



ALL-CERAMIC CROWNS IN THE FRONTAL REGION – STUDY CASE PRESENTATION (PINK & WHITE AESTHETICS WITH GINGIVECTOMY)

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Abstract. *The modern lifestyle brings the need for an ideal appearance and a beautiful smile. The correction of the physiognomy today is one of the basic goals of patients who are looking for the aesthetics of the face and teeth. In the frontal region the relation of the teeth to the surrounding soft tissues is very important. The harmony of pink and white aesthetics is a priority. Any deviation from the marginal gingival symmetry is counterproductive for the final result and has a negative effect on the aesthetics and proportions of the teeth. In addition to modern dental materials and equipment, it is very important to have a precise and thorough treatment plan at the start, but also a vision for a positive result. Technical skills, knowledge and manual dexterity and patience are needed, but most of all, to have an idea is of utmost importance.*

Keywords: *smile, aesthetics, marginal gingiva, physiognomy, teeth.*

1 INTRODUCTION

Contemporary living imposes the need for aesthetics restorations, especially of teeth in the frontal region. Nowadays we are not only talking only about nice teeth, but also about a stunning smile. There are millions of questions in our mind about how to get to a dazzling smile. Very often, we, the dental doctors, have a professional challenge to fulfill the needs and wishes of our patients for the perfect smile. There is much more than the beauty itself as a main field of interest of the aesthetic dentistry. It implies oral rehabilitation with maximum aesthetic that satisfies our patients. The smile not only affects the face and the body, but also the self – confidence of the human being. The affection of the aesthetic appeal in the everyday living is very important component. While reconstructing the frontal region we give great importance not only to the function, but also to the aesthetic parameters. These parameters are the focus of our interest - the teeth with the surrounding gum, the mucosa of the oral vestibulum and the lips. The gum represents the frame of the teeth and it is very important element in achieving final results when planning the prosthetic dental treatment. The gum covers the coronal parts of the alveolar ridge and it forms the interdental papillae which in their base have triangular shape, but their tip ends at the contact point of the tooth. It has to be always pink, firm, and not inflamed. Every exception of the gingival symmetry will affect the final result of the prosthetic rehabilitation in negative way. There are strictly defined steps for creating and configuring the smile from a dental point of view. We are led by generally accepted parameters - the proportion between the facial median line and the teeth, their symmetry, incisal length, axis, interdental contact points and surfaces, the shape, size and color of the teeth. In terms of soft tissue aesthetics, the bi-pupillary line, the smile line and the line of lip angles are important. Before the start of the treatment we need to notify all irregularities that should be addressed during the treatment phase. We need modern materials and techniques, precise treatment plan and vision of the final result. Apart from the equipment, knowledge and technical skills, to have an idea is of paramount importance.

2 MATERIAL AND METHODS

The patient's initial presentation revealed a disharmony between the teeth and the surrounding soft tissue (Fig.1) To solve this challenging problem, taking the turbine in hand right away and starting with tooth preparation is not a viable solution. Good tooth preparation technique and modern dental materials in the dental laboratory materials are not sufficient for a successful clinical outcome.^{5,6,7} It takes a creative engagement, teamwork and well-planned workflow



to fulfill this goal. The first step was the complete clinical examination, which revealed the present irregularities and the possible solutions to them. The clinical decision to reconstruct the frontal region was based on extensive analysis that started with a patient interview, several anatomic impressions and production of studio models necessary in the further phases as a reminder of the starting position. Panoramic and intraoral x-ray images were also done in order to evaluate the condition of the teeth, especially the periodontal tissues; the length of the roots and their relation to the surrounding bone. We took photos of the patient's face (later used for drawing special prosthetic lines), occlusion photos and photos of the prosthetic rehabilitation workflow phases.

The second step was reaching out to the newest digital diagnostic methods - multiple measures and drawing several orientation lines on the face that connect the forehead, the eyebrows, the eyes, the lips and the chin. (Fig.2) The goal was to get ideal symmetry and aesthetic in the frontal region. The gum line was parallel to the bipupilar line and the base of the nose. Based on the zoomed photos of the teeth, we were able to create computer simulation. The procedure started with drawing two parallel lines in the intercanine sector. We proceeded with drawing the marginal edges of the gum. The next step is to elevate the level of the gum to the desired height in order to achieve a satisfactory height/width proportion of the future all-ceramic crowns. The purpose of this simulated gingivectomy was to obtain equal shape and size of the frontal teeth and harmonic dental arch in the cervical part of the teeth.^{8,9,10} Therefore, this digital workflow was very important step in achieving a satisfying smile (Figure 3). After the thorough discussion about the designed computer simulation among the team members and its final approval by the patient, we started with the clinical phase of the treatment. A terminal anesthesia was administered in the frontal region (Scandonest 2 %, Septodont, Saint-Maur-des-Fosses, France). After the measurements with 1 mm graduated periodontal probe (UC-15, Hu-Friedy, Chicago, USA) that started at the incisal edge of the teeth, bleeding points in the soft tissue were created in order to mark the anticipated zeniths of the gingival margin in accordance with the digital design. The soft tissue was removed with paramarginal, intrasulcular incisions and final excision using 15 C blade (Swann-Morton, Sheffield, England). A full-thickness flap was gently raised at some sites in order to gain access for bone removal and osteoplasty with diamond burs in order to create favourable anatomical conditions for new biological width formation. The tissues were sutured with vertical mattress sutures using 5-0 polypropylene suture (Assut Medical, Pully, Lausanne, Swiss). Two week later the sutures were removed. (Fig.4) One month later we moved to teeth preparation phase under local anesthesia. During the preparation we paid attention to the parallelism between the teeth and the space between the antagonistic teeth. We ended this phase with tissue trimmer (porcelain turbine drill) to add final touch to the gum, the papillae and to open the gingival sulcuses (Fig.5 and 6). The patient's mouth was rinsed with antibacterial solution and alginate anatomical impression was taken for production of studio models in hard gypsum (Fig.7). When the gypsum model was ready we started with wax-up modelling, with which we envisioned the future teeth with their shape, length, width and convexity (Fig. 8 and 9).

On the waxed teeth we did another measurements. We can theoretically use many mathematical formulas, but the simplest is the one where we divide teeth's width with their length. The gained result should be a coefficient with values from 0.75 to 0.85 and it guarantees ideal shape of the waxed-up teeth. We applied this protocol, but we also used some personal creativeness in adding or removing wax to get a realistic image of the future all-ceramic crowns. (Fig.10)

3 RESULTS

Based on the digital wax-up design, PMMA provisionals were fabricated. They had multipurpose function: to serve as protective bandage for the fragile marginal gum, protection of the sensitive prepared teeth, restoring of function and aesthetics in the patient's everyday life, maintenance of the newly gained gingival levels and guidance for papillae formation for pink aesthetics. They also give us a chance to notice certain disadvantages of the teeth so that we are able to correct their shape, size and color at this point.^{11,12} The final shape of the temporary teeth serve as guiding starting point for the dental technicians about the direction in which they should start the workflow in the dental laboratory (Fig.11).

One month later we moved to the next phase - taking final impression. The provisionals were removed and impregnated retraction cords were gently applied. A dual phase technique using condensation silicone was used (Zeta Plus with Oranwash kit, Zhermack, Badia Polesine, Italy). After the evaluation of the impression quality, it was sent to the dental laboratory for production of the permanent all-ceramic crowns (Fig.12,13). The production of the all-

ceramic crowns in the dental laboratory was in the following order: scanning the model, computer modelation of the caps with palatal reinforcements, lobbing on CAD/CAM machine, finishing corrections, trying the construction in the mouth, modeling of the porcelain and finally glazing with shading (Fig 14). The final all-ceramic crowns were cemented in the patients mouth using glass-ionomer luting cement (Fuji I,GC,Tokyo, Japan). The static and dynamic occlusion was checked and the necessary adjustments were done. The patient was given complete and comprehensive instructions and was scheduled was regular follow-up examinations (Fig. 15 and 16).

4 DISCUSSION

It is utmost importance to restore the proper lateral occlusion before starting the frontal reconstruction. This is the first thing for the therapist to do if it is not already done. Otherwise, in a short period of time a huge disappointment may follow represented in chipping or breaking of the new ceramic frontal teeth. This clinical phenomenon happens because a patient with a lateral occlusion disability spontaneously uses the frontal teeth for mastication. This way all effort, time and finances are useless. Every compromise with the patients in order to fulfill their wish to make the frontal teeth first and the lateral later ends with guaranteed failure. The chipping/breaking of the ceramic restorations is a very common issue in everyday dental practice and that is why it is a very important theme for discussion (Fig.17).

5 CONCLUSION

The dental professionals should always have in mind that while dealing with dental aesthetics, the psychological self-confidence of the patients plays the most important role. It is not only about treating the teeth, but also about creating a beautiful smile. While trying to achieve perfection in aesthetics it is extremely necessary to balance between the patient's wish and the clinical reality. The smile is created by aesthetic parameters that have been present for many years and they are very useful as tools while reconstructing the teeth in the frontal region. However, to achieve a satisfying final outcome, apart from our knowledge and clinical skills, it takes patience both from us as clinicians and the patients.



Figure 1. Initial situation

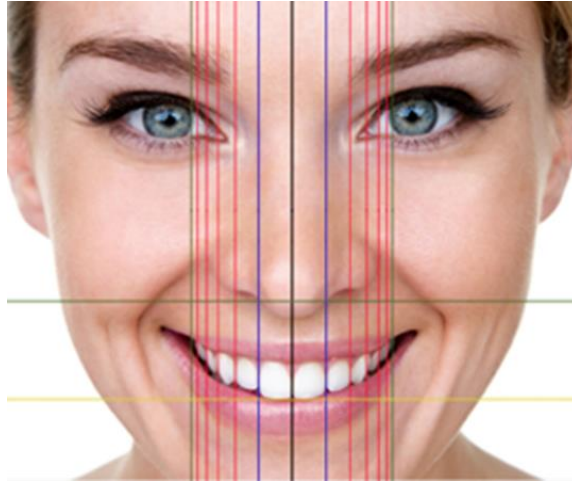


Figure 2. Orientation lines



Figures 3 and 4. Simulated and Clinical gingivectomy



Figures 5 and 6. Open gingival sulcus

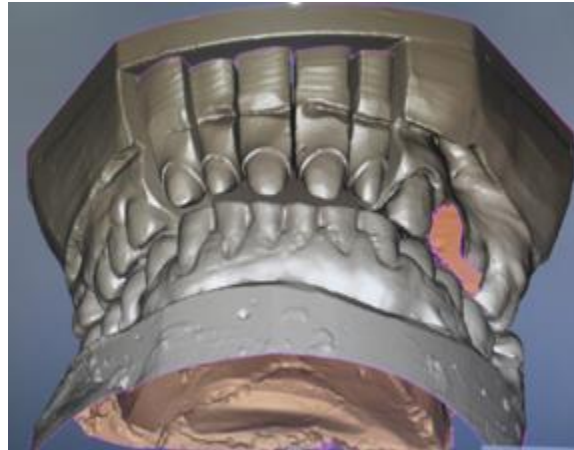
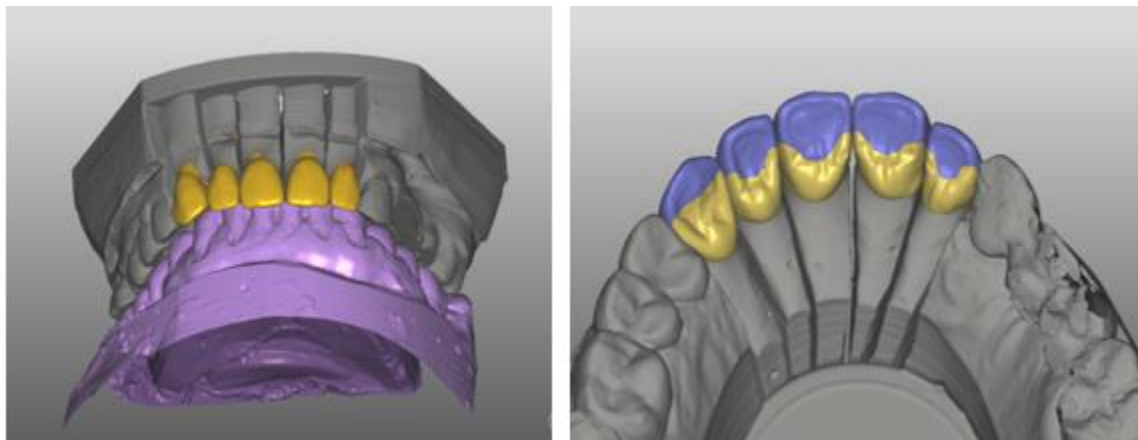


Figure 7. Studio model



Figures 8 and 9. Wax-up modelation

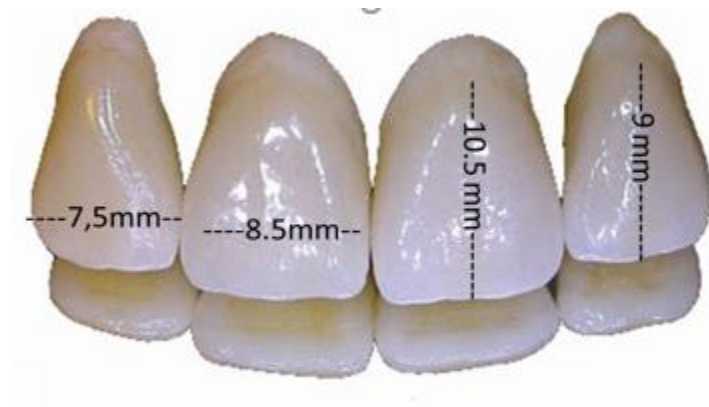


Figure 10. Teeth proportions with in the coefficient values



Figure 11. Provisional PMMA temporary teeth

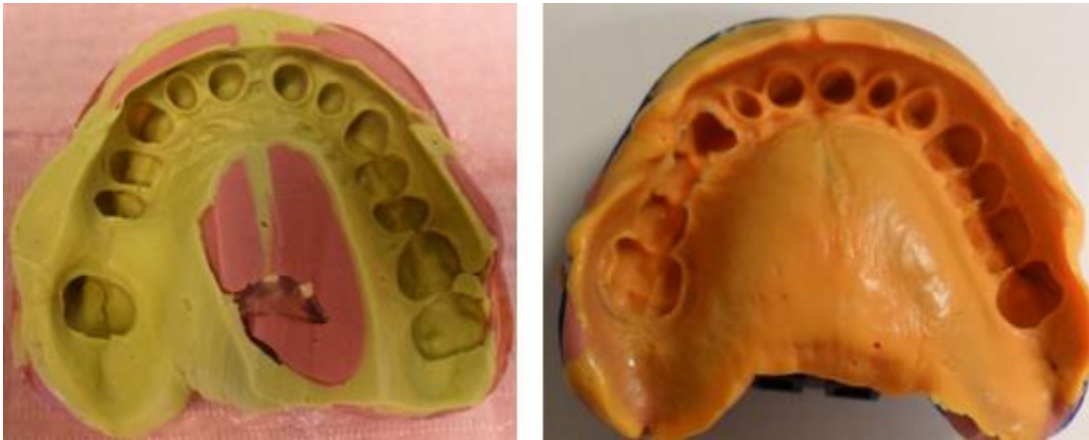


Figure 12 and 13. Dual phase final impression



Figure 14. Fabrication of final prosthetic restoration in the dental laboratory



Figures 15 and 16. Before and after clinical situation



Figure 17. Proper lateral occlusion

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