LATERAL BONE EXPANSION FOR IMMEDIATE PLACEMENT OF ENDOSSEOUS DENTAL IMPLANTS

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Abstract: The study included 10 patients, 28 endosseous implants “AlphaBio” were placed in the alveolar ridge, using the split control expansion technique and the immediate implant placement. This study showed that, as the result of using the split control technique of treatment, an expansion of the alveolar bone of 3 to 4 mm has been achieved, and it allowed the immediate placement of dental implants and the loading 4 months postimplant placement. The benefits of this technique make it much better that the existing traditional ones and allow the possibility to prepare the alveolar bone and the immediate placement of the endosseous dental implants, without any controlled vertical and horizontal expansion of the alveolar bone with osteotomes. Bone expansion and compaction technique using osteotomes allows condensing the spongy bone by alveolar horizontal resorption. The osteotome technique represents a substantially less-invasive procedure for controlled alveolar horizontal expansion (especially in lateral sites of the mandible).

Keywords: Endosseous implants, alveolar bone resorption, alveolar bone condensing, alveolar bone expansion.

INTRODUCTION
Currently, the rehabilitation of occlusion with dental implants is considered to be one of the most modern and efficient treatment methods for edentulism [1-2].

Most edentulous patients lose teeth as a result of various local dental-periodontal diseases, dental caries complications, infections, traumas, tumors, inappropriate iatrogenic dental treatments, and the use of dental implants is the only possibility to anchor the prosthetic denture and complete the restoration. At the same time, the use of implants limits the need for bridgework; avoids sacrificing the vitality and the use of endodontic treatment of the pillar teeth.

At present, the patients are more interested in dental treatments that have better esthetic results and procedures that demand less treatment time. Dental prosthetic restorations on implants have shown good functional and psychological results, which are beneficial to patients (develop their sense of freedom, allow them to have the desired diets, reduce any speech phonation defects, eliminate smile restrictions, lead to an improved personal health condition, physical appearance and emotional feedback).

Placement of endosseous dental implants can be a problem due to the alveolar bone resorption, both vertical and horizontal. This happens after the extraction of teeth if the patient has been missing teeth for a considerable period of time. It is well known that 6 months after tooth extraction there appears a dimensional reduction of the alveolar ridge to $4.2 \pm 0.48$ mm in width, and $1.5 \pm 0.14$ mm in height. It is also known that after a year there is 25% reduction in the bone volume and during the first 3 years after the extraction, it increases to 40-60%.

In the literature, bone-grafting techniques have shown variable results. Additionally, bone grafting requires a longer treatment time and a need for a second surgery, and it adds significant cost to the treatment. These factors often discourage patients from having dental-implant treatment.

Another technique for placement of dental implants in narrow bone ridges is: repositioning and remodeling of alveolar bone by controlled condensation and expansion.
This technique uses “screw”-type configuration osteotomes and threadformers with increasing diameters. This article presents clinical cases for placement of endosseous dental implants with the use of osteotomes method for controlled condensation and expansion of the alveolar bone. [3-4].

PURPOSE

Decrease pre-prosthetic treatment time with the immediate placement of dental implants using the osteotomes method for controlled condensation and expansion of the alveolar ridge (split control technique).

MATERIALS AND METHODS

The study included 10 patients aged between 20 and 45 years. 28 "AlphaBio" implants were placed. The clinical and radiological examinations, traditionally used in dental implantology, have revealed the indications and patients’ prosthetic rehabilitation potential with dental implants placement, using controlled condensation and expansion of the alveolar ridge (split control technique). Depending on the type of edentulism and other parameters, the number of implants placed to a patient varied from 1 to 5.

The Bone Expansion Kit (the Meisinger Split Control Bone Expansion Kit) was used to solve these problems. The kit and the technique consist of pilot burs (with diameters of 1.0 mm and 1.8 mm), a disk used for crestal bone splitting, expansion burs that allow condensing of the bone, and threadformer burs. With the help of the carrier, the non ablative threadformers may be carefully screwed into the osteotomy site so as to spread the cortical bone and condense the cancellous bone.

Surgical technique: After raising a mucoperiosteal flap, using a thin separating disk and then a 1.0-mm-diameter pilot drill, a thin trench is created, 0.1 -0.2 width and 5.0 – 6.0 length, depending on the defect. The depth of the trench is maintained at 10 mm vertically, using the 1.0-mm pilot drill, which is the select length of the implants to be used. At each terminal end of this trench, the bur is pushed slightly toward the buccal wall to create a “weak” point for the buccal wall. This is done due to the hard cortical bone and to allow the entire buccal wall to expand. If a crack would appear, it would still be held in place by the intact periosteum. The Meisinger expansion burs are then used in the two-three select sites where the implants are to be placed. Care is taken to go only half way in diameter in the first site, and then start in the second site. This gradual alternating of the mesial and distal sites allowed equal expansion of the bone on both sites, along with uniform expansion. Once expanded to the desired diameter, the implants are placed. Bone-graft material is used to fill the trench between the implants. Soft tissue is approximated, and primary closure is achieved.

Clinical case: Patient S.S., a 45-year-old female, presented for replacement of the missing maxillary right lateral teeth 45; 46. The teeth had been extracted 3 years ago, and the patient is currently wearing an acrylic resin bridge fixed on teeth 44; 47. Because of the pressure in pillar teeth, tooth 47 lost its stability and was extracted. The patient was offered the option of block-graft augmentation by taking bone either from the chin or the mandibular ramus, then waiting approximately 6 months to 8 months, followed by implant placement. Then, the patient would possibly have to wait for another 6 months prior to final recovery and prosthetic restoration. The total treatment time was about 12 months. This was unacceptable to the patient. The second option was to try placement of dental implants by expanding the bone using the Meisinger bone-expansion system. The patient chose the latter, due to reduce time and cost, as well as not
desiring an additional surgery to harvest

Clinical exam: (Fig. 1; 2) reveals partial mandibular edentulism on the right side, the patient missing the second premolar and both molars. It was decided to place a 10-11,5 mm length, 3.75 mm diameter AlphaBio implant, using the Meisinger split control expanding and condensing technique. The patient was prescribed pre and postimplant placement anti-inflammatory medicines.

The site was anesthetized using local anesthetic Sol. Ubistesini forte 4% - 3,4 ml. A crestal incision was made, but only minimal tissue reflection was done in order to preserve the periosteum attachment surrounding the buccal and lingual bone. This was done as it was feared that the buccal bone plate may crack. Keeping the periosteum intact would facilitate repositioning of the fragments and achieve good healing.

Using a thin separating disk (Fig. 3) and then a 1.0-mm-diameter pilot drill, I created a thin trench 5.0 mm distal from the medial side of the first premolar on the right of the mandible. The depth of the trench was maintained at 10 mm vertically, using the 1.0-mm pilot drill, which was the select length of the implants to be placed. At each terminal end of this trench, the bur was pushed slightly towards the buccal wall. Then I used the Meisinger expansion burs in the 2 select sites, where I placed 3 implants, Fig. 4 (a; b) Bone-graft material was used to fill the trench between the implants. Then I approximated the mucoperiosteal tissue, and achieved primary closure without any problems. As can be seen, a significant increase was achieved in the bone dimension, which enabled the placement of endosseous dental implants. The following surgical procedures were performed after 4 months.

Fig. 1. Radiograph before treatment

Fig. 2 Photograph before treatment

Fig. 3. A separating disc being used to decorticate the crest of the ridge
RESULTS
During the controlled bone expansion and implants placement on the mandible, using this method, no bad results were detected. On the 7th day of the treatment, the healing was normal and the sutures were removed. Of the 10 patients (28 implants), 1 patient had a hematoma in the proximal cavity. On the second day after surgery, four patients developed a swelling of the gums and the adjacent soft tissues. It was expanding, became maximal on the 2nd day, and gradually disappeared by the 4th day. On the first day after surgery, the patients accused slight pain and were prescribed painkillers. The sutures were removed on the 7th days after surgery. In two cases there was partial dehiscence of the wound with healing per second by the 10th day. At the second phase the gums covered the implants and they did not differ from the neighboring ones. The radiologic exam of 3 implants showed a medial cortical bone resorption of 1.2 mm (minimum - 1mm, maximum - 2mm). In one patient two implants were not integrated and were rejected on the 25th day, but they were replaced by other implants with a larger diameter 30 days later. This phenomenon has also been described by other authors [5].

When implementing these methods, we followed the principle of postextraction wounds epithelization. It is known that dental extraction with minimal trauma of the adjacent tissues and the blood clot, which fills the postextraction socket, facilitates wound epithelization in a shorter period of time (7-10 days). Along with other factors, blood vascularization plays an important role in osteogenesis, as well as, in preimplant placement remodeling [6]. There is evidence [3] that more than 70% of the blood supply of the maxillar cortical bone comes from the periosteum. Recent studies [4] show that traumas of the
periosteum, especially the maxilla, cause obvious cortical resorption. We can say that raising mucoperiosteal flaps leads to dysfunctions in the nutrition of the bone, and, probably, impedes its complete restoration and contributes to cortical resorption. At the same time, we should also mention the fact that the controlled expansion of the alveolar bone with immediate endosseous dental implants placement is a challenging technique and can be used by clinicians who have appropriate experience in oral implantology and oral maxilla-facial surgery. A prerequisite for using this method is the presence of an alveolar diameter not less than 3 mm in thickness.

CONCLUSIONS AND DISCUSSIONS

This study shows that the use of the respective technique leads to an expansion in the alveolar bone of up to 3-4 mm, which allows the immediate implants placement with their functional loading 4 months after placing the implants.

This method allows:
- The immediate implants placement in narrow ridges at the time of expansion
- The possibility to be used in both the maxilla and mandible with some technique modification
- The use of controlled and gradual force application
- Requires less time from first surgery to final restoration as compared to the use of block grafts
- Is minimally invasive
- Is cost effective
- Can be used with most commercially available implants

Using the same concept of bone compaction and expansion as in the Summers’ osteotomes, the Meisinger Split Control Lateral Bone Expansion kit uses increasing diameters of bone-condensing burs and threadformers of gradually increasing diameters, which allows controlled and gradual expansion. This technique offers a viable alternative to bone grafting in select cases for lateral bone expansion where teeth have been missing for a considerable period of time.

REFERENCES