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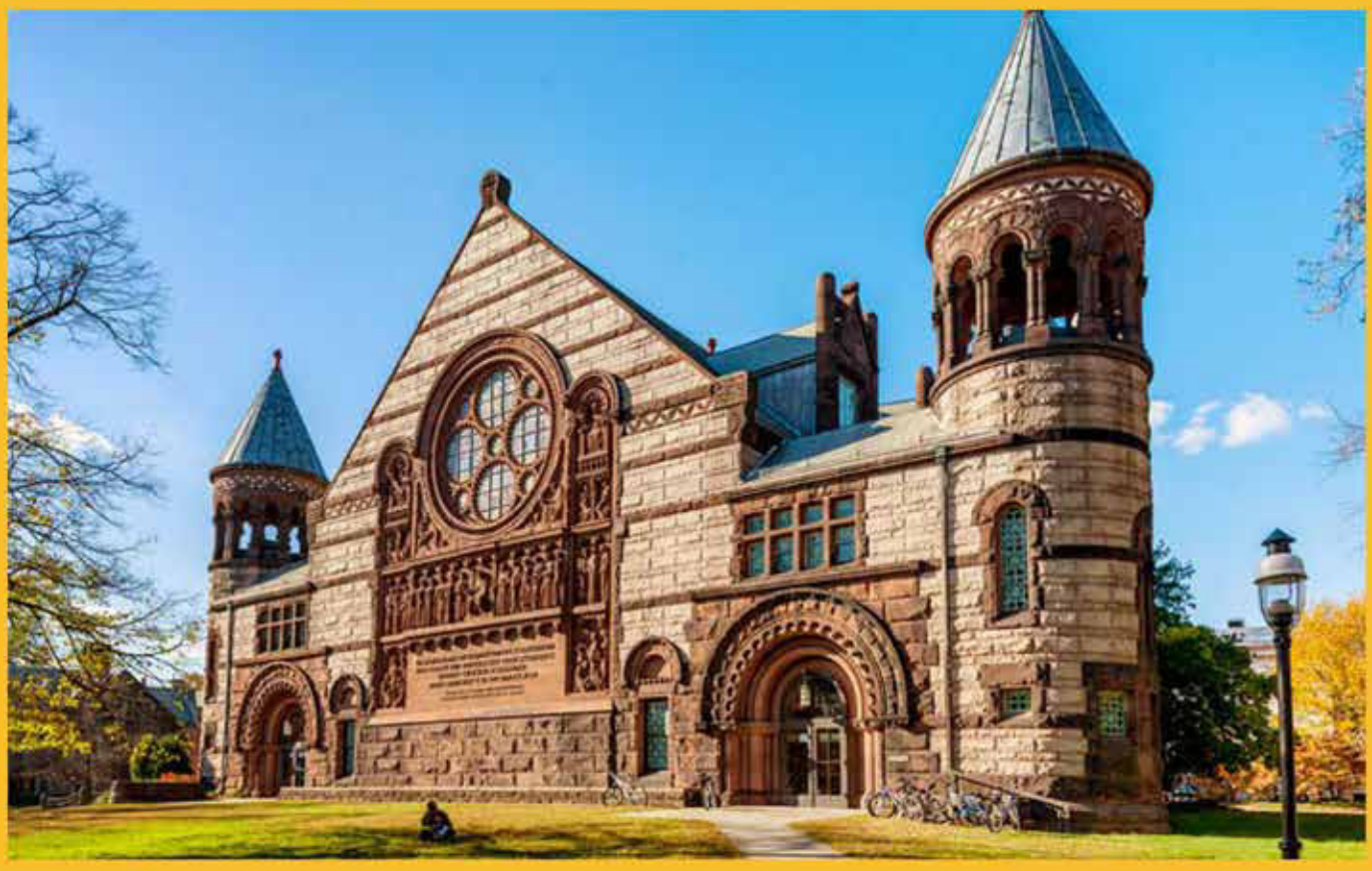

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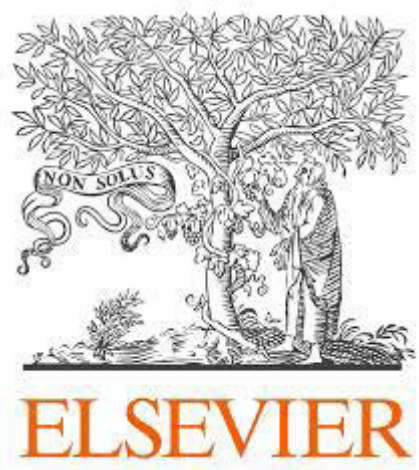

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Bio-patch bone regeneration as a predicted method of the vertical augmentation of the lower jaw distal sections

Abstract: So, the majority of the implant surgery procedures is the typical every day routine of the dental clinics. The aim of the department of the children and dental surgery of BSMU except for improving the implant surgery procedures is also to introduce the effective and minimal invasive methods of elimination of the complicated dental alveolar pathology and complicated atrophy which limit or make the dental implants setting impossible. Taking into account significant groundwork and scientific researches of the foreign colleagues it's quite difficult to introduce authentic techniques, though improving and adopting of the existing methods by doctors-stomatologists is an important task of the department staff.

Keywords: invasive methods, sub-antral augmentation, auto-xenotransplants, augmentations.

With every year a number of patients asking for implantation is steadily growing which is caused by numerous factors: 1) a wish of the doctor and the patient to the save the vitality of a tooth; 2) avoiding the removable prosthesis; 3) improving of the dental surgery level which is proved by the decrease of the invasive surgical procedures.

Having analyzed the patients' visits at the department of the dental surgery between 2010 and 2015 we have admitted that the biggest problem in the implanting rehabilitation is the atrophy of the distal sections of the lower jaw (clinical cases connected with the jaw resection are out of analysis). Undoubtedly the antral resorption, deficit of the width of the alveolar sprout, iatrogenic post extraction defects, etc. are quite frequent though the anatomic investigations are relative and do not

cause irreversible changes. The procedure of the DBR type (directed bone regeneration), sub-antral augmentation are technically accessible for the vast majority of the stomatologists and have long-term fundamental scientific proves [1].

Compromise esthetic result of the orthopedic treatment within the unrequited volumetric atrophy is quite acceptable for most of the patients (we mean an imitation of the natural soft tissue contour by the pink ceramics).

Undoubtedly, such orthopedic decisions deserve to exist if they can provide normal hygiene and functionality.

Observing the possibility of effective implantation in the distal sections of the lower jaw within a vertical atrophy is advisable to pay attention to the depth of the mouth cavity atrium (often absent in such cases), height of the muscles attachment, width of the attached mucous membrane and anatomic investigations, exactly the space to the canal of the lower-alveolar nerve. Such injuries can be found in every dental surgeon's practice which is characterized by neurological pain and sensitivity disorders. The treatment of such injuries depends on the exposure of the injuring factor, presence or absence of the lasting compression, possibly the effect of the chemical agents. The symptoms (pain, paresthesia) can develop constant features without an in-time and competent treatment. Such cases are quite frequent.

Undoubtedly extending of the attached membrane size with the help of the short implants use is possible with the help of the different mucogingival surgery techniques [2], though the deepening of the atrium within vertical atrophies is often complicated and impossible. Thus, within the available adequate zone of the attached gums a chronic trauma of the mucous membrane caused by a volumetric orthopedic construction is possible, hygiene disorders which cause development of the inflammatory processes [3].

We believe that the use of the short implants in the distal sections of the lower jaw is possible in the high position of the upper-alveolar nerve and within the limiting forms of atrophy.

In our opinion it is reasonable to restore the alveolar sprout of the lower jaw distal sections with its further implantation. Having observed the techniques of the bone plastic surgery of the areas mentioned below suggested by different schools of implantology and having conducted our own clinical investigations we classified and characterized the following methods:

1. Membrane techniques of the DBR type, exactly the use of the combination of the auto-xenotransplants with the membranes intensified by titanium (Cytoplasm, Gore-Tex), titanium nets with the frame developed of screws (plates), frame membranes OsteobioLamina.

General characteristics: crestal access; necessity of the significant patch mobilization; necessity of the relatively complicated fixing of the membrane of the tongue side by screws; sharply limited use within the thin membrane biotype.

We have to admit that the expected qualitative height growth with the adequate heeling is between 2-3 mm, and terminated results show the significant resorption of the newly developed bone, especially the Gore-Tex membrane, which are no more produced nowadays [4]. The main problem of these techniques is providing of the qualitative vascularization of the bone plastic composition, limitation of the vessels vertical growth. Clinically we have admitted high risks of the suture separation which causes the total lose of the augment due to different data up to 30% [5]. The terminated expositions are also quite frequent and have negative effects.

Great hopes are connected to many successful recorded clinical incidents with the use of OsteobioLamina, but the absence of the randomized investigations, weak clinical directivity and relatively high cost extinguish our further steps in this direction.

2. Augmentation of the bone block of the side plate type; crestal access; necessity of the significant mobilization; relatively easy fixation; availability of the donor area; limited use within the thin mucous membrane biotype.

The use of the bone blocks due to the side plate type perfectly works while restoring the width of the alveolar sprout but in the vertical augmentations blocks behave unexpectedly except for significant resorption from 25 to 50%, very frequent are total block breaks also connected to a total angiogenesis. The increase of the heeling terms, collagen membranes use does not guarantee the block's full integration. Exposition on any stage causes full lose of the augment.

3. Tunnel augmentations by the bone blocks: complicated and limited surgical access; availability of the donor area; high risk of the patch perforation.

Fixing of the auto-bone blocks under the uninjured periosteum is the most forward-looking tendency. Though, there are certain anatomic limitations in the soft tissues and periosteum (with the evident cicatrices changes). Muscle fibres also influence the result. In general method demands significant surgical skills and is not accessible for the vast majorities [5].

4. Lateralization of the lower alveolar nerve. Actually lateralization is not an augmentation method, but a way to avoid anatomic limits. It has risks of neurological changes. Paresthesia is a very important part of treatment and has constant characteristics. In implantology while removing the off-site objects of the lower jaw section we don't use this method in spite of having much experience in this field. Our data prove high trauma risks of such surgeries.

5. Undoubtedly the range of such cases does not leave any alternative augmentative techniques. Though, effective use of the midmental space ALL-on-Four, TorontoBridge is in our opinion the most suitable even in the case of necessity of the intact teeth removal [6].

6. Distracting ontogenesis: necessary use of special equipment; relatively complicated choice of distraction vector in the lower jaw distal sections. This method is the most effective and histologically proved, but expensive equipment and need in frequent visits tend us to use a technically similar method.

7. Segmental osteotomy (bio patch bone) has the same principles as distraction. But as compare to distraction where a segmented jaw fragment raises rises every day, the osteotomical segment is set on the necessary level. The main condition is the availability of the 4 mm bone under the neurovascular bundle.

The advantages of the method: 1) one surgery; 2) possible to enlarge size both vertically and horizontally by changing the dissection angle of the osteotomical segment; 3) wound closure without additional mobilization; 4) possible accomplishment without bone plastic compositions (risk of the alveolar sprout formation).

The disadvantages: 1) comparing to a classical distraction it has growth limitations up to 5-6 mm; 2) risk of the tongue sprout perforation which demands an immediate surgery termination; 3) impossible to use in early post extraction period; 4) technical difficulties within the expressed squint lines of the tongue.

Taking into account the bilateral vessel growth on the side of the osteotomic fragment which preserves trophic due to the mucous bone patch where it is set, and also on the side of the donor area results are limited to 5-6 mm, though there is data which proves effective rise up to 10 mm.

The space between bone fragments totally renews by a native bone tissue [7].

The surgery methodology: under the local anesthesia there provides a membrane dissection up to 4-6 mm lower that the evident level of the attached gums from the premolar teeth to the retromolar space. The section of the mental

neurovascular bundle is obligatory for trauma prevention. The fragment osteotomy is accomplished by 2 mm deviation from teeth and 2 mm from the lower jaw canal. Frequently a fragment is a saddle-like form, though other forms are not exceptional. The most important is maximally bland osteotomy without a perforation of the tongue sprout. In this case surgery should be stopped not removing the fragment, stitch the wound. The recurring interference in such cases is possible after 8 weeks. If the osteotomy is successful the bone fragment is separated from the donor area in a suitable way (rasparator, elevator, chisels) and rise to a necessary level (6 mm maximum). The fragment is fixed with the help of the titanium plates and screws, the space between the fragments is filled with any bone plastic material There is another way of fixing – only auto- or xeno block fixing but such variant has many risks due to the predictable resorption which is difficult to control within time. The wound closure does not demand additional mobilization and is based on general surgical principles.

During 2012 and 2015 we have accomplished 16 surgeries. In all cases we used small blocks – auto-bones, constructed from the lower jaw angle for the primary fixing of the osteotomical fragment in the wound. Then there was additional fixing by the titanium plates. In our opinion, primary fixing helped with the further drilling of the raised fragment for fixing the titanium plates by a screw. No bone plastic material was used. All the 16 clinical cases were heeled by a primary strain, the height renewal happened in 15 patients. Only in one case a 70% regeneration happened. We believe that the reason was the incomplete adaptation of the titanium plate which caused soft-tissue trauma and inflammation.

The given data proves good results of the abovementioned surgical technique which allows being widely and frequently used. Further we plan to use segmented osteotomy either in the distal sections of the lower jaw or other clinical cases.

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