrare al implantelor folosind această tehnică; rata de succes a implantelor inserate atât la maxilar, cât și la mandibulă după ce am folosit tehnica despicării osoase clasice. Material și metodă. Studiul a fost efectuat pe un lot de 62 de pacienți cu edentații termino-terminale maxilare și mandibulare, care s-au prezentat în Clinica de Implantologie Orală a Spitalului Militar din Sibiu, pentru reabilitarea orală. Aceștia au beneficiat de tratament implanto-protetic în urma inserției implantelor într-un os despicat prin metode clasice. Rezultate. În urma studiului efectuat pe o perioadă de 3 ani de la inserție, termenul de osteointegrare la mandibulă a variat între 5-6 luni, iar la maxilar între 8-10 luni, coeficientul de succes fiind de 98,3%. Concluzii. Capacitatea de osteointegrare a implantelor într-un os despicat depinde de integritatea celor doi pereți osoși rezultați în urma despicării, de calitatea patului osos implantat precum și ca stabilitatea primară a implantului inserat.

Cuvinte cheie: despicare osoasă, osteotomie

INTRODUCTION

The modification of the seat of the implant involving the quality and the bone dimension has an increasing importance in the differential choice of the implantologic therapy concept. The common aim of all the treatment methods is to obtain an implant seat that is biologically adequate, properly blood supplied, in other words: alive.

Once the teeth are gone the resorption and atrophy of the alveolar crests begins, the morphologic modifications of the of the alveolar crests becoming more and more intense as the edentation grows older. The three dimensional available bone can only be partially estimated through a clinical exam, the rest of the information coming from the imagistic methods of examination (the retro-alveolar radiography, the ortho-pan-tomography, the profile teleradiography, the computer-tomography, the nuclear magnetic resonance NMR) .

It is well known the fact that the minimum width of the available bone necessary for an implant insertion is of 5 mm for the screw type implants; this is why when there isn't enough bone width we can use osteotomies to enlarge the horizontal contour of the bone. In the distal mandible area we usually find a bone with D2 density and in the distal maxillary area, a bone with D3,D4 density, an extremely important fact since the density of the available bone has a major importance in establishing the treatment plan and the surgical approach , influencing the healing period , the selection of the implant type and the period of the progressive healing of the bone.

The bone density can itself be improved when the methods of the bone crest augmentation are used with the help of bone grafts .The horizontal contour of the alveolar crest can be extended when it is too narrow – blade type- by using the bone splitting technique and its augmentation with granular grafts. The alveolar and palatine bones are pushed laterally and the crest extends in a vestibular-oral direction. These sharp crests (below 6 mm width) are split through classical methods (calibrated drills and chisels) or through piezo-surgery (ultrasound emission under intense cooling of the bone)

The objectives of the two splitting techniques are: the obtaining of an alveolar crest with a width suitable for the implant insertion requirements.

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The classical method initially uses the globe drill for creating the osteotomy contour lines. Using these guidance lines, the splitting of the crest is then done consisting of an osteotomy which corresponds to the longitudinal axis of the implant, as well as two vertical osteotomies at 5 mm mezially and distally from the future implant insertion spot after the osteotomies have been done. The vestibular cortical will be slightly pushed vestibullary with the help of a chisel. In the obtained space and after the neo-alveoli have been created, the implant will be inserred, the remaining space between the implant and the periimplant walls being augmented with bone grafts particles; the barrier membranes are applied only optional.

The advantages of the splitting technique of the edentulous crest are given by:

1. The improvement of the bone offer with the simultaneous placement of the implant
2. The primary stability achieved through micro-fixation
3. The low cost comparing to the utilization of the membranes.

With the purpose to increase their deficient width and in the same time to offer them the possibility of implant insertion with proper diameters we have split the narrow edentulous crests.

The apex of the neo-alveoli is positioned deeper comparing to the inferior extremity of the longitudinal split with the purpose to offer a better primary stability to the future inserted implants.

The resulting space after the crest splitting has been filled with particles of bone graft mingled with blood in order to avoid any defect around the implant.

After applying the bone graft particles follows the repositioning of the muco-periostal skin graft and its suturing.

MATERIAL AND METHOD

The study is based on an implant-prosthetic restoration done to 25 patients with termino-terminal old mandible and maxillary edentations with resorbed alveolar crest vestibulo-orally, fact that has imposed the utilization of the classical osteotomy technique- splitting surgery- and the augmentation with granular graft, evaluating the degree of implant integration.

We have used a single type of implant- Witall (Fa. Wieland, Germany) and as augmentation material- granular graft of 0,5- 1mm and resorbable membranes Bio-Oss (Fa. Geislich, Switzerland)

The clinical and paraclinical examination (OPT,CT) have shown that:

- 3 out of 15 patients with termino-terminal mandible edentations presented a very intense resorption of the alveolar crest and an impression of the submaxillary gland on the internal face of the horizontal part of the mandible, situation which has not allowed the insertion of the implants together with the osteotomy and the crest augmentation. This is why in their case we have done two surgeries: first- the crest augmentation followed by the implant insertion after

4 months.

- 2 out of 10 patients with maxillary termino-terminal edentations had resorptions of the alveolar crest vestibulo-orally and also an expansion of the maxillary sinus with resorption in the alveolar process with a low quality of the bone density. This is why in their case it was necessary a bone reconstruction in the distal maxillary bone area by lifting the sinusal floor, also splitting osteotomy followed by implant insertion after 6 months from the first intervention.
- Out of the 12 patients with termino-terminal mandible edentations, 4 of them had resorbable membranes applied after the splitting of the crest and the insertion of the implants- in the places where the wall presented a fracture line being necessary the reconstruction of the crest from the vestibule using granular bone graft.

Approaching the narrow crests through splitting (splitting osteotomy) using classical techniques

This augmentation technique of the crest through splitting (splitting osteotomy) is used when there is a narrow crest in vestibule-orally way.

In the Dentistry Clinic of the Emergency Military Hospital from Sibiu we use the two methods: the classical one-with chisels and the modern one using the piezosurgery machine. However, this paper deals only with the classical method of crest splitting.

The objectives of both the splitting techniques are obtaining an alveolar crest with a width to satisfy the necessary requirements of the implant insertion. The two techniques are different from the surgical instruments used for splitting the edentulous crest, the classical method (manual) uses the chisels while the modern method (mechanical, less invasive and atraumatic) uses the piezosurgery machine. For both the techniques an oralised paracrestal incision will be done accompanied by two vertical incisions of release. After taking off the muco-periostal graft the splitting of the edentulous crest will be done.(fig. 1)

Picture no. 1. Taking off the muco-periostal graft (Dr. V. Nicolae archive)



The classical method uses in the beginning the spherical drill for creating the contour lines of osteotomy (picture no. 2) Using these guidance lines the splitting of the crest is then done which consist in executing an osteotomy which corresponds to the longitudinal axis of

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the implant, as well as two vertical osteotomies situated at 5 mm mesially respectively distally from the future spot of insertion of the future implant after the osteotomies. (fig 3,4) The vestibular cortical will be slightly pushed vestibullary with the help of a chisel. In the obtained space and after the neo-alveols have been created , the implant will be inserted , the remaining space between the implant and the periimplant walls being augmented with bone grafts particles; the barrier membranes are applied only optional. (fig 5,6,7,8)

Picture no. 2 Creating the lines of osteotomy (Dr. V. Nicolae archive)



Picture no. 3. Splitting the crest with graded chisels (Aeskulap Set– graded chisels from 8,10,12)



Picture no. 4 The splitted crest and the distal vertical versant for detensioning the vestibular versant of the crest (Dr. V. Nicolae archive)



Picture no. 5 Creating the neoalveos with sword drills (Dr. V. Nicolae archive)



Picture no. 6 The implant insertion with drilling design (Dr. V. Nicolae archive)



Picture no. 7 The augmentation with the granular graft of the resulted spaces after the crest osteotomy (Dr. V. Nicolae archive)



Picture no. 8 the suture of the grafts (Dr. V. Nicolae archive).



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RESULTS AND DISCUSSIONS

The term of the bone integration in the mandible has been between 5-6 months and in the maxillary 8-10 months after which the implants have been loaded. None of the inserted implants in this study have been immediately loaded.

There have been cases in which the maxillary bone in the distal area with a D4 density required spitting but also the compacting of the bone walls transforming the D4 density bone in D3 density bone the neoalveols being created with the help of the osteotoms.

The classical bone splitting technique is seemingly an inconvenience when the bone walls are very thin, the precision in executing the splitting without fracturing the vestibular wall being deficient. The partial or complete fracturing of the vestibular wall has led to a partial or complete loss of the implant primary stability.

When the vestibular wall has been fractured we have obtained the primary stability through:

- The deepening of the neoalveol – when the bone offer allows it –
- The reorientation of the insertion axis of the implant possible especially in the maxillary where the implant is reoriented towards the palatal cortical much more consistent and generous
- Keeping the partially fractured bone and augmentation with granular bone graft Bio-Oss (Fa. Geistlich Germany) then also covering with a resorbing membrane Bio-Guide, (Fa. Geislich, Switzerland)

CONCLUSIONS

After the study we can draw the following conclusions: using the osteotomy splitting technique for the narrow edentulous crest augmentation we have succeeded the implant insertion but the bone-integration period has been longer both in the maxillary and in the mandible. The capacity of bone-integration of the implants in a split bone depends on

- The integrity of the two bone walls resulted after splitting
- The quality of the primary implant bone
- The primary stability of the implant inserted in a split crest

A major part in the long term success of the implants is played by the following of the prosthetic and surgical treatment as well as by the hospitalising program from the end of the prosthetic stage.

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