



ALL ON FOUR. PROSTHETIC CONSTRUCTION IN MANDIBULA

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Abstract. *In the clinical dental practice, often, we are faced with patients that have very few teeth, or they haven't got any at all – total tooth loss. The prosthetic is the future of these problems. With its many possibilities, it has a scientific basis to solve all these cases with mobile or fixed prosthodontics. In these cases we're doing reconstruction and rehabilitation of the mouth with prosthodontic appliance in order to make up for the lost teeth and to set up functional and aesthetic harmony of the patient's mouth. Nowadays, the prosthetic treatment of the total tooth loss combined with oral – surgical procedure called ALL ON FOUR is ideal, practical and safe reality to solve such a problem. Metal – ceramic fixed construction is placed over the 4 integrated implants. The crucial question is the biomechanical loading of the fixed construction, which asks extensive analysis and planning of the case. At the very beginning, based on the panoramix X-ray images and studio models, we are marking the most suitable static positions for the implants on our model. In advance, we have to keep in mind the action of horizontal and vertical strength. They act like flipping mastication strength and we have to calm and balance them. The augmentation of the ridge, correct designing and forming of the suprastructures, as well as the stable and polygonal orientation of the occlusion, are inevitable. Later, with oral – surgical treatment the implants are placed, together with ridge augmentation and its voluminous enlargement. After a 3-6 month period we're starting with producing of the future fixed metal ceramic construction that at the end is going to be screwed like suprastructure over the implants.*

1. INTRODUCTION

In the nature everything is perfect and in harmony, but in the reality it isn't that simple and ideal. We, the dental therapist, wish to get closer to her and that specific perfection is the challenge for progress in our profession. That way, more or less successful in our cases, we, like imitators of the perfect nature, are trying with our professional engagement and knowledge to solve different kind of dental problems. With our commitment to the work, every day and unstoppable we are moving the borders towards better, more beautiful and more natural.

In the clinical practice, often, we are facing patients with handicap, which from different reasons have very few teeth or they don't have it at all – total tooth loss. The dental prosthetic is really a magic and the future with lots of possibilities. It has scientific base for rehabilitation of these lost teeth. In these cases we are reconstructing the total loss with mobile or fixed prosthetic tool. The goal is to replace the lost teeth, so we can set a long term functional and aesthetic harmony in the patients mouth. The prosthetic treatment of the total teeth loss like multidisciplinary combination with oral surgery intervention is known in the world with popular short name ALL ON FOUR. This is not just a fantasy without proofs, but contrary, safe reality and ideal modern solution of this kind of problems. This technique is practical combination for quality rehabilitation for the disappointed patients.

Over the minimal number of 4 implants, comes fixed bridge construction with maximum of 12 teeth. This theme is a subject of discussion for the last few years, so here, we are going to describe the whole process from the beginning to the end from prosthetic aspect. This case is presented after a real distance of time with detailed description of all the work phases.

2. MATERIAL AND METHOD

The crucial question is the biomechanical loading of prosthetic construction, it needs thoroughly analysis and planning. According to the panoramix X-ray images and the studio models, we are looking for the best static positions for the future 4 implants. We have to take into account the influence of the horizontal and the vertical forces. They, like flipping and masticatory forces need to be calmed and balanced. For this, we need appropriate natural height of the intermaxillar space, basically we need interjaw space splited in equal halves. We have to have visual 3D image for the future teeth and which need ideal prosthetic plain. With selective grinding of the antagonists we get the wanted space for the regular position of the teeth. Planning the suprastructure at this point results in stabile and polygonal positioned occlusion with multi – point contacts. This quarantee long lasting of the structure. With these kind of contacts we would get the wanted balanced positioning of the masticatory and non – masticatory forces in wider zones./Pic.1 Starting position ,Pic.2 Studio model /

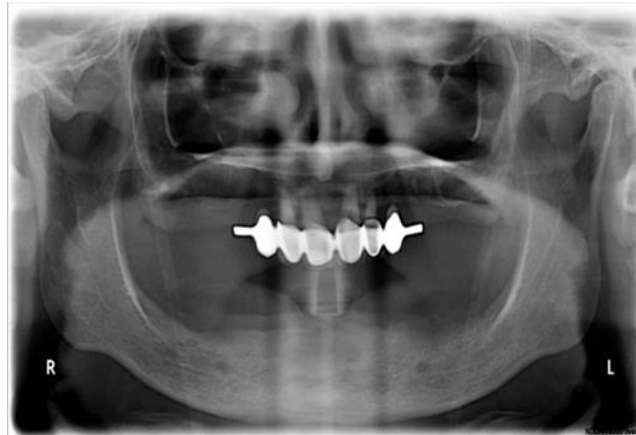


Figure 1. Starting position



Figure 2. Studio model

After this extensive analysis, according to work protocol, we proceed with oral surgical intervention and implantation of 4 implants. During the intervention we have to be very careful, so the implants are placed in the middle of the bone cliff, if possible on positions 2-2; 5-5. With this kind of positioning we are avoiding the compromitation of foramen mentale, as well as canalis mandibularis. Basically, that is the reason why the posterior implants are inserted under angle of around 30 degrees. At the same time we are getting implant length in the bone /Pic.3 Post implantation status – 4 implants /.

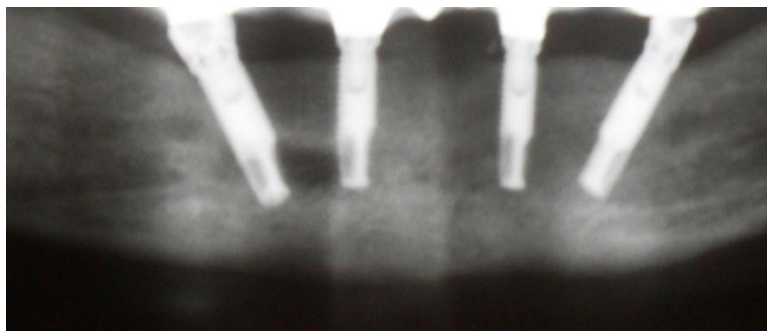


Figure 3. Post implantation status – 4 implants

We compensate the inclination of the distal implants with 30 Angled Multi – Unit abutments which are screwed over the implants right after their insertion.

The same day, when the implantation is finished, we are taking one-phase impression with syringe technique, with the principles of the open tray method, so we can start the preparation of the hybrid bridge. Immediately, before taking the impression, in the patient mouth we are placing respectively the chosen transfers. /Pic.4 Placing of the transfers/.

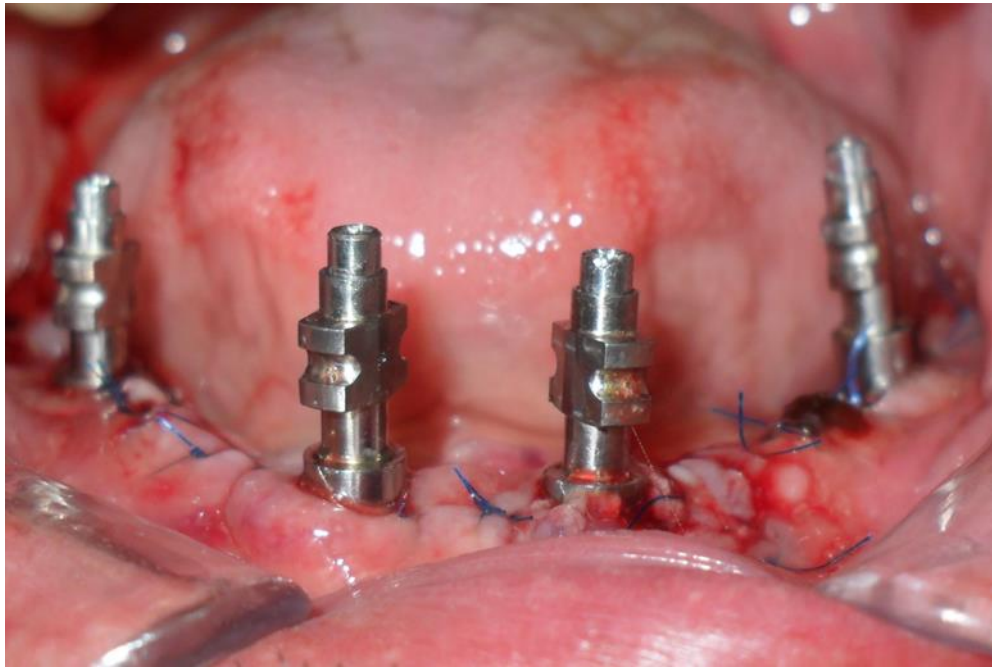


Figure 4. Placing of the transfers

When the impression is taken, very precisely, we are placing the appropriate analogues in the directions of the transfer caps. Carefully, we are controlling their mobility. /Pic.5 impression with analogues,Pic.6 impression with transfers/.



Figure 5. Impression with analogues



Figure 6. Impression with transfers

The next step is spilling the impression and preparing the working model. At the beginning the spilling is with silicone gingival masque between the analogues and the transfers and all around the cliff. The silicone has elastic abilities and it simulates the reziliation of the gum. The other parts of the impression are spilled with hard gypsum with zero expansion – zerostone. /Pic.7 gum mask, Pic 8 working model/.



Figure 7. Gum mask



Figure 8. Working model

When the working model is finished, we are making test template made of acrylic base in which are placed temporary titanium abutments. They are finished factory product that is used in the phases for the hybrid bridge, so they are captured in the acrylic base. /Pic.9 test template/.

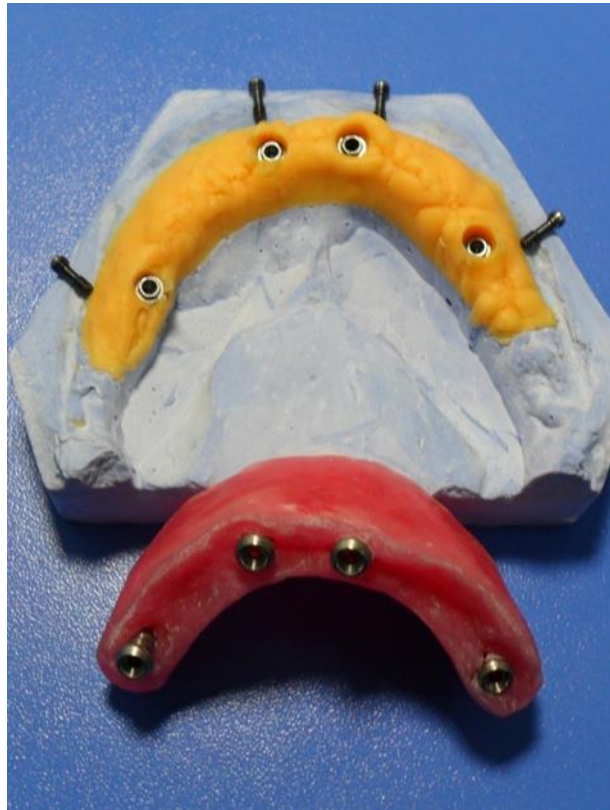


Figure 9. Test template

The next step is to build rose wax turret on the acrylic template. We use the turret to determinate the needed height of the interjaw space into equal halves. Because we need easy manipulation and perspicuity we release the holes for screwing./Pic.10 rose wax turrent/.



Figure 10. Rose wax turrent

When the test template is prepared, we fix it in the patient's mouth with hexagon screws that are shown above. The template is multi-functional, we use it like a test control for the impression preciseness. In some bad cases, if the impression is wrong, the template won't work, so in this early phase we have opportunity to fix it. If the correction is needed we should follow the next procedure: first, we remove the wax from the turret, then we separate the acrylic from the base of the template. The separated fragments are fixed with screws in the patient's mouth and we connect them with thermoresin. When the template is fixed we are taking new precise impression.

We proceed to the next phase, to determine the needed height, but at that point we have to be sure that everything is fine with the test template. For better stability, always, we are fixing it in the patient's mouth. After that, we are determining the height. The intermaxillary rate is determined according to classical principles, minus 2-3mm from the physiological standby, with softened wax, in occlusion. /Pic.11 rose wax turret/



Figure 11. Rose wax turret

We transfer the fixed height together with the models in half – individual articulator. The fixing of the models has to be with special gypsum for that purpose – artifiks that has not expansy. If the fixing is with ordinary white gypsum, depending on the producer, its expansy may increase the height up to 1mm. In the following phases that would be a problem because it increases the determinate height. When the fixing is finished, we start to position the teeth in the wax. For that purpose we use acrylic factory teeth, we are using the same type of teeth in the mobile prosthetic. The the positioning of the teeth is classical, also like in the mobile prosthetic. Of course, during this step we pay attention the teeth to be positioned according to the functional and the aesthetic needs, in the middle of the comb, without Spee - curve. Depending on the conditions and when the implants have more lingual position on the comb, we use back stage placing of the teeth. They are placed frontally, but the screwing hole in behind them. After this laboratory phase, we try the teeth in the patient's mouth, with prior fixation. This step, asks fast corrections, so the wax does not melt from the mouth warmth. We recommend their cooling in the fridge and a glass of cold water between the work phases. There is a possibility for reocclusion with selective seizure of the antagonists and increasing the agonists from the wax. The procedure is repeating until we get ideal occlusion, visibility of the teeth while smiling and their natural playfulness. The tried and fixed teeth are moving back on the working model. It comes the making of the metal constructional splint and changing the wax for acrylic material. This step ends with polishing the hybrid bridge. Nowadays, this is a hit in our profession, but because the short amount of time to execute it, the team work and its efficiency are needed. Although the final construction becomes fixed, during all the work phases, the mobile and the

fixed prosthetic are mixed, which asks solid knowledge of both disciplines. Everything that is said above has to be done very precise and in a period of seven days to be fully finished. The hybrid bridge should not have reassigned alveolaria in the acrylic of the mesostructure because every single facial pressure can affect the structure. This like extra side pressure can disfigure the immediate loading of the implants. Next, follows the trying of the finished hybrid bridge in the patient's mouth with additional reocclusion, polishing to high shine and its fixation with hexagon screws. /Pic.12 The hybrid bridge /



Figure 12. The hybrid bridge

For the immediate loading we use the defensive power of the organism, for its self – reparation with regenerative power towards the surgical zone. For maximum 7 days we have to load the implants with the hybrid bridge for the limited time of osteointegration in function of chewing. For the patients this is a practical transient solution because of the fact that they got teeth immediately. They are happy and the satisfaction sees in their eyes. They are full with spontaneous optimism and totally psychologically relieved. This way we can extend the transitory period without unnecessary forcing. The benefit of the immediate loading is in the fact that there is bigger contact between the bone and the implant (bone-to-implant) which is even for 64,2% bigger compared with delay loading implants.

The most optimal is the early or immediate loading of the implants to be done in a period from 48 to 72 hours. This frame can be extended to maximum 168 hours (7 days), but no longer than that. This recommendation is supported with in vivo and in vitro experiments (McCracken et al., 2001) that show that the biggest uptake of necessary minerals on metabolic level are in this specific time interval. After the seventh day, there is rapid decrease of the metabolic processes, so loading after that period will be disaster.

The stitches can be removed later, even after two to three weeks without removing the hybrid bridge, with inevitable irrigation and laser therapy.

After a period of at least 6 months, when the osteointegration is accomplished, comes new impressions for the final metal – ceramic construction. When the impression is taken, we put the sulcus formers with hexagon screws in the patients mouth. /Pic.13 sulcus formers /



Figure 13. Sulcus formers

The following step is in the dental lab, where with help of the hybrid bridge on the working model, we are putting secure keys and we are forming forgus from optosil. These keys are guaranteeing the stability of the forgus for identical transfer of the condition and the inclination of the teeth for the future wax modelation of the fixed construction./Pic.14 forming forgus from optosil stability /



Figure 14. Forming forgus from optosil stability

First, on the working model we are screwing the factory manufactured CASTABLE UCLA ABUTMENTS. They are connecting and fixing between them with thermoresin, which presents nucleus of the construction in a shape of splint./Pic.15 thermresin splint and Pic.16 grey wax modelation /.



Figure 15. Thermresin splint



Figure 16. Grey wax modelation

When this is done, we proceed to wax modelation – CROW WAX. In half – individual articulator, we are checking the occlusion and we are modeling the final shape of the wax construction, so the thermoresin split stays in its nucleus./Pic.17 modeling contol in articulator /.

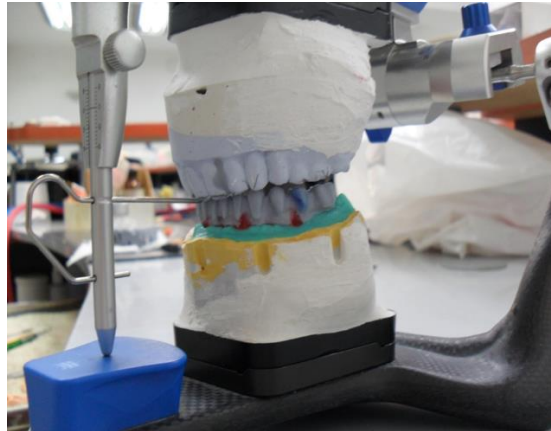


Figure 17. Modeling control in articulator

When the wax modeling is over, we are pouring form appropriate compatible metal together with original abutments that stay stuck in it. Then comes the finishing of the metal and its sanding. /Pic.18 . metal construction/



Figure 18. Metal construction

The prepared construction is used for the metal trying in the mouth. In the mouth, we check its stability, the laying on the gum and the prosthetic plain in parallel towards the ridges. The final check is the intermaxillar relation in horizontal and vertical dimension which ends with new impression in soften wax.

We are defining the color and the shades of the ceramic, as well as the color and the shades of the gum mask like mesostructure. It comes the shaping in ceramic in the dental laboratory and its baking in many layers. While modeling there should not be too many morphological characteristics over the occlusal surfaces – in other words soft modeling of the tubers. When we try the construction in the patients mouth, before the final glazing, we do the reocclusion. With the reocclusion we should give freedom over the sliding ridges of the occlusal tubers, known as FREEDOM IN CENTRIC. It is very important to relax the stress occlusal contacts between the agonists and antagonists, so we get multiple contacts with at least 3 to 4 contacts per tooth. This kind of polygonal occlusion softens the lateral strengths and provides stabile occlusion which is priority for stability and long – lasting of the suprastructure. /Pic 19 and 20 pre-glazing/



Figure 19. Pre-glazing



Figure 20. Pre-glazing

Following procedures are shading and final glazing of the ceramic in the dental laboratory /Pic.21 metal ceramic bridge/.



Figure 21. Metal ceramic bridge

When the construction is glazed and polished, we put it in the patient mouth and we fix it with hexagon screws. The holes for manual manipulation are temporary closed with gutta-percha or cotton tampon covered with cavite. The screwing should be step by step, so in the end it finishes with strength by 20 N. For this purpose we use special tools (syringe) according to the recommendation of the manufacturer.

After a certain period, comes the regular check of the tightness of the screws. Afterwards it is followed by their closing, in the lower parts with gutta-percha or cavite and in the higher parts they are sealed with layer of nano composite. The composite color should be chosen according to the ceramic and the occlusal shape should be in the same style like the ceramic construction.

3. RESULTS

The case is worked in 2013, but after a distance of time, it is now presented. Because of the quality control, surely, we can confirm its stability and permanency to the bone and the surrounding tissues. There aren't any noticeable changes during the normal everyday activities of the patient. How it looks today, it can be seen on the last picture that is taken recently during the regular check.

We recommend the checks to be more frequent, when we use oral jet and profi jet for cleaning the construction. The regular check, also includes occlusion check, as well as polishing to high shine if there are pigmented deposits. At home, the patient should do regular wash with device under water pressure called water pik. We also recommend using mouth washes for refreshing the oral cavity that in their components have chlorhexidine /CHX/.

4. DISCUSSION

It is valuable to mention the real interest for the time of waiting for the osteointegration of the implants. This pause for the patients is very important factor because of their real psychological tense. They have been with teeth problems for so many years, so their patience and faith are finished. Another 6 months of waiting for osteointegration of the implants for them is too much time to be without teeth. Everyone of them want to get teeth sooner, so any kind of convincing for the patient is unacceptable.

The period for osteointegration can pass with two options: either classical total temporary prosthesis adapted to the newly mouth conditions after the implantation or hybrid bridge with immediate loading. Nowadays, the immediate loading is used more often like practical transient method. It is always followed by the final metal ceramic construction.

The permanent construction, depending on the patients financial possibilities, can be made of non-metal, full ceramic (ZIRCONIA). Basically, the phases remain the same until the moment of the shaping in wax. In this case, this step is made on previously scanned model and its modeling on computer on some of the world programs for designing such as Exocad or 3 D Shape. Then, with CAD-CAM machines from Zirconium Oxide block is cut the whole construction. /Pic.22/ Followed by modeling and baking the ceramic in multiple layers. When the construction is made of zirconia, it is recommended to use transfer caps and replicas for a single use-laboratory analogues. For better precision in the phases of scanning, it is very important to use scan abutments for each laboratory sample.



Figure 22. Zirconium Oxide block

No matter if the construction is made of metal ceramic or zirconia, the recommendation is for each implant to be used two pairs of identical screws, one for the phases in the dental laboratory and the other for the phases in the patient mouth. Over all this is for sterility during the work, but as well as for the possible damage of the hexagon in the dental laboratory.

5. CONCLUSION

The curtail characteristic for the shown techniques is that there is always possibility for screwing and unscrewing (remove) of the construction. That gives us space for any corrections in future, inside or out the patient mouth, in our dental office or in the dental laboratory. The constructions that are fixed with classical cement don't have that possibility, for corrections outside the patient mouth. In these cases, removing the bridge with separation is the worst case scenario, because we have to make new construction. Our experience gives us right to conclude that it is a great difference and huge advantage compared to the other techniques of fixing of the construction, so we share like benevolent recommendation.

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