

## IMPLANTO-PROSTHETIC REHABILITATION IN THE POSTERIOR MANDIBULAR REGION. CASE STUDY

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### ABSTRACT

Posterior mandibular edentations with a reduced alveolar ridge require a complex treatment plan. Treatment concepts involving two to four implants supporting an overdenture have been proposed. In this article, we present a clinical case of implanto-prosthetic rehabilitation of the posterior mandibular area with bone addition using the synthetic biomaterial "Kolapal KP - 3LM".

**Key words** *Peri-implantitis, Gingival graft, Implant, Bone resorption, Gingival biotype, Osseointegration*

### INTRODUCTION

Edentulism is defined as the absence of one or more teeth in the patient's arch. This can be of 2 types: partial (which occurs as a result of the loss of one to 15 dento-periodontal units on a dental arch) [1] or total (which is characterized by the total lack of teeth on the arch).

The etiology of edentulousness is multi-factorial, including general factors related to the socio-economic status of the patient, i.e. age, gender, level of education, economic status, urban or rural residence [2]; and local: dental caries, periodontal disease, dental and jaw trauma, suppuration and dental tumors, including the absence of tooth buds, etc. [3]. Edentulism has consequences on the patient's oral and general health. The most important result, however, is alveolar bone loss [4]. Bone atrophy of the alveolar ridges is a continuous process after tooth loss [5], affecting the mandible four times more than the maxilla [6]. Edentulism has been

shown to have a significant effect on the resorption of the alveolar ridge [7], which leads to a reduction in the volume of the alveolar bone and the surface area of the prosthesis support area, resulting in changes in the facial aesthetic appearance [5]. The most obvious changes in the profile of the soft tissues are attested at the level of the mandibular lip and chin prominence.

In order to better systematize and define the resorption of the alveolar ridge, several classifications have been created, the most used being that of Misch and Judy which classifies the edentulous ridge into 4 types (A,B,C,D), class A and B being favorable for implanto-prosthetic treatment; C and D, however, require a rehabilitation of the alveolar ridge [8]. To carry out a complete diagnosis of edentation we need a clinical and paraclinical examination. The clinical examination is performed according to the sequence: subjective examination, objective examination (exo and endo-buccal).

Following the clinical examination, we can topographically describe the edentation using Kennedy's classification (I-biterminal edentation; II-uniterminal edentation; III-posterior intermediate edentation, IV-anterior intermediate edentation), it is useful to add to the Kennedy - Applegate classification the Lejoyeux subclasses that bring additional data regarding the quality of the dental-periodontal and muco-osseous support. There are four Lejoyeux subclasses, named from A to D. Lejoyeux subclass A is granted when both the dento-periodontal and the muco-osseous support are healthy. In the case under class B, the dento-periodontal support is healthy and the muco-osseous support is affected, while subclass C includes cases in which the muco-osseous support is healthy and the dento-periodontal support is affected. We classify the cases in which both the dento-periodontal support and the mucosal support are affected in subclass D [9].

For the paraclinical examination, the most used radiographic methods are: orthopantomography (OPG) and computed tomography (CT) [8]

Currently, all types of edentulousness benefit from several treatment options, including implant-prosthetic therapy. In the case of patients with sufficient bone supply, we currently know a multitude of constructions and implant systems: submucosal, subperiosteal and transmandibular, blade-shaped implants, but the most often used in implantological practice are endosseous implants. They are considered a clearly superior solution due to the advantages: favorable aesthetic result, and increased oral comfort in the rehabilitation of lost functions [10]. An alternative in the case of insufficient alveolar bone volume is the short, narrow and angled implant, which has recently been used more and more often. The advantage of this type of

implant is the possibility of use in the case of a patient with less bone, avoiding bone addition procedures [11].

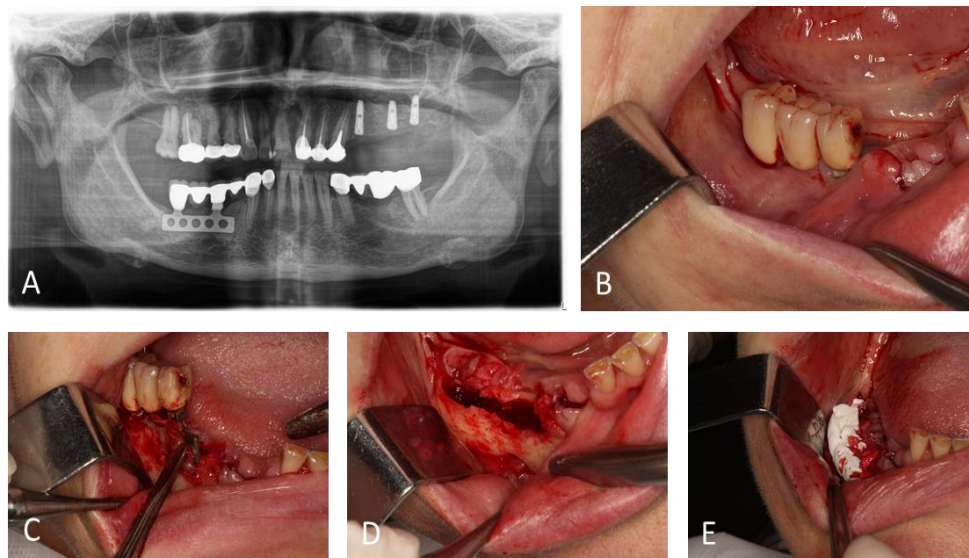
According to specialized literature, due to alveolar bone tissue atrophy in 60% of cases after tooth extraction, it is impossible to install a sufficient number of dental implants in positions determined by orthopedic requirements without bone augmentation [13]. In this case, we know 2 solutions: bone growth with immediate implantation and bone growth with delayed implantation [14]. The presented case demonstrates a longer approach with bone augmentation of the bone defect and peri-implant soft tissues with delayed implantation and delayed loading, but the given approach fully supported by the patient allowed morpho-functional and aesthetic rehabilitation to the level of the patient and the expectations of the medical team.

## **MATERIALS AND METHODS**

Patient ST X, aged 59, presented herself on 11.03.2021 in the "OMNI DENT" dental clinic, Chisinau, Republic of Moldova, with the following complaints: masticatory disorders, pain in the right region of the mandible and mobility of the prosthetic work. From the anamnesis it can be concluded that the implant was inserted 15 years ago, the pains appeared approximately 1 year ago. During the objective exobuccal examination, no changes were observed, the face was symmetrical, proportional, palpation of the emergences of the trigeminal nerve without pain, the regional lymph nodes were not enlarged in volume upon palpation. During the endobuccal examination, hyperemia of the soft tissues with a cyanotic appearance was observed, a lack of keratinized soft tissues around the prosthetic work in the right posterior area of the mandible, painful palpation and percussion, grade 3 mobility of

the prosthetic work, during probing, periodontal pockets of about 7-8 mm. To evaluate the state of the bone tissue, OPG and CBCT were performed where we determine peri-implant resorption ( Fig.1 A). Following the clinical and paraclinical examination, the diagnosis of Peri-implantitis was established

in the region of the blade implant at the level d. 44-47. The treatment plan included: explantation and augmentation of the defect; reimplantation after completion of the bone regeneration period; peri-implant soft tissue management; prosthetic rehabilitation after the osseointegration period.



*Figure 1 – Stage I (Explantation): A. pre-operative OPG; B. The appearance of the wound after making the incision; C. Removal of the implant; D. The defect formed after explantation; E. Augmentation of the defect.*

The patient was informed about the established diagnosis, the treatment plan and the possible risks. By common agreement, the following stages were carried out. **Stage I. (Explanation).** Prior processing and isolation of the operative field was carried out. Under local anesthesia, a marginal incision was made through the peri-implant sulcus in a trapezoid shape of approximately 4 cm in the region of teeth 4.8-4.3 (Fig. 1B). The muco-periosteal flap was detached from the vestibule, the blade-type implant was removed (Fig. 1C), the peri-implant soft tissues that covered the defect were not removed, they were detached from the surface of the defect keeping the attachment to the gingiva on the lingual side, to be later used to close the defect. The bone defect (fig.

1D) was augmented with synthetic biomaterial "KOLAPOL KP3-LM" (fig. 1E). Suturing the wound.

**Stage II. (Implantation).** After a healing period (11 months), the patient applied for continued rehabilitation in quadrant 4. (fig. 2). Following the clinical and radiological measurements, it was determined that the bone supply is sufficient, according to the classification proposed by Misch, in the anterior region the edentulous ridge belongs to class B+ with dimensions of 6x12 mm and the distal region is attributed to class C-h with dimensions of 10x10 mm (Fig. 2A,B ,C). After prior processing and isolation of the operative field (Fig. 2E), a 6 cm marginal incision was made on the alveolar ridge. Taking off the mucoperiosteal flap and

exposing the bone tender (Fig. 2D). This was followed by the drilling of the neoalveoli in the region of teeth 42, 44, 46, 47 in which 4 Dentium Superline type implants were

inserted: 42 - 4.0 x12 mm; 44 - 4.0 x 10 mm; 46 and 47 -5.0 x8 mm, implant cover screws were applied (Fig. 2E), wound suturing (Fig. 2F).

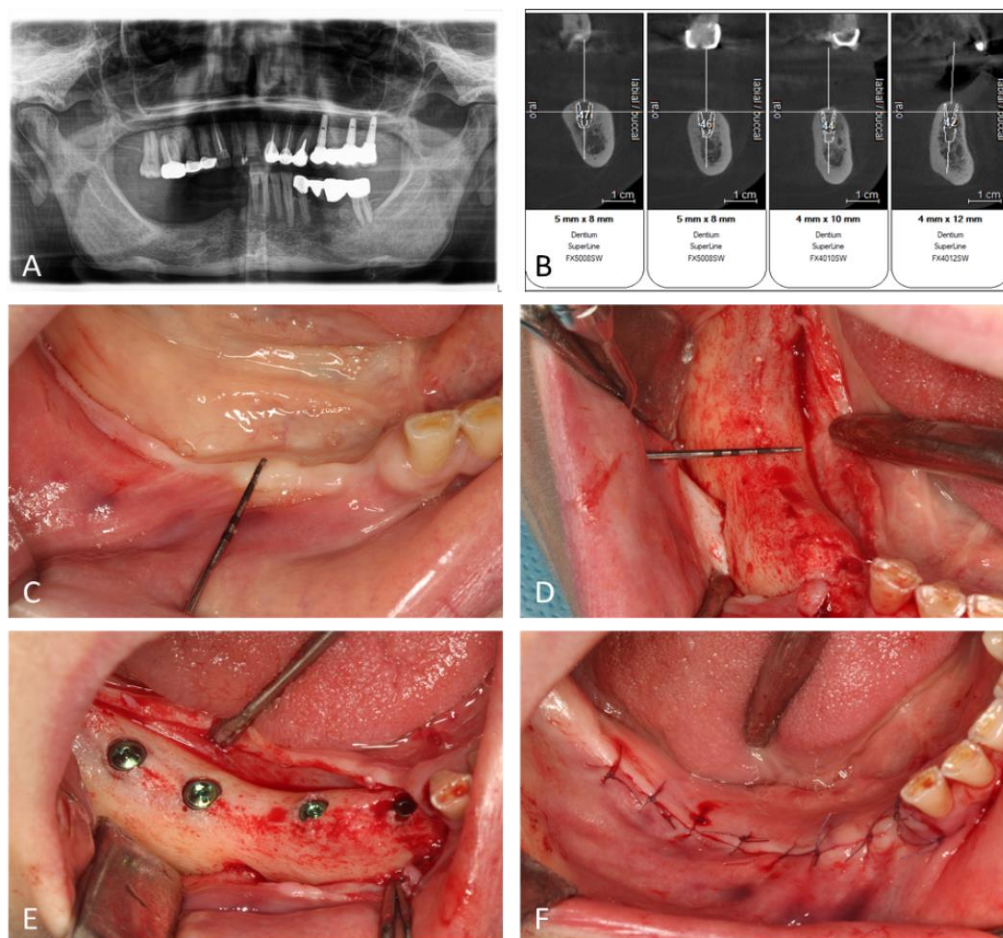
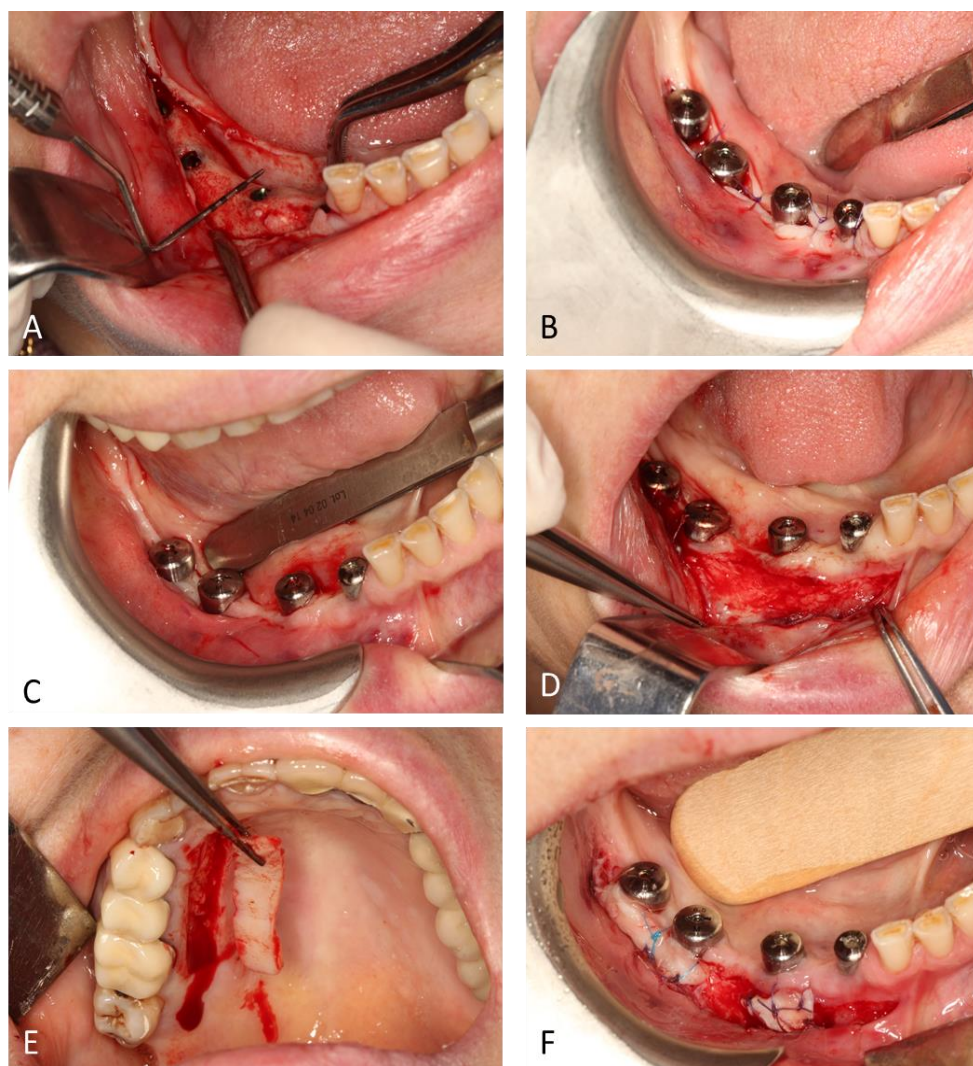


Figure 2 – Stage II (Implantation): A. OPG after healing period; B.Planning the implants ; C. The preoperative appearance of the alveolar ridge; D. Available Bone; E. Wound appearance after insertion of implants and cover screws, F. Wound suturing.

**Stage III and IV (Application of healing abutments and Management of peri-implant soft tissues).** After the 4-month osseointegration period, the patient presented for the application of healing abutments. The linear incision was made to expose the implants (Fig.3 A), the cover screws were removed and the gingival conformers were applied, finishing with suturing (Fig.3 B).

After 2 months, at the next session, the insufficiency of keratinized soft tissue around implants 4.4, 4.6, 4.7 was resolved ( Fig.3 C). To augment the keratinized tissue, it was decided to perform vestibuloplasty (Fig. 3D) with the augmentation of a soft tissue graft of approximately 7x2cm from the hard palate in the region of teeth 1.6 - 1.3 (Fig. 3 E-F).



*Figure 3 - Stage III and IV (Application of healing abutments and Management of peri-implant soft tissues): A. Revealing the implants; B. Healing abutments; C. Insufficiency of keratinized tissue, short vestibule more than 2 months after the application of healing abutments; D. Vestibuloplasty; E. Taking the free graft from the palate; F. Palate graft augmentation.*

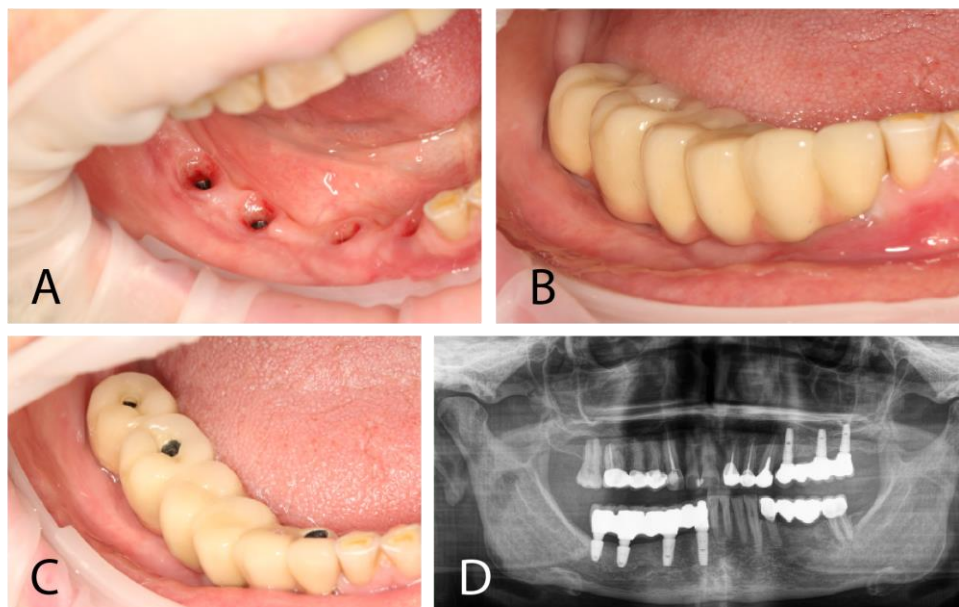
**Stage V (Overdenture on implants).** The patient during the objective clinical examination was examined according to the following parameters: WES (white aesthetic sign), PES (pink aesthetic sign), contour and emergence profile, available prosthetic space, lower smile line. Taking into account these aspects and resulting from the fact of the need

for priority functional rehabilitation in severe atrophies, at the prosthetic stage a metal-ceramic fixed bridge with Dentium FP3 implant support after Misch was made on standard prosthetic abutments using the Cr-Co metal alloy and the Visio line ceramic component Ivoclar, with the application of

the pink gingival mask for the rehabilitation of teeth 4.2-4.7.

This was followed by the impression of the prosthetic field with the help of individual open impression spoons using silicone additive materials and the solidification of the transfers with the help of self-polymerizing

acrylic masses. The sample of the metal skeleton, the determination of the color shade of the physiognomic component, the sample of the ceramics with the adjustment in functional occlusion, later fixation by screwing at 30Ncm.



*Figure 4 – Stage V (Overdentures on implants). A. Appearance of the peri-implant emergence profile of the gingiva after removal of healing abutments; B. Definitive sample of the FP3 prosthetic work according to Misch; C. Fixing by screwing; D. Postoperative OPG after 1 year.*

## RESULTS AND DISCUSSIONS

This clinical case presented a clinical interest due to its complexity. At each stage, contemporary treatment methods were used and sometimes contradictory decisions were approached. Thus, at the explantation stage, the granulation tissue that replaced the peri-implant bone tissue was not completely removed, this tissue served to cover the enlarged defect[11]. The method used has demonstrated its effectiveness. Similarly, a fact that must be highlighted is the increase in bone supply in sufficient volume for the insertion of implants of larger sizes than the standard ones using the synthetic biomaterial

"Kolapol KP - 3LM" without the use of the protective membrane[12]. The restoration of the oral vestibule and the gingival contour was also a particular one, calling for vestibuloplasty and grafting of epithelioconjunctival tissue from the palate, operations performed in a surgical time. This method has been shown to be effective in augmenting the keratinized tissue around the implant. The creation of the gingival emergence profile was carried out with the help of temporary crowns. The fixed-duration work, made of metal-ceramics, restored the morpho-functional and aesthetic integrity of the dental arch, touching up insignificant

discrepancies while also taking into account the possibility of appropriate sanitation. The patient was dynamically monitored for a period of 1 year after being put into office. According to the evaluation criteria by observation, inspection, palpation and radiological examinations, the absence of inflammatory clinical and radiological signs, the healthy state of hard and soft tissues, harmonious aesthetic and functional appearance was determined.

## CONCLUSIONS

For a long-term favorable prognosis in cases of complex rehabilitation, it is necessary to use several contemporary methods of rehabilitation of the alveolar ridge and peri-implant soft tissues, availability of apparatus and instruments, competence, patience and patient compliance.

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