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Research Article

APPLYING OF QZA-IMPLANTS FOR PATIENTS WITH DIFFERENT ALVEOLAR RIDGE BONE AND SOFT TISSUE VOLUME. CASES REPORT

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Abstract:

The prospective clinical study of the results of treatment using dental implantation for patients with edentulism in different cases. The clinical condition, alveolar bone level and degree of stability (implant mobility index) of the installed dental implants were assessed. In this article presented clinical cases with sufficient and insufficient ridge bone / soft tissue volume. Authors described four different clinical cases of dental implantation with minimally invasive treatment protocol that used only local tissue without artificial bone substitutes, as well as membranes and authors declare that a correct treatment plan and high level of medical skill allow achieving success in all clinical cases.

In the long-term period there was a good aesthetic results, good control X-ray, high stability of inserted dental implant and prosthetics. This study demonstrates that functional and aesthetic recovery as a result of QZA-Implants is an effective and reliable method for patients with edentulism. The results did not reveal significant clinical and statistically significant differences between groups of patients. Implantation success, level of alveolar ridge and soft tissue volume, high stability of dental implants and clinical results suggested this protocol deserves attention. However, final conclusions require additional long-term multicentric clinical study with an adequate cohort of patients.

Key words: dental implantation, treatment protocol, alveolar ridge insufficiency, piezosurgery, simultaneous local bone modification, soft tissue grafting, dental implant stability, implant mobility index, QZA-Implant.

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INTRODUCTION:

Dental implantation is widely used in the dentists practice. And now it is more a routine than an innovative method of dentition restoring. After numerous studies and development of the theory of osseointegration, the two-stage method of dental implantation with the use two-pieces implant construction has become most prevalent. The two-step surgical protocol is the most common in the world and has become a classic.

The main problem in dental implantation is the problem of alveolar ridge insufficiency and / or volume of soft tissues, because edentulous, almost always accompanied by signs of insufficient volume of bone and soft tissues of the alveolar ridge, which is often an obstacle to the success of aesthetics and function rehabilitation.

One way to reduce overall treatment time and increase its effectiveness is to use low-impact protocols without using artificial bone and barrier materials. So, for example, the installation of an implant with simultaneous local bone modification (LBM) with local tissues and / or soft tissue grafting allows you to avoid additional surgical trauma and has a more predictable result. We use piezosurgery split techniques, osteotomy, bone extenders, reverse technique for preparing bone holes for dental implants in cases with insufficient bone volume. In cases with insufficient soft tissue volume we mainly use free tuberosal-palatal connective tissue flap or local soft tissue slip flaps. As for membrane, in our opinion the best membrane for bone recovery and healing is intact periosteum. However, it is worth noting that such a protocol simultaneously carries with it an additional responsibility and requires a high class of skills.

Based on our experience, we would like to notice that dentists usually choose a system of dental implants based on the cost and prevalence of the system, rather than on real constructive and clinical featuring. However, we believe that the results of treatment are more dependent on the dentist, skill's level and the correct tactics of treatment than on the manufacturer of the implants.

Therefore, we decided to analyze the use of dental implants for patients' rehabilitation with different alveolar crest bone and soft tissues volumes. For a prospective study, we chose the QZA-Implants System (TRINON Titanium GmbH, Germany), made with advantages from other systems on the market (Pic. 1), namely:

1. Universality, simplicity of the surgical and orthopedic protocol.

2. Use of well-proved researches for its elements: bone level design; root shape; optimal surface topography; double winding thread on the main part and six individual micro threads in cortical part of implant.
3. Reliable connection between internal and external parts (Spiralock® design of internal thread); conical 5° internal hexagonal connection ("contact welding").
4. High precision manufacturing of small parts.
5. Optimal range of sizes, as well as clinical protocol convenience.
6. Affordable cost of dental implants, kits and surgical / prosthetic components.

The aim of the study was observation of clinical results and possibility of universal use of dental QZA-Implants for patients with different bone's and soft tissues' volumes of the alveolar ridge.

MATERIALS AND METHODS:

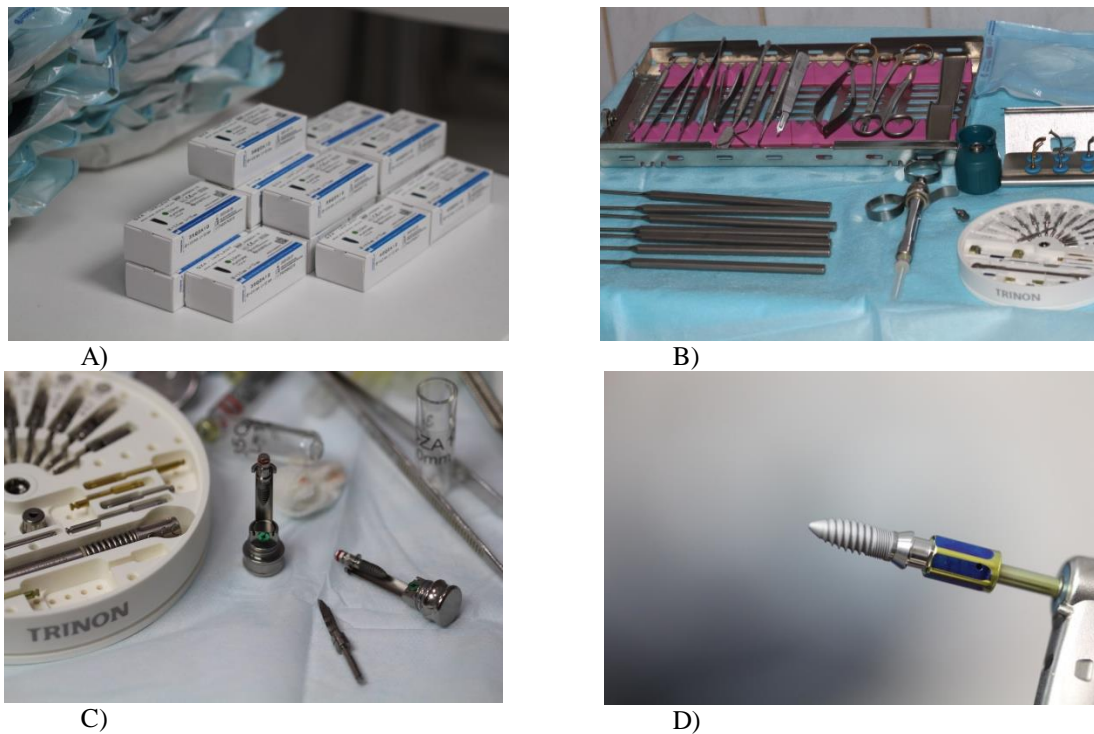
Four clinical cases of dental implantation with simultaneous local bone remodeling and / or soft tissue grafting are described below. In all patients, the general state of health was satisfactory, no one suffered from aggressive periodontitis, although one of them smoked and two regularly used antihypertensive drugs.

In the presented clinical cases, local bone modification (LBM) was performed with non-traumatic piezosurgery technique and osteotomy (bone-split), without using the patient's own bone from other anatomical area and without using artificial materials (bone substitutes) with using local bone.

Simultaneous soft tissues grafting was carried out with local tissues and / or transplantation of free connective tissue palatal graft. This approach allows you to avoid additional surgical intervention to increase the volume of soft tissues, especially important in case of insufficient bone volume and in aesthetically significant areas.

Prosthetics were performed in two cases immediately after implantation with the help of acrylic temporary crowns. The final decision for local bone modification (LBM) and soft tissue grafting was made on the basis of a preoperative clinical examination, analysis of 3D and cast models, X-Ray (Panoramic and CT-Scan).

In two delayed cases, dental implantation was carried out according to the classical protocol with prosthetics fixed metal-ceramic bridges and attached full-arch overdenture.



Picture 1. Dental implants and surgical kit of QZA-Implant System (TRINON Titanium GmbH, Germany).

Patients were monitored for the entire duration of the study and were called up for examinations at 1, 3, 6, 12, 24 and 36 months after surgery. During the control examinations, a clinical exam was carried out and the following parameters were recorded: oral hygiene status, gingival bleeding, state of implants' pockets during probing, change in marginal bone level, surrounding soft tissue volume and degree of stability (mobility) of inserted dental implants – Implant Mobility Index (IMI).

IMI of the installed implants was measured by periostometry (Periotest M, Medizintechnik Gulden e.K., Germany) in three directions (oblique vestibulo-mesial / distal-lingual, transverse vestibulo-lingual, oblique vestibule-distal / mesial-lingual) with average value calculation and in most cases was negative. There were no statistically significant differences in bone level between groups.

In each case QZA-Implant System, original surgical kit, osteotomes Q-TOM (TRINON Titanium GmbH, Germany), implant machine Surgic Plus (NSK Nakanishi Inc, Japan) were used. Piezosurgery was performed using VarioSurg NSK instruments (NSK Nakanishi Inc, Japan). The main suture material was monofilament nylon thread Daclon 4-0, 5-0; 6-0 (SMI Sutures, Belgium).

RESULTS:

The state of oral hygiene was assessed visually. Gingiva bleeding and depth of implants' pockets

were assessed using periodontal probing and correlated with state of oral hygiene. The state and soft tissues volume were compared in symmetry with the opposite side and in relation to the preoperative level. There were no significant clinical differences between the protocols, except for the duration of treatment. Changes in the level of alveolar bone were assessed by pre- and post-operative radiographs. There were differences between the protocols.

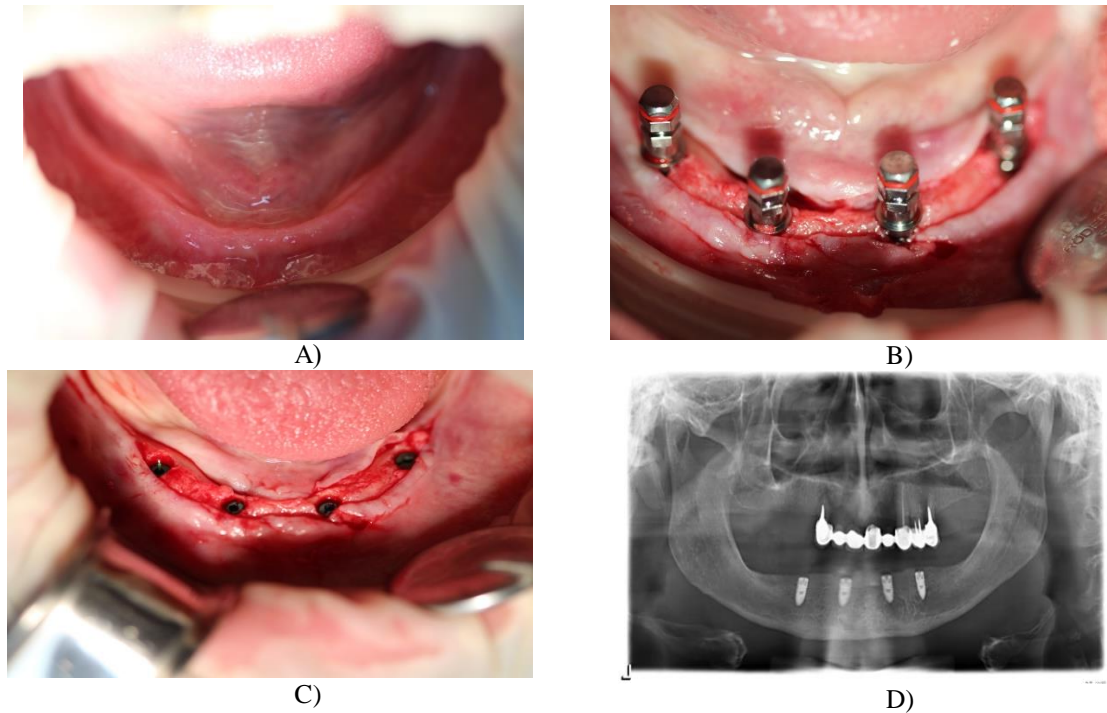
Clinical cases

Patient 1.

A man, 50 y/o, complained of difficulties in chewing and phonetics when using a full denture. After the examination, a decision was the dental implantation for attached full-arch overdenture on lower jaw (Pic. 2, 3).

DS: Edentulous jaw (K 00.01). Alveolar ridge atrophy (K 08.2):

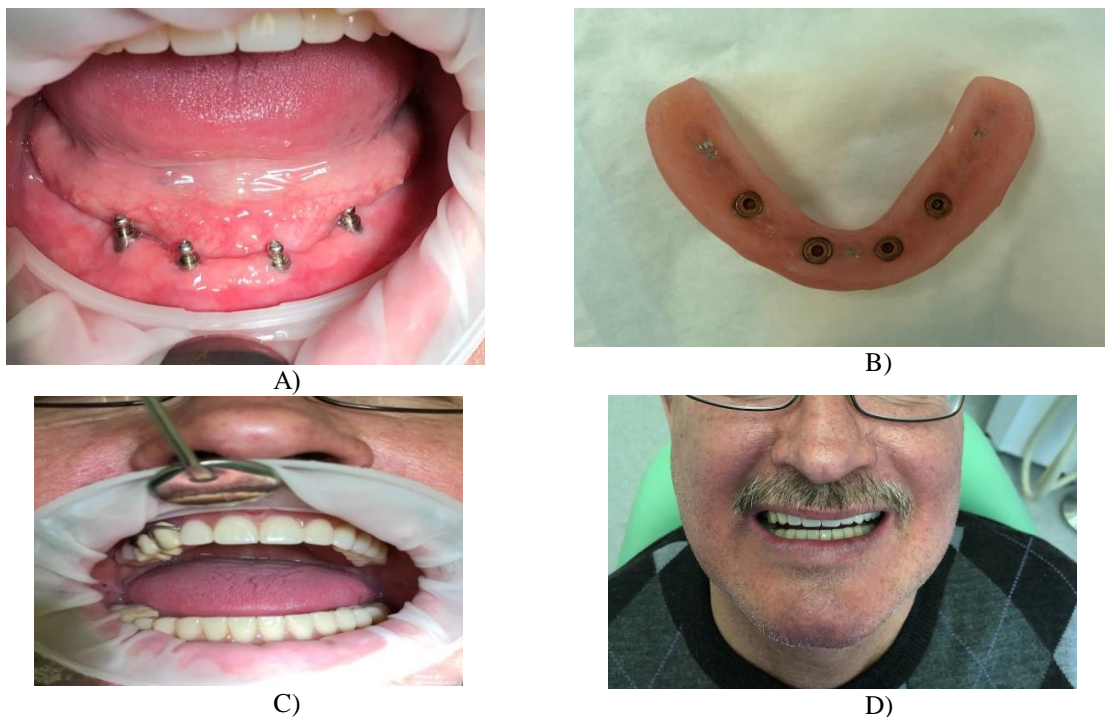
Treatment: with local anesthesia Sol. Articaini 4% + Epinephrine 1: 100000 - 8.5 ml. the insertion surgery of dental implants was performed in the teeth position: 3.2, 4.2 - 3.8/10 mm; 3.5, 4.5 - 3.5/10 mm in size, wound sutured. 7 days after surgery wound healed by primary closing with no signs of inflammation; stitches were removed. 2 months after healing abutments were installed and after lower jaw prosthesis was made with Q-Ball attaching fixation and the treatment was completed.



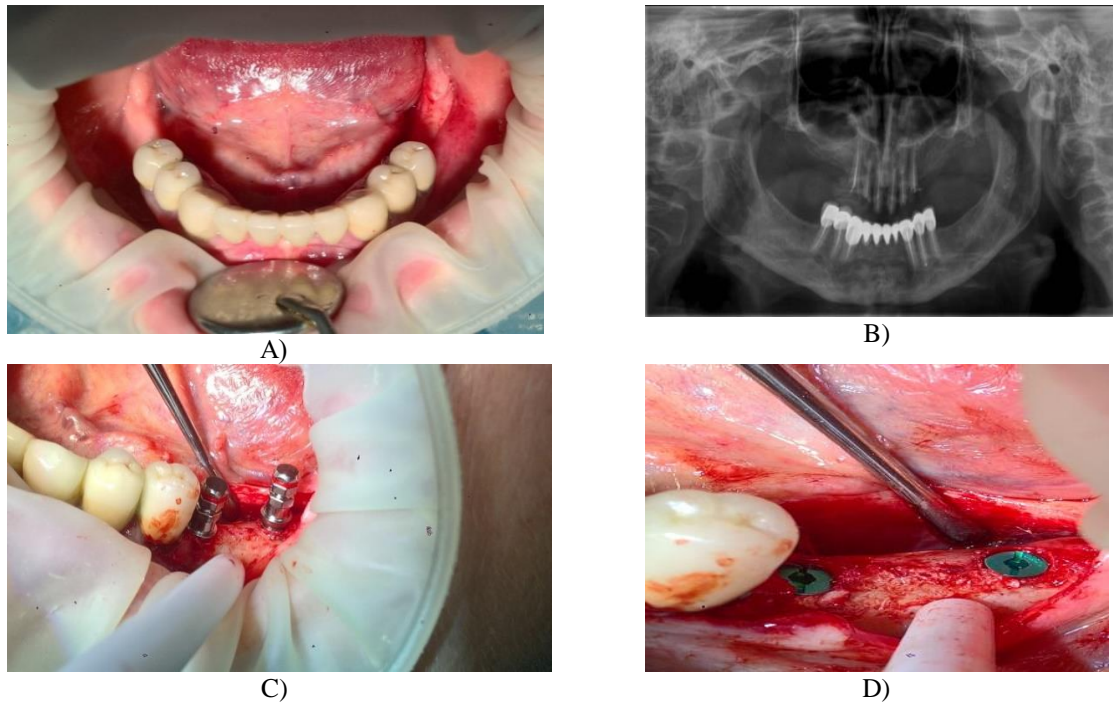
Picture 2. Surgical stage of QZA-Implants insertion: A) View before; B) Parallelism check; C) Installed dental implants; D) Panoramic control.

After 6 months, the patient has no complaints, however, there is not good state of oral hygiene, mucosa was with signs of gingivitis. Installed implants were stable, without clinical and X-ray signs of periimplantitis. IMI of installed implants: -

5.6; -4.7; -4.2; -5.1 (average -4.9). After interviewing and analyzing the questionnaire, complete patient satisfaction with the treatment was revealed. The patient underwent professional oral hygiene, recommendations were given.



Picture 3. Prosthetic stage of dental implantation: a) Installed Q-Ball abutments; B) Overdenture with attachments; C) Prosthesis in the mouth; D) Patient's smile after treatment.



Picture 4. Clinical case of QZA-Implant installation: A) Before treatment; B) Panoramic X-Ray before; C) Intraoperative parallelism check; D) Installed dental implants with cover-screws.

Patient 2.

A woman, 66 y/o, complained about the absence of teeth, difficulty in chewing and an aesthetic failure. After examination, it was decided to install dental implants for fixed metal-ceramic lower jaw's bridges (Pic. 4, 5).

DS: Partial edentulous jaw (K 08.1):

Treatment: with local anesthesia Sol. Articaini 4% + Epinephrine 1: 200000 - 6.8 ml. the insertion surgery of dental implants was performed in the teeth position: 3.6, 4.6 - 3.8/12 mm; 3.7, 4.7 - 4.2/10 mm in size, wound sutured. 7 days after surgery wound healed by primary closing with no signs of

inflammation; stitches were removed. 10 weeks after surgery healing abutments were installed and after fixed metal-ceramic bridges with screw fixation were made and the treatment was completed.

After 6 months the patient has no complaints, there was good state of oral hygiene with no signs of inflammation. Installed implants were stable, without symptoms of periimplantitis. IMI of installed implants: -2.6; -3.2; -4.4; -4.9 (average - 3.8). The patient's questionnaire with the treatment, complete satisfaction was revealed. The recommendation was oral hygiene only.



A)



B)



C)



D)

Picture 5. Clinical case of QZA-Implant installation: A) Wound suturing; B) Closed tray impression; C) Final oral view; D) X-ray control.

Patient 3.

A woman, 67 y/o, complained of difficulties in chewing and an aesthetic defect. Anamnesis: a failed

prosthesis. It was decided to immediately install dental implants to preserve the parameters of the hole and shorten the treatment time (Pic. 6, 7).

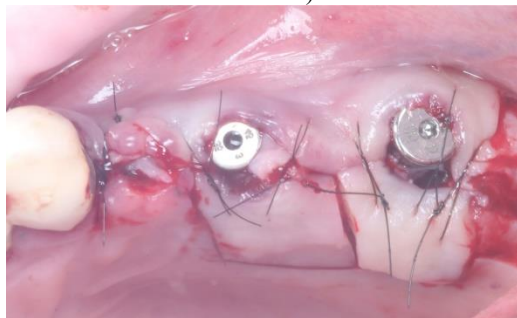
DS: Partial edentulous upper jaw (K 08.1).



A)



B)

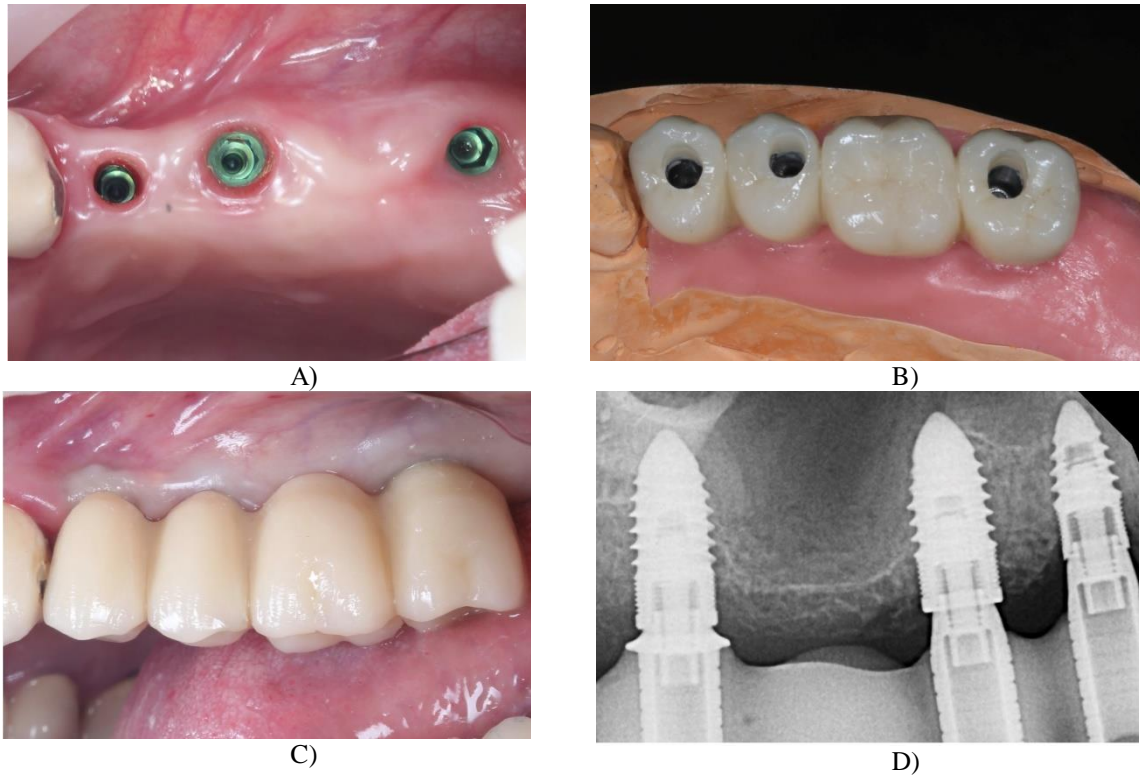


C)



D)

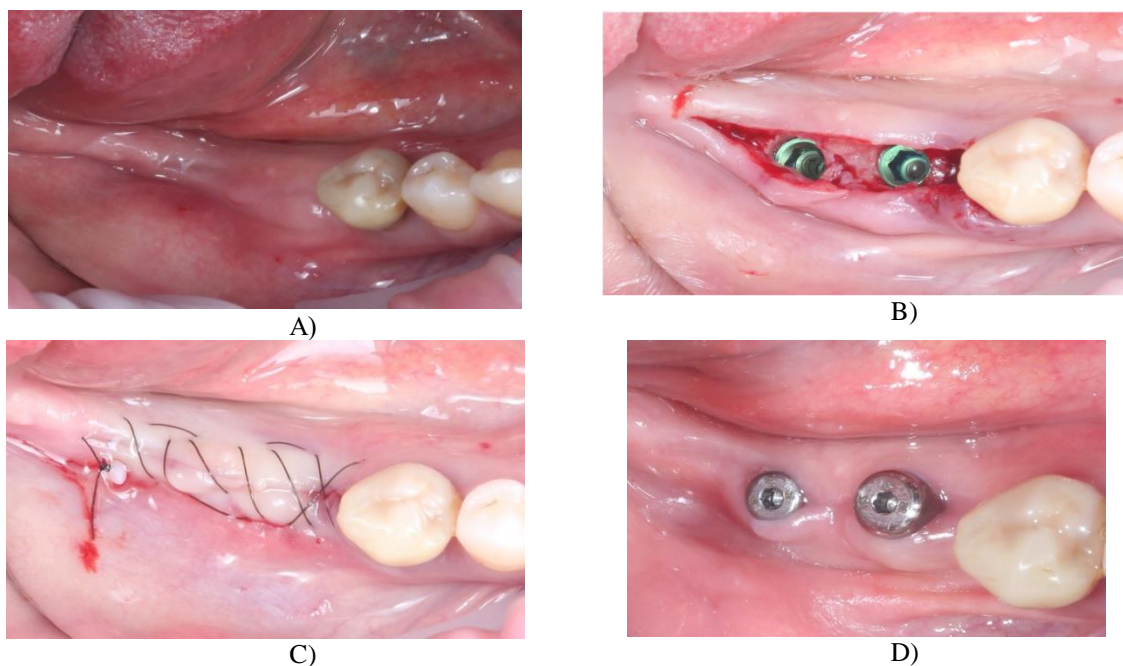
Picture 6. Clinical case of QZA-Implant installation: A) Before treatment; B) Intraoperative position of dental implants; C) Installed dental implants and healing abutments; D) Installed transfers for closed tray impression.



Picture 7. Clinical case of QZA-Implant installation: A) Oral view before fixing the final prostheses; B) Metal-ceramic bridge on cast model; C) Bridge in the mouth; D) X-ray control.

Treatment: with local anesthesia Sol. Articaini 4% + Epinephrine 1:200000 - 6.8 ml. QZA-Implants were inserted in the teeth position: 2.4, 2.5, 2.7—measuring 3.8/10; 4.2/12; 4.2/12 mm in size with healing abutments immediately, wound sutured. 7 days after surgery, the patient has had no

complaints; general condition is good; operative wound heals by primary closing; no signs of inflammation; stitches were removed. 3 months after surgery, metal-ceramic bridges with screw fixation on dental implants were made and the treatment was completed.



Picture 8. Clinical case of installation of QZA-Implant: A) Oral view before treatment; B) Intraoperative position of dental implants; C) Sutured wound; D) Installed healing abutment after 2 months.

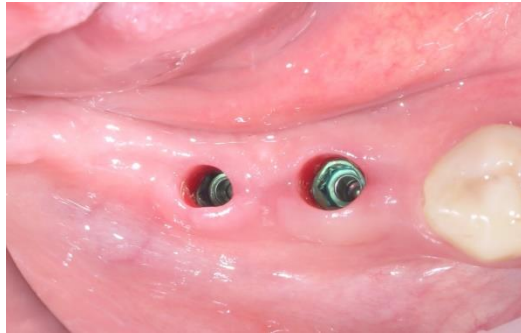
Patient 4.

A man, 59 y/o, complained about absence of teeth, difficulty in chewing. After examination, a decision was made to install dental implants for fixed metal-ceramic crowns in the lower jaw (Fig. 8, 9).

DS: Partial edentulous lower jaw (K 08.1).

Treatment: with local anesthesia Sol. Articaini 4% + Epinephrine 1: 200000 - 6.8 ml. dental implantation

in the position of teeth was performed: 4.6 - 4.2/8 mm; 4.7 - 4.2-10 mm in size, wound was sutured. 7 days after surgery, the patient has no complaints; general condition is well; surgery wound heals by primary closing with no signs of inflammation; stitches were removed. 2 months after the surgery healing abutments were installed, metal-ceramic crowns with screw fixation were made after and the treatment was completed.

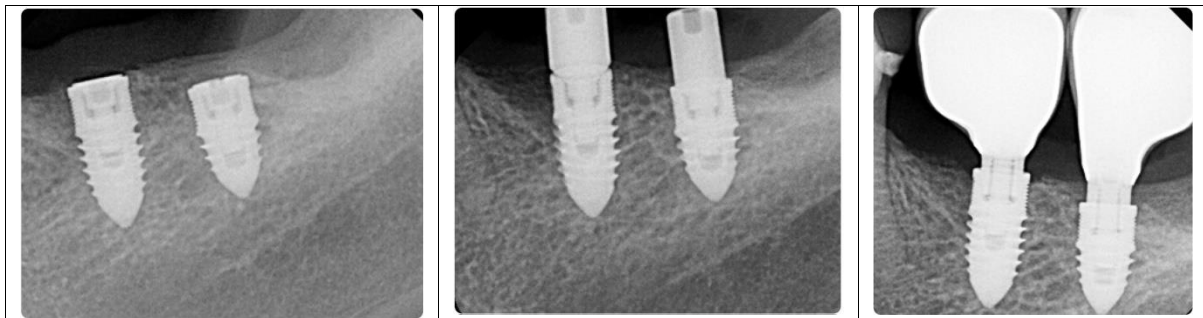


A)



B)

Picture 9. Clinical case of QZA-Implant installation: A) Oral view in before crown's fixation; B) Final oral view.



Picture 10. X-ray control on the rehabilitation's stages with QZA-Implants.

DISCUSSIONS:

Replacing teeth with dental implants is a complex clinical task, especially in cases with bone insufficiency and lack of soft tissue. This requires a particularly thorough examination and treatment planning, as well as a high level treatment.

In this study, an assessment was made of the results of treating patients according to various surgical protocols of dental implantation: two-stage (with delayed installation of healing abutment and subsequent prosthetics); one-stage (with simultaneous installation of healing or temporary abutment with temporary crown); with delayed and immediate protocols of prosthetics. In one-stage protocols cases this provided the necessary support for the increased volume of soft tissues, preventing their collapse.

Minimally invasive simultaneous local bone modification (LBM) by splitting made it possible to install implants without a long time wait, the

additional use of artificial materials and ensured bone healing by an absolutely biological mechanism like natural bone repair way.

It is worth noting that in the most cases we performed the implantation surgery only in the fully recovered bone after tooth extraction with a finally completed cortical lamina.

Nowadays literature, descriptions of immediate implantation are often found; the authors obtained both good and unsatisfactory long-term results. Some authors have noted high risk and large percentage of failures during volume bone grafting, as well as a high risk of adverse contour changes of soft tissues, regardless of the prosthodontics protocol. And in aesthetic areas concern, it is preferable to use a delayed implant installation protocol. In addition, the long-term results of bone grafting and what influences this remain unknown.

Our study differed in fact that in the presented clinical cases only local tissues were used without autogenous bone intake from other areas and without the use of artificial bone substitutes and membranes.

Despite the small sample, it can be considered that good oral hygiene and high level of manual performance largely determine the achievement of aesthetic and functional result. Here we cannot agree with the opinion of Sakkas A. et al. that manual skills and the level of technical execution of operation do not affect the success of bone grafting and dental implantation.

Despite the one-stage surgery protocol and insufficient bone and soft tissue volume, clinical outcomes of all patients in this study meet or exceed similar results with split bone/soft tissue grafting and implantation protocols from other authors.

Thus, the level of alveolar ridge, the volume of soft tissues, the degree of stability of installed dental implants and the clinical results make it possible to consider this presented simultaneous local bone modification (LBM) and soft tissue grafting protocols worthy of attention. However, additional long-term multicentric clinical studies with a sufficient cohort of patients are needed for final conclusions.

Anyway, the use of QZA-Implant system and the presented treatment protocols allowed to restoring lost functional and aesthetic dental state in all studied patients.

CONCLUSION:

Right treatment plan and perfect manual skills allow clinicians achieve good results. Dental implantation with minimally invasive surgery is predictable and effective treatment option for cases with sufficient and insufficient bone or soft tissue of alveolar ridge. In the long-term, there was good aesthetics, high stability and satisfactory X-ray of installed dental implants. This study demonstrates that the aesthetic and functional rehabilitation using QZA-Implants is an effective and reliable method of treating patients with edentulism.

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