DISTRACTION OSTEOGENESIS IN IMPLANT DENTISTRY

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Abstract: *When dealing with severe bone atrophy, implantologists and oral surgeons have many options to restore the lost bone including: sinus lifting, IAN lateralization, bone splitting, bone condensing and distraction osteogenesis. Case report: The paper presents the case of a 54-year-old male diagnosed 3 years ago with carcinoma of the floor of the mouth. He was subjected to a marginal anterior resection and modified neck dissection. Histological exam for the lymph node proved to be negative. After a non eventful follow-up period, the surgical team placed an internal distraction device, followed by insertion of 4 implants and prosthesis. Results and discussions: distraction osteogenesis represents a viable option in treating bone deficiencies. The good results obtained by us confirm the importance of this surgical technique that has many advantages. One of the many advantages of the technique is that is does not require a donor site for graft, it enhances both hard and soft tissue together and the resorption is kept to minimum due to good blood supply, the transplantation also having periostal vessels and the minimal complications.*

Cuvinte cheie: *osteodistracție, atrofie osoasă, reconstrucție implanto-protetică*

Rezumat: *În defectele osoase importante ale proceselor alveolare alături de reconstrucția acestora cu ajutorul grefelor osoase sau a altor tehnici chirurgicale alternative precum: sinus lifting, lateralizarea nervului, bone splitting, bone condensing s-a impus și osteodistracția procesului alveolar pentru a permite inserarea implantelor. Prezentare de caz – Este vorba despre un pacient de 54 ani operat în urmă cu 3 ani pentru carcinom spinocelular (scuamos) de planșeu bucal anterior (T2N1aMo) la care s-a făcut ablația tumorii cu rezecția segmentară a procesului alveolar anterior și evidare ganglionară supraomohioidiană bilaterală, ganglionii fiind negativi la examenul anatomopatologic. Datorită evoluției favorabile a afecțiunii de bază se efectuează osteodistracția procesului alveolar restant în zona anterioară a mandibulei (interforaminal), urmată de inserarea a 4 implanturi și reconstrucție protetică conjunctă. Rezultate și discuții – Elongarea dirijată a procesului alveolar constituie o alternativă viabilă în refacerea defectelor osoase pentru a permite reabilitarea implanto-protetică. Rezultatul bun obținut de noi confirmă importanța acestei tehnici chirurgicale ce are multiple avantaje: elimină o nouă intervenție de recoltare a unor grefe osoase, obținerea concomitentă a unor țesuturi moi, resorbție minimă, transplantul având și vase periostale, complicații minime.*

INTRODUCTION

Implant supported prosthesis is often hard to manage in sites where there is a severe bone atrophy caused by early edentulism, age, systemic disease, tumour resection. The standard techniques used to treat such cases require the knowledge of experienced surgeons and are often associated to many complications.(1)

The introduction of distraction osteogenesis led to more accurate bone management with good efficacy allowing implants to be placed in more favourable prosthetic positions. This technique is derived from orthopedic treatment and it was first described in the past century, when a report mentioned that an orthopedist tried to fix a femur fracture with an external device. The result was not bone fixation but rather progressive bone elongation. The final result was the achievement of good quality new bone tissue. The Russian orthopedist Ilizarov is the one who applied the technique in large bone defects.(2) This method was introduced to current maxillo-facial practice after the '90. After 1996, the treatment was applied to alveolar bone deficiency and led to new bone formation with a good blood supply.(3)

A bone fracture when it heals, it passes through several stages and it relies on a bone callus. The blood clot between the 2 bone fragments will turn into a mesenchyme tissue. The macrophages cells will resorb it and the fibroblasts will form a fibrous tissue which will mature in an osteoid tissue. This tissue will receive minerals thus forming a bone tissue that will reshape itself.(4)

When a distraction device is applied in an osteotomy site, it will impact on the newly formed non mineralized bone tissue and it will lead in a new bone formation with a good supply. Also, soft tissue will follow the regenerated bone.(5)

CASE REPORT

We followed up on a period of 6 years, a 54-year-old male patient diagnosed with squamous carcinoma of the floor of

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the mouth staged T2N1aM0. A surgical marginal resection of the anterior arch was performed with tumour extirpation and modified bilateral neck dissection. The histological report confirmed the diagnosis of the preop biopsy and the lack of metastasis in the cervical lymph nodes. 3 years later, because there was no relapse, an implant driven prosthesis was planned.

Prior to implant insertion, there was the need to reconstruct the resected bone. After preoperative exams including: blood tests x-ray and computer tomography (figure no. 1,2), an intervention was outlined which meant the use of bone distraction devices.

Figure no. 1. Preoperative OPG showing the anterior bone defect

Figure no. 2. CT with 3D reconstruction of the defect

The treatment was done under general anesthesia (nasal intubation). A horizontal incision was performed in the vestibule. A mucoperiostal flap was reflected and the 2 mental foramens are visualized and the mental nerves preserved. There was no reflection on the lingual side. Using surgical disk and oscillating saws a segmental osteotomy was performed (figure no. 3).

Figure no. 3. Osteotomy done with oscillating saw

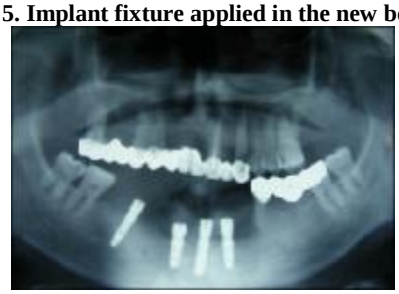
The mobilized segment was 5mm in height. The displacement was done using special chisels. According to the CT, an internal distraction device was chosen preoperatively. The device was placed and fixed with the help of osteosynthesis screws (figure no. 4).

The device was set to have a distance of 2mm between its arms. This distance was necessary for the stabilization of the blood clot.

Figure no. 4. Osteodistraction device fixed into place

7 days postoperatively, the sutures were removed and the device was activated as to obtain an increase in height of 1 mm/day. After there was sufficient height, the device was fixed in that position and allowed for the bone to heal for approximately 3 moths. 3 moths later, the device was removed and 4 implants were placed (figure no. 5). After another 3 moths, a dental prosthesis was fabricated. The patient is followed up, at the last check-up (3 years postoperatively), there are no sign of relapse or implant disorders.

Figure no. 5. Implant fixture applied in the new bone



DISCUSSIONS

The present case was followed up for a period of 3 years after distraction osteogenesis and 6 years after the carcinoma resection. The present case confirms other reports from the literature of good results using this method even in oncologic cases.

The other option included the use of autologous or heterologous grafts. The main advantage of the distraction osteogenesis is the preservation of the lingual soft tissue including the blood supply. At follow-ups, there was little resorption of the newly formed bone (5% after 3 years, analyzed using the x-ray exams). There were no immediate complications such as dehiscence with exposed bone, infections or fractures of the mandible.

When using other techniques such as augmentations with autologous or heterologous bone grafts the resorption rate is much higher, some reports indicate a rate of even 30%.(6) When dehiscence is observed or there is an infection at the surgical site it can be managed using a liquid or semiliquid diet, antiseptic mouthwashes, wide range antibiotics (amoxicillin) according to the antibiotic sensitivity test. The infection is usually managed in a couple days. There are no reports regarding deep layers infections. The systemic contraindications of this method are the ones found in general implantology or other augmentation procedures. They include the pathologies that interfere with wound healing, bone metabolism and can favour the presence of complications. These types of contraindications can be managed when the surgeon collaborates with other specialists and a careful preoperative examination and treatment is done.

This procedure should be avoided in patients who undergo bisphosphonates therapy or had radiotherapy in the maxillo-facial region.

Regarding local complications, the minimum requirements are: a vertical height of 8 mm and width of 7 mm in order to prevent fractures and to be able to place implants.(7,8)

CONCLUSIONS

Distraction osteogenesis represents a good technique in achieving newly formed bone lost because of atrophy, trauma, and tumour resection. The complications often encountered in autologous graft augmentations are avoided. Also, there is no second site morbidity; the overall treatment time is reduced. The resorption is kept to a minimum because the technique implies the superior movement of a vascularised hard and soft tissue flap with proper blood supply. There is no need for further mucogingival surgery.

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