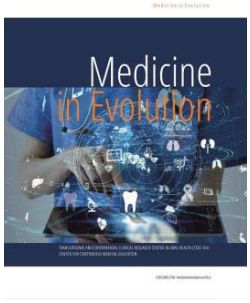
Esthetics of the maxillary frontal group in dental prosthetics



Olariu I.[1], Olariu T.[2], Popovici R. A.[3], Cosoroaba R. M.[3], Pitic (Cot) D. E.[3], Paşca C.[1*], Flueraş R.[1,2], Ilieş I.[1]

[1]Department of Dentistry, Faculty of Dental Medicine, "Vasile Goldis" Western University of Arad, Romania 2
[2]Department of Medicine, Faculty of Medicine, "Vasile Goldis" Western University of Arad, Romania
[3]Department I, Faculty of Dental Medicine, Victor Babes University of Medicine and Pharmacy, Timisoara, Romania

Correspondence to:
Name: Ciprian Paşca
Address: Department of Dental Medicine, Faculty of Dentistry, "Vasile Goldis" Western University of Arad, Romania, Arad, Str. Liviu Rebreanu, nr. 86, Campusul Universitar „Vasile Goldiş"
Phone: +40 722931421
E-mail address: ciprianpasca@uvvg.ro

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Abstract

The esthetics of the maxillary front group is a crucial aspect in dental prosthetics, having a significant impact on the patient's smile and confidence. Modern prosthodontics offer various treatment options, including all-ceramic crowns, dental veneers, and dental bridges made of esthetically superior materials such as zirconia and feldspathic ceramics. The article highlights the importance of the multidisciplinary approach in the restoration of the maxillary frontal group, involving the collaboration between dentists, dental technicians and, in some cases, specialists in plastic surgery and orthodontics. Particular attention is paid to minimally invasive techniques, which allow the preservation of the natural tooth structure, while maintaining long-term aesthetics and functionality.

Keywords: interdisciplinary approach, fixed prosthesis, CAD/CAM technology, oral rehabilitation

INTRODUCTION

For a complete and correct oral rehabilitation, all the functions of the dento-maxillary apparatus must be perfectly restored. In addition to the masticatory function, which is the most important for the patient, the phonation function plays an important role as well as the aesthetic function. In recent years, physiognomic function has received increased attention, both from doctors and patients who are increasingly concerned with how their teeth look or how they smile. The demands of dental aesthetics are increasing from patients, and the possibility of achieving the requirements is in full development, due to the acceleration of technology and the development of the dental materials industry [1].

The esthetics of the maxillary front group is a crucial aspect in dental prosthetics, having a significant impact on the patient's smile and confidence. This area is directly visible in social interactions, which is why prosthetic restorations in this region must meet strict aesthetic criteria in addition to optimal functionality. Modern prosthodontics offer various treatment options, including all-ceramic crowns, dental veneers, and dental bridges made of esthetically superior materials such as zirconia and feldspathic ceramics [2].

In order to achieve successful aesthetic results, a detailed analysis of the shape, color and alignment of the teeth, as well as the harmony between the dental restorations and the surrounding soft tissues, is essential. Advanced ceramic modeling and layering techniques, together with the use of CAD/CAM technologies, allow obtaining restorations that faithfully imitate the optical characteristics of natural teeth. Also, the integration of aesthetic principles, such as tooth proportions, symmetry and smile dynamics, play a crucial role in patient satisfaction [3].

The aesthetics of the maxillary frontal group in dental prosthetics is essential for the aesthetic and functional rehabilitation of patients. A combination of theoretical knowledge, clinical skills and the use of cutting-edge technologies can ensure optimal results that meet both the aesthetic and functional expectations of patients.

Purpose and objectives

The aim of this study is to explore and analyze the factors that influence the aesthetics of dental restorations in the maxillary frontal group, considering the major importance of this region in smile perception and in patients' social interactions. Aesthetic dental restorations in this area must meet both aesthetic and functional criteria, given the complexity of the elements involved, including the shape, color, texture and alignments of the teeth, as well as their interaction with the surrounding soft tissues.

DENTAL AESTHETICS – BASIC PRINCIPLES

The term *aesthetics* was introduced by Alexander Gottlieb Baumgarten in the work "Aesthetica" in 1750, it defines aesthetics as "*the science of sensory knowledge*". According to Baumgarten, sensory knowledge is differentiated from that of thinking by the objective opposition of logic and aesthetics. The first pursues the truth and the second the beautiful. The present is lived in a world where the personality and the examples chosen by man determine his clothing, behavioral and social life criteria. Many people want to modify their appearance to resemble their idol or strive for perfection. Society decides what should be considered beautiful. The desire to look good, or better, has become a true necessity, imposed by economic, social and sexual relationships [4].

The face is the most representative part of the body, and the lips are prominent formations, that's why the teeth, when exposed, attract attention in an obvious way. Facial

physiognomy recognizes three factors: dento-facial, dento-gingival and facial. The first two are of direct interest to the dentist. Every physician must know the psychological importance of the mouth. He must acquire the fundamental aspects of aesthetic treatment, as well as the problems they can raise or aggravate in the patient. Any dentist who performs changes in the appearance of the face must be aware of both the psychological and the purely physical consequences. Not only the consequences of the treatment must be considered, but also the reasons that lead the patient to undergo a treatment with an aesthetic background [5].

Personality, desires, motivation, self-esteem, expectations, the ability to accept the change and the desire to cooperate, are very important factors for the completion of the treatment to have a successful end. Conflicts can arise from the patient's unrealistic expectations, a different perception of beauty (the results from an aesthetic and technical point of view are correct), the patient has the expectation that through the dental treatment his psychological problems will diminish or even be solved, or the situation in which the patient he may be satisfied with the result, but his family and relatives are not. Very rare, but still encountered, is the situation where the patient does not want to improve his aesthetics, and only the dentist does. In this case the aesthetic appearance is only a defense mechanism, the patient has got used to it and it helps him.

The lips are a real help in evaluating the dentofacial structure and establishing a concept of the smile. The lips define the space that is separated by the arrangement of the teeth. For this reason, the lips require special aesthetic care from the dentist. By diminishing or accentuating the visible components of the teeth, harmony with the other components of the oral region can be obtained or destroyed. The main lip shapes are curved, straight, arched, elliptical, inverted and rectangular. Of these, curved, straight and elliptical shapes are found more often. By fullness, lips can be classified as medium, full and thin. The morphological aspects of the lip that must be considered are width, symmetry and fullness. In general terms, a smile that is at least half the width of the face at that level is considered aesthetic [6].

The smile line is established by the relationship between the gingival tissues, teeth and the position of the lower edge. The first authors, who published the notion of the smile line, were Frush and Fisher. Hulsey reported the smile line to the lower lip and revealed that it is quite an important factor influencing the aesthetics of the smile. From the point of view of the position of the upper lip, the smile line can be medium, low or high. The most difficult cases to restore prosthetics in the frontal area are those cases in which the patients have a high smile line, any mistake has a direct impact on the aesthetic area. If the smile line is high, more gum tissue is exposed. This situation is recognized in the specialized literature under the name of gummy smile [7,8,9].

The gingival contours must be symmetrical, the line of the parcels on the anterior teeth must be in an imaginary straight line from canine to canine. The bundle of the upper lateral incisors should be positioned below this line, by 1-2 mm, while the bundles of the central incisors, and of the canines, should be positioned approximately at the same level. Consistent with aesthetic parameters, the presence of a pale pink papilla plays an important role in the composition of the smile, even in the circumstance where it is exposed to a lesser extent [10].

The gingival zenith represents the highest point of the free gingival margin placed in the long axis of the tooth. The highest gingival zenith must be placed at the level of the maxillary canine. In the upper lateral incisors, the mandibular incisors, the zenith coincides most of the time with the longitudinal axis of the teeth. In the case of central and lateral incisors, the axis of inclination of the teeth is achieved by joining the highest point of the tooth bundle, with the middle of the incisal edge. A mesially inclined shaft is usually obtained. In canines and lateral teeth, the axis of inclination is established by joining the highest point of the tooth bundle with the tip of the cusp. In correspondence with the norms of ideal aesthetics, these axes are parallel to each other. They are also parallel to the axis formed by

connecting the external angle of the palpebral fissure with the buccal commissure. The long axis of the anterior maxillary teeth must necessarily follow a gradual inclination starting from the interincisive line, towards the distal. Within an aesthetic smile, the degree of axial inclination varies, depending on different groups of teeth. Starting from the upper central incisors, as we move away from the interincisor line, distally, the degree of mesial tipping must progress [11,6].

The anatomy of the tooth is disclosed by means of the vestibular face, the apparent face of the tooth, is that area of the vestibular face, bounded by the rounded transitional edges, as they can be seen from the vestibular face. Transition lines mark the transition from vestibular to mesial, distal, cervical and incisal. The shadows of the vestibular face of the tooth highlight, start at the transition lines. These shadows delimit the boundaries of the apparent face [12].

The law of the face requires that, for the purpose of working out the similarity between the disharmonious teeth and the apparent faces, they must be made so that they are equal. The equal composition of the apparent faces, in the case of two adjacent disharmonic teeth, imposes areas that are not similar, except for passing backs. Secondary anatomy, such as gloss and texture, vertical or horizontal on the vestibular face of the tooth, makes up different visual characteristics. One of its characteristics is the fact that natural teeth are polychromatic. Saturation, lightness and hue are the three appreciable dimensions used in tooth color characterization. In geometric terms, according to their shape, the teeth are divided into ovoid, square and triangular. The teeth can still retain a contour: convex, flat or concave. All this gives individuality to the patient's smile. The vestibular face of the anterior teeth presents three planes, viewed from the lateral norm. The profile of the vestibular face, of the central incisor, presents three distinct planes: middle, gingival, incisal. The lack of adequate contouring of these plans will give a flat appearance [13].

Tooth length has been recognized, extensively documented and researched. According to studies, the central incisor has an average length of 10mm, a minimum of 8mm and a maximum of 12mm. The central incisor is approximately one-sixteenth of the bizygomatic width, and the width of the central incisor is between 75%-80% of the length. The width of the central invisibles is approximately equal to the width of the nasiogenian groove [14].

In order to obtain the ideal width of maxillary front teeth, several methods can be used such as measuring the dimensions of the similar tooth, using the Bolton analysis (ratio between maxillary and mandibular teeth - 0.78), using the golden ratio (the ratio of 1:1.681 between width and length of the tooth), using the recurring dental proportion or using the length-to-width ratio (between 75-80%) [15].

Female teeth are round in shape, demonstrated by both the transition lines and the incisal edge. The incisal embrasures are more prominent. In order to create the illusion of delicacy, the incisal edge can be obtained more translucent, and with white hypoplastic striations. At the level of the incisal edge, of the vestibular face, the translucency appears as a gray line. Male teeth are much more irregular and angled. As the years go by, the saturation of the teeth in men is greater, the color of the tooth body extending to the incisal edge. The incisal embrasure is more square, and not very pronounced. Individualization is strong incorporating dark fissures [16].

Regarding the age of the patients, the teeth in the elderly are dark in color, lack texture, are short, the color has a higher saturation and are abraded, they are more individualized, they have a large and wider clinical crown, with open cervical abrasions. In young people, the teeth are more textured, have a low saturation, are bright, the gingival margin corresponds to the enamel-cementum junction, the lateral incisors appear shorter due to the rounded incisal margin, compared to the centrals and canines. Embraces are reduced, with lower individualization, usually with hypoplastic spots and lines [17].

Perceptions about the size, dental shape, color or gender and age of the patient are based on certain prejudices, which are part of the cultural area of each patient. Perceptual preconceptions are divided into two categories: artistic and cultural. The manipulation and use of these preconceptions allow esthetic dentistry to deceive the eye of the beholder when dealing with prosthetic restorations.

FRONTAL GROUP AESTHETIC RESTORATION THROUGH MINIMALLY INVASIVE TECHNIQUES

The first stage of the patient's examination is the extraoral examination that looks at the proportionality of the facial floors, the facial symmetry that is evaluated according to the median line. In the case of patients who require the restoration or improvement of aesthetics, special attention should be paid to the smile line, the degree of exposure of the teeth during speech and smiling, the symmetry or deviation of the smile line and the nasolabial or lipo-chin grooves. During the smile, the evaluation of the oral corridor and the degree of exposure of the teeth [10].

The patient is female, oval face shape, facial symmetry, the floors of the face are proportional, the lips have a normal appearance, normotonic. The perioral furrows are normally represented, the opening of the oral cavity is within normal limits, there are no lesions with plus or minus of substance at the level of the facial integuments and the color of the integuments is normal. Reason for presentation: Disturbance of aesthetic function. (Fig. 1)

Figure 1. The initial case at the presentation in the dental office

During the endobucal examination, the mucous membranes were examined: the tongue has a normal color and the absence of pathological changes at the level of the taste buds on the dorsal side of the tongue, the floor of the mouth has a medium insertion without pathological formations, the mucosa of the hard palate, the palatine veil and the uvula with appearance normal, without pathological formations, buccal mucosa, vestibule, buccal and labial floor with normal appearance. No pathological formations are present in the oral mucosa.

The teeth were called from the oral cavity where 1.8, 4.8, 2.8 and 3.6 were not present and 1.4 OCL-M, 1.5 MD, 1.6 MOD, 1.7 D, 2.1 M, 2.2 MD, 2.4 M, 2.5 D, 2.6 MOD, 2.7 MOD featured obturations. Low tartar deposits were present. M1.6 had endodontic treatment.

The radiological examination was subsequently performed (Fig. 2). After this stage, the treatment plan was developed: descaling, air flow and professional brushing in a first stage, after which 1.1, 1.2, 1.3, 1.4 – pressed ceramic dental veneers, 2.1, 2.2 – threshold grinding for individual dental crowns on the support of zirconium and ceramic application and on 2.3,2.4 – pressed ceramic dental veneers.

We present in Fig. 3 the result of oral rehabilitation with a significant improvement in aesthetic function.

Figure 2. OPG Radiography

Figure 3. Pressed ceramic veneers and zirconium-supported crowns with ceramic application. Final aspect

THE CHALLENGES OF AESTHETIC RESTORATIONS

Esthetic prosthetic restorations in the maxillary frontal group represent a major challenge in restorative dentistry, given the importance of the smile in the aesthetic perception and confidence of patients. Although modern technologies and materials have considerably improved esthetic results, there are still numerous obstacles and factors that can compromise the success of an esthetic prosthetic restoration [18].

Natural teeth have subtle variations in color, translucency and opacity that are difficult to replicate in prosthetic materials. Metameria is the phenomenon where two colors that appear identical under one type of light can appear different under another light. This phenomenon can make it difficult to ensure a perfect match between natural teeth and prosthetic restorations. Although modern materials such as ceramics and composites offer superior esthetics, achieving a perfect color match remains a challenge [19].

Any discrepancy between the restoration and the tooth structure can lead to visible margins, thus compromising aesthetics. If the restorations are not fitted correctly or if there

are rough edges, gingival recession can occur, exposing the edges of the restoration and creating unpleasant esthetics [20,21].

Improper prosthetic materials or ill-fitting edges can lead to gingival irritation and inflammation, affecting the aesthetics and general health of the oral cavity. Lack of adequate gingival papillae support around prosthetic restorations can lead to the formation of unsightly black triangles between the teeth [22].

Esthetic materials such as ceramics are fragile and may be susceptible to fracture, especially in strong occlusions or parafunctional habits such as teeth grinding (bruxism). Incorrect occlusion can lead to tension and stress on the restorations, resulting in damage or compromised esthetics [23,24].

Obtaining accurate impressions is essential to making well-fitting restorations. Any error in the impression process can result in restorations that do not fit properly. The quality of the work depends largely on the skills of the dentist and the dental technician. Ceramic layering and prosthetic material processing techniques require considerable experience and skill [25].

Loss of bone support from tooth extractions or other conditions can compromise aesthetics, making it difficult to restore the natural proportions of the teeth. Congenital dental anomalies, as well as incorrect positioning of the teeth, can create difficulties in achieving aesthetic restorations.

Last, but certainly not least, a constant challenge in dental aesthetics is patient expectations. Patients' aesthetic expectations can vary significantly, and differences between patient and dentist perceptions can lead to dissatisfaction if not properly managed. Patients must be informed about the technical and biological limitations that may influence the final aesthetic results [26].

In conclusion, the success of an esthetic prosthetic restoration depends on an integrated approach that takes into account all these factors. Close collaboration between dentist, dental technician and patient is essential to overcome these obstacles and ensure long-lasting esthetic and functional results. Patient education and the use of advanced technologies and materials play a crucial role in achieving successful esthetic restorations.

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