Photographic-assisted prosthetic design technique for the anterior teeth

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Abstract

The aim of this article is to propose a standardized protocol for treating all inesthetic anterior maxillary situations using a well-planned clinical and photographic technique. As inesthetic aspects should be treated as a pathology, instruments to make a diagnosis are necessary. The prosthetic design to resolve inesthetic aspects, in respect of the function, should be considered a therapy, and, as such, instruments to make a prognosis are necessary. A perspective study was conducted to compare the involvement of patients with regard to the alterations to be made, initially with only a graphic esthetic previsualization, and later with an intraoral functional and esthetic previsualization. Significantly different results were shown for the two techniques. The instruments and steps necessary for the intraoral functional and esthetic previsualization technique are explained in detail in this article.
(Int J Esthet Dent 2015;10:48–67)

Introduction

We have long adopted the Digital Smile Design technique,[1] which has proved to be a very effective instrument for communication between the clinician and the dental technician. However, we have realized that to communicate with the patient in everyday clinical practice it is necessary to offer more powerful evaluation instruments. Further, we have found that functional problems have sometimes prevented the realization in actuality of what was processed graphically.

It has therefore become our consolidated practice to carry out the graphic processing stage privately. We always do an intraoral previsualization, at which time the patient sees the proposed alterations, and the dental team is able to assess the possibility of creating the prosthetic design from a functional point of view.[2,3]

To make the graphic processing predictable and usable by all, it is necessary to accurately identify the inesthetic elements to be evaluated during the esthetic diagnosis. A simple and readily usable diagnostic protocol was devised to accurately identify the inesthetic elements, to show the patient in a convincing manner the possibilities for improving the smile, and to allow the team to check the function of the prosthetic design.

To prove the effectiveness of the proposed technique, we compared it with a purely graphic technique. We formed a group of 10 patients who had requested a prosthetic improvement of the esthetic aspect of their anterior maxillary teeth. All the patients underwent the Digital Smile Design technique for an improvement simulation of the aspect of their anterior maxillary teeth.

The patients were first shown the graphic simulation and, irrespective of their given opinion, the intraoral simulation of the prosthetic design was carried out only later. We evaluated the degree of the patients' involvement in the two techniques, and the degree of reliability of the intraoral prosthetic design presented to the patients.

Materials

The observation group comprised 10 patients who had spontaneously requested prosthetic treatment to improve the esthetic aspect of their anterior maxillary teeth. This group was made up entirely of patients from the authors' private practices. The patients were informed that they would take part in a study, and signed informed consent forms. The procedures followed the standards set by the Italian authorities (Decree of 17 December, 2004), and the Declaration of Helsinki (2008).

The patients comprised men and women between the ages of 22 and 65. The photographic analysis was carried out using a D800 FX camera (Nikon) with images acquired in raw format, an AF-S Micro-Nikkor 105 mm f/2.8G ED VR lens (Nikon), and a SB-R200 flash (Nikon).

The photos were all standardized and taken with a camera that was consistently held at approximately the same distance from the particular patient's face (about 85 cm for the face shots and about 20 cm for the intraoral and smile shots). The computer used had a Windows 7 Ultimate 64 Bit platform (Microsoft Corpo-

ration). The graphic processing software was Photoshop CS6 Extended (Adobe Systems), and the software used to collect the performed analysis was PowerPoint 2010 (Microsoft Corporation).

The transparent templates used to analyze the preoperative photos had white outlines with a transparent background in PNG format, and were prepared by tracing photos of clinical cases solved or schemes of other publications.[4,5] The common characteristic shared by the different transparent templates is the absolute symmetry with respect to the midline.

The Digital Smile Design technique was used for the smile analysis and the graphic previsualization. The previsualization mask technique was indirect.[3] The impressions for the study models and for the models used for the diagnostic wax-up were consistently taken with Flexitime Light Flow and Medium Flow silicon (Heraeus Kulzer). The resin used to perform the intraoral previsualization was Luxatemp Star (DMG Dental) with bis-acrylic resins.

Methods

Digital Smile Design technique

The preoperative photos were taken according to the described technique and were transferred onto the computer. Once the photos had been analyzed and the elements for alteration identified, the images were processed using Photoshop CS6 software.

After processing, the images were converted into JPEG format and mounted on PowerPoint slides. The PowerPoint presentation was shown to the patients to explain the situation of departure and the expected outcome.

The patients were then interviewed and asked:

- Whether they had enough information for them to accept the proposed therapeutics.
- Whether they wanted to proceed with the proposed work.
- Why, in the case of a negative answer, they did not want to proceed.

Photographic-assisted prosthetic design technique

The aim of the photographic-assisted prosthetic design technique is to provide the team with instruments to:

- Systemically analyze the patient's smile and divide the observation areas.[2]
- Identify the inesthetic elements to be corrected and perform an inesthetic diagnosis.
- Draw up precise guidelines for the diagnostic wax-up.
- Create, do a clinical trial, and possibly alter the previsualization mask.
- Perform the functional and esthetic prognosis.

The technique is divided into different steps:

- The patient stands holding a small hand mirror. The team interviews the patient to attempt to understand what the patient dislikes about his/her smile. The patient is often able to point out an inesthetic aspect but is unable to grasp its cause. It is the task of the team to identify these elements.

- The team takes a series of coded photos for the case study and discharges the patient.
- The team analyzes the preoperative photos with the aid of transparent templates, diagnoses the inesthetic aspect/s, and draws up guidelines for the diagnostic wax-up.
- The technician performs a diagnostic wax-up according to the given guidelines.
- The technician makes a silicone shell on the diagnostic wax-up. The dentist fills this shell with resin and places it on the patient's teeth.
- The dentist creates the previsualization mask over the patient's teeth according to the proposed technique.
- The team repeats the set of coded photos for the case study and makes the necessary changes to the previsualization mask.
- Only once the team is satisfied with the outcome is the patient allowed to look in the mirror.
- The team interviews the patient, who stands about a meter away from a large mirror. If requested to do so by the patient, the team makes further alterations to the previsualization mask.
- The team evaluates the static and dynamic occlusal function and makes a functional and esthetic prognosis.
- Only once the patient is completely satisfied does the team repeat the set of coded photos of the previsualization mask as a guideline for creating the provisional and definitive prosthesis.

Systematic analysis of the patient's smile and division of observation areas

The team takes the following set of coded photos for the case study:

- Preoperative frontal photo of the face with smile.
- Preoperative frontal photo of smile.
- Preoperative intraoral photo from 8 to 8.
- Preoperative intraoral photo from 4 to 4.
- Preoperative intraoral photo from 4 to 4 with black occlusal background.

The patient is discharged and the photos are transferred onto the computer. Photoshop CS6 is used to analyze the preoperative photos and identify the elements for alteration by means of the transparent templates. The processed photos are transferred onto PowerPoint slides of 20 x 60 cm format, on a light-gray background.

The inserted photos are all reduced in size to different heights, arranged horizontally, and aligned vertically:

- 18 cm high if inserted individually.
- 15 cm high if inserted in pairs.
- 12 cm high if inserted in threes.

Comments are written at the bottom of each slide.

First analysis: preoperative frontal photo of the face with smile

This is performed by superimposing the digital facebow (Fig 1).

This template serves to orient the patient's face by superimposing the bipupillary line over the upper horizontal line of the digital facebow. It is assumed that the horizontal line corresponds to the bipupillary line.[6] Consequently, when the

face is rotated, the smile will also be correctly oriented to the horizon line.

The observation areas are divided by analyzing the different elements of the smile separately:

- The line that joins the labial commissures to the horizontal line.
- The facial midline and the upper dental midline.
- The upper dental midline and the lower dental midline.

Fig 1 Case I: Assessing the possible rotations to be made to the photo of the patient's face.

Second analysis: preoperative frontal photo of smile

This is performed by superimposing the digital facebow. To be certain that this photo is correctly oriented with regard to the horizon line, the photo of the oriented face is used as a reference (Fig 2).

- The photo of the smile making up the face is significantly enlarged on a new slide. Since it is an enlargement, the result is very grainy (PowerPoint). The photo is imported into Photoshop CS6.
- The preoperative frontal photo of the smile is reduced to 50% by the transparency tool and is highly detailed.
- The preoperative frontal photo of the smile is superimposed over the enlarged photo and is oriented in the same way.
- The photo of the smile making up the face is cancelled.
- The transparency of the preoperative frontal photo of the smile is brought back to zero (0) so that the preoperative frontal photo of the smile is correctly oriented with the horizon. The oriented photo is imported into PowerPoint.
- The base of the digital facebow is superimposed.

Fig 2 Case I: Preoperative condition of front smile.

The following aspects are analyzed:

- Parallelism of the curved line of the lower lip with the horizon line.
- Parallelism of the incisal edge with the lower lip curve.
- Parallelism of the inter canine line that joins the tips of the canines to the horizon line.
- The symmetry between the two sides of the incisal edge.
- The symmetry of the labial corridors.

Fig 3 Case I: Preoperative intraoral condition from 8 to 8.

Fig 4 Case I: Superimposition of the template most suitable to the composition of the patient.

Third analysis: preoperative intraoral photo from 8 to 8

This is performed by superimposing the digital facebow. To be certain that this image is correctly oriented with regard to the horizon line, the same technique is employed as for the second analysis (Fig 3).

The following aspects are analyzed:

- Whether there are large disharmonies horizontally at the posterior sectors (dental axes).
- Whether there are large disharmonies vertically at the posterior sectors (curve of Spee).
- Whether a possible alteration of only six anterior teeth would create problems when contrasted with the posterior sectors.

The aim of these three analyses is to split any single, large problem into various smaller problems in order to more easily identify which zones require alterations.

Identify the inesthetic elements to be corrected and perform an inesthetic diagnosis

Fourth analysis: preoperative intraoral photo from 4 to 4

This is performed by superimposing dental templates (Fig 4). To be certain that this image is correctly oriented with regard to the horizon line, the same technique is employed as for the second analysis.

The dental templates are part of a library of files in PNG format classified according to the form of the teeth and the composition of the anterior group.[4]

The principle is the same as that for different forms of commercially available teeth for the total prosthesis. Just as the technician chooses the most suitable forms of commercially available teeth, so we choose the template that best suits the patient's teeth. The templates are made up of the contour of the six anterior teeth so that it is, to all intents and purposes, like one single image.

The templates are used systematically, adapting the one that best corresponds to the shape of the most significant tooth of the preoperative intraoral photo from 4 to 4. The selected template is altered in size to best suit the patient's six anterior teeth.

The following aspects are analyzed:

- The perception of the symmetry in general.
- The perception of dominance of the central incisors.
- The width/length ratio of the six anterior teeth.
- The zenith symmetry of the gingival margins.
- The correspondence of the transparent templates with the mandibular teeth.

The slide is marked in detail, tooth by tooth, indicating which areas require treatment.

Fifth analysis: preoperative intraoral photo from 4 to 4 with black occlusal background

This is performed by superimposing dental templates. To be certain that this image is correctly oriented with regard to the horizon line, the same technique is employed as for the second analysis.

Having only a black background with no image of the mandibular teeth makes it easier to identify the alterations that need to be made to the anterior maxillary teeth (Fig 5).

The slide is marked in detail, tooth by tooth, indicating which areas require treatment.

Fig 5 Case I: With a black background it is easier to grasp the changes to be made to the anterior maxillary teeth.

Sixth analysis: preoperative intraoral photo from 4 to 4 with black occlusal background

This is performed by superimposing the interincisal angle analysis. The interincisal angles have a strong influence on the definition of the negative space that exists between the mandibular and maxillary teeth when the patient opens his/her mouth slightly from the head-to-head position. The interincisal angles look like an inverted V, and are different sizes:

- The smallest and most symmetric angle lies between the two central incisors.
- A slightly larger angle lies between the lateral and central incisors. This angle is not vertical but slightly open in a distal sense.
- An even larger (vertical) angle lies between the lateral incisors and the canines.

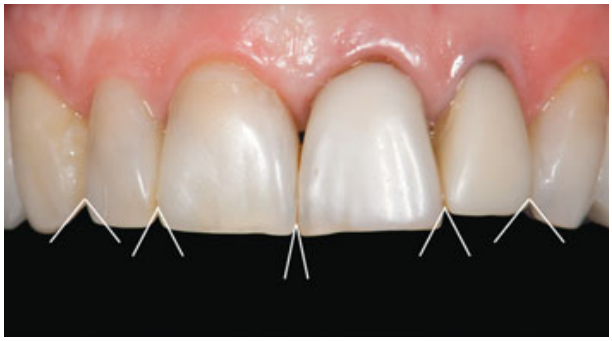


Fig 6 Case I: Analysis of the interincisal angles.

Fig 7 Case I: Analysis of the axial inclination of the six anterior maxillary teeth.

The vertical position of the V apex is even more apical moving distally, and follows the lower-lip curve (Fig 6). As the largest interincisal angle lies between the lateral incisor and the canine, one of the most frequent errors is not obtaining symmetry between these two angles.

The slide is marked in detail, tooth by tooth, indicating which areas require treatment.

Seventh analysis: preoperative intraoral photo from 4 to 4 with black occlusal background

This is performed by superimposing the anterior axial alignment. The aim is to evaluate the axial inclination of the six anterior maxillary teeth. The anterior teeth axis is perfectly vertical only in the central incisors.

It is generally recognized and accepted that the maxillary anterior teeth show an axis inclination that becomes increasingly accentuated moving from the central incisors towards the canines (Fig 7).

The axial inclination is due to the fact that these teeth are perceived by their mesial surface. The posterior teeth, from the first premolar on, are perceived in the same way as the canines, and maintain the axis parallel to the canine axis, but their visibility is reduced due to a perspective effect. One of the most common errors is to alter the teeth using parallel axes, as this results in them appearing like piano keys.

The slide is marked in detail, tooth by tooth, indicating which areas require treatment.

The aim of these four analyses is to precisely identify which areas alter the general harmony of the smile in order to make a detailed diagnosis of the inesthetic aspect. The diagnosis consists of a detailed summary of all the highlighted points.

Drawing up precise guidelines for the diagnostic wax-up

The detailed summary of all the highlighted points is the point of departure for drawing up the guidelines for the diagnostic wax-up. The team inserts into PowerPoint the different photos altered with the transparent templates, together with the initial unaltered photo.

For each slide, the team writes the diagnostic wax-up guidelines below the two photos. The last slide gives a summary of all the alterations to be made with the diagnostic wax-up. The PowerPoint file containing the inesthetic diagnosis and the diagnostic wax-up guidelines is saved as a PDF file to reduce its size, then e-mailed to the technician.

Creation, clinical trial, and possible alteration of the previsualization mask

The technician makes the diagnostic wax-up according to the guidelines given on the PDF file (Fig 8).

A silicone shell is then made on the diagnostic wax-up. It is filled with resin and positioned over the patient's teeth. The strength of the silicone shell is the modeling that follows the ideal gingival margin and minimal soft-tissue compression. Therefore, it is easy to remove the excess resin and to immediately begin the esthetic and functional analysis (Fig 9).

The dentist isolates the teeth with Vaseline and, having injected the Luxatemp Star auto-polymer resin, positions the mask over the teeth (Fig 10).

Fig 8 Case II: The diagnostic wax-up.

Fig 9 Case II: Silicone shell to be placed on patient's teeth.

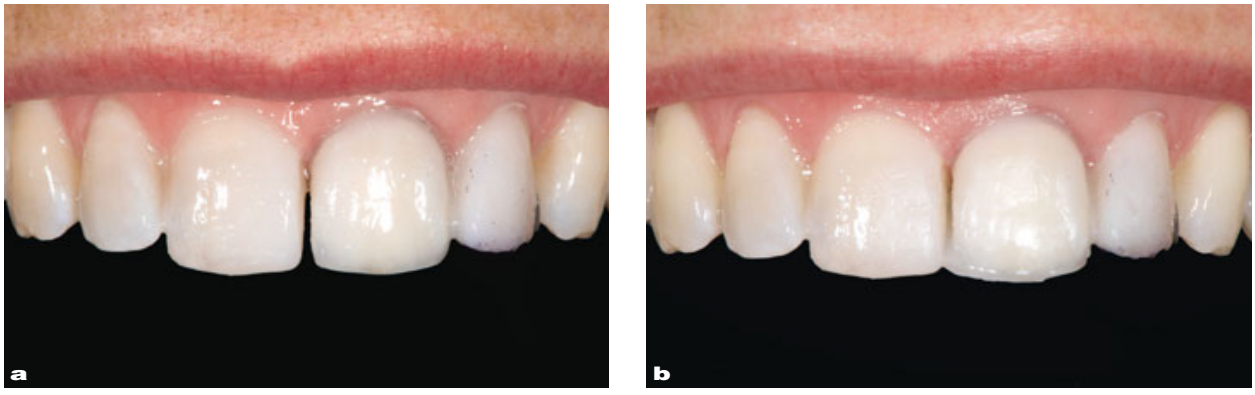
Fig 10 (a to c) Case II: Silicone shell with resin to perform the previsualization mask.

Fig 11 Case II: Esthetic and functional control of the previsualization mask.

The team checks the static and dynamic function of the dental contacts and the phonation. The patient is then asked to stand, and the same set of five photographs are taken as for the systematic analysis of the smile (Fig 11).

The crux of the technique is the intraoral analysis of the prototype. Since the patient's conditions of departure are the most disparate, three methods of approach to the previsualization mask have been identified to rationalize the systematics:

- Additive previsualization.
- Subtractive previsualization.
- Functional previsualization.



Figs 12a and 12b Case III: Further alterations may be made with composite resin (in this case, with the removal of the diastema that the patient previously wanted to keep).

Figs 13a and 13b Case III: Before and after, keeping the laterals slightly rotated, as requested by the patient.

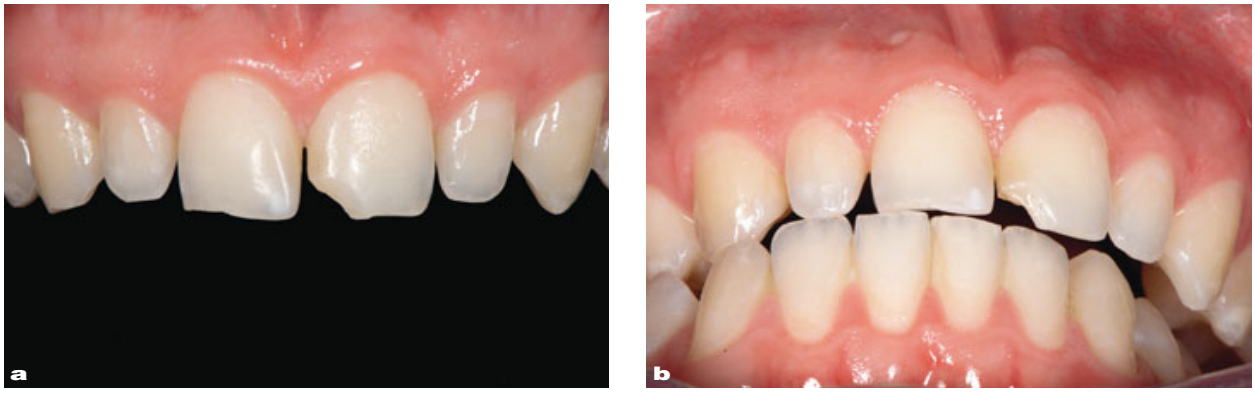
Figs 14a to 14c Case IV: A black line shows the part to be removed. It is merged with a black background inside the mouth so as to highlight only the exposed white teeth (in particular, see vestibular side of 13).

Additive previsualization:
This refers to the condition in which the previsualization mask is larger than the patient's teeth (Figs 12a and 12b). It is the easiest condition to perform and test. The patient observes him/herself with the mouth both open and closed (Figs 13a and 13b).

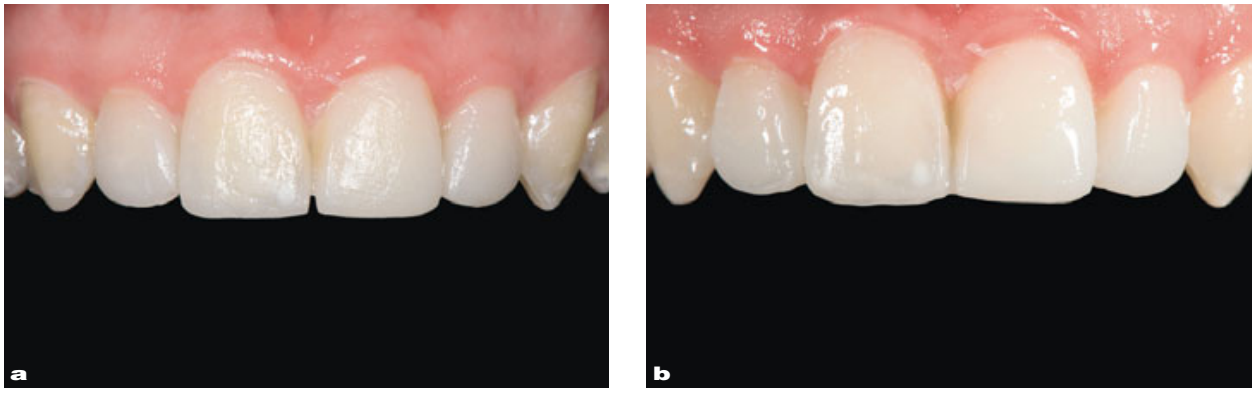
Subtractive previsualization:
This refers to the condition in which the previsualization mask is smaller than the patient's teeth (Figs 14a to 14c). It is the most difficult condition to perform and test. It is necessary to resort to optical strategies, using a black pen and black background. The patient observes him/herself only with the mouth open, with a black background in position (Figs 15a and 15b).

Functional previsualization:
This refers to the condition in which the previsualization mask must restore a missing function (Figs 16a and 16b). It is a difficult condition to test because the typical thinness of the resin is often not sufficiently resistant to the functional stresses during the tests. In this case, the patient must try the phonation and the disclusions with extreme caution and delicacy.

Figs 15a and 15b Case IV: Before and after shortening the tooth length, as requested by the patient.



Figs 16a and 16b Case V: Initial analysis. Although the patient asked the team to resolve the problem of old restorations on the central incisors, and to reshape the conoid lateral incisors, it is shown clinically that a working interference on 12 and 11 would have been a serious risk factor for the laminate veneers.



Figs 17a and 17b Case V: Despite taking into account (with the diagnostic wax-up) the problem of the reduced right canine guide, an intraoral alteration with added resin composite on 13, 12, and 11 had to be made to give greater support to the laterality and symmetry of the dental composition.

Fig 18 **(a)** Case V: Fully respected function. Despite the initial design involving only four teeth, it was necessary to make the patient aware of the need to also involve the canine in the prosthetic rehabilitation. **(b to d)** Case V: The final case.

At this stage, the patient is still not involved in the decision-making process and so is not yet asked to look in a mirror. The photographs are immediately transferred onto the computer for evaluation. The team, irrespective of the opinion of the patient (to avoid being influenced), analyzes the photographs of the previsualization mask on the monitor. The larger the monitor, the better it is to identify the corrections that need to be made.

It is almost always necessary to make intraoral alterations to the previsualization mask because the patient's posture and the dynamics of the lips may cause unpredictable situations on the articulator (Figs 17a and 17b).

For each alteration made to the previsualization mask, the entire set of photos is repeated again and analyzed once more on the monitor. During this step, it is no longer necessary to resort to superimposing transparent templates over the images. Only when the team is completely satisfied with the result does the patient become involved in evaluating the outcome (Figs 18a to 18d).

Figs 19a to 19d Case II: The final case with regularization of the shapes, the color, and the surface texture.

The team interviews the patient, who stands about a meter away from a large mirror

It is important that the patient looks at his/her reflection in a large mirror from the distance of about a meter to evaluate how the smile is integrated in the face. This is also to ensure that the patient is not distracted by the inevitable imperfections of the previsualization mask. This is the only way of involving the patient objectively in the decision-making process.

The team interviews the patient asking:

- Whether the patient has enough information to accept the proposed therapeutics.
- Whether the patient wants to proceed with the proposed work.
- Why, in the case of a negative answer, the patient refuses to proceed.

Performing the functional and esthetic prognosis

Once the alterations have been made and the patient is completely satisfied with the esthetic aspect, the static and dynamic checks are carried out. One of the fundamental points of the proposed

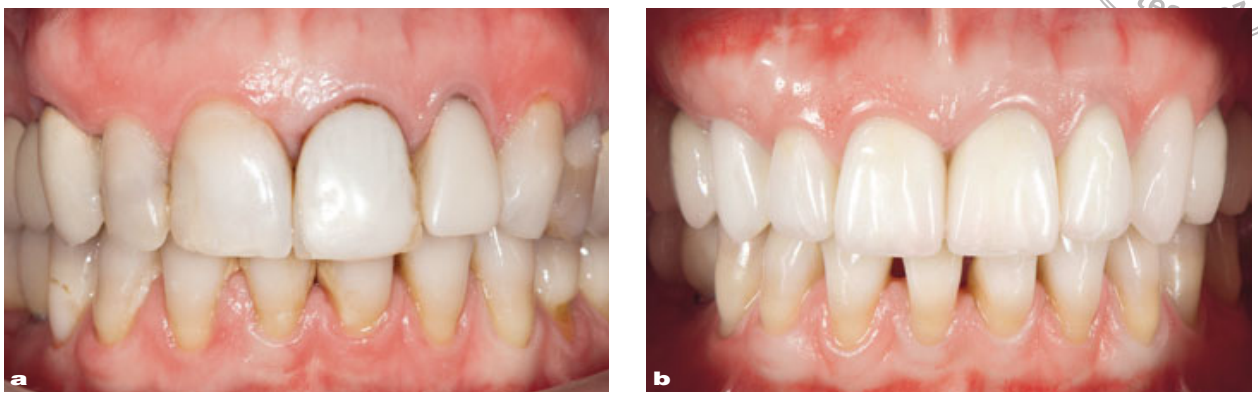
Figs 20a to 20d Case I: The final case.

technique is that the functional analysis cannot be performed by a simple computer evaluation.

Changing the shape of the teeth often results in functional interferences that must be checked thoroughly in order not to incur functional disorders or restoration fractures. To eliminate these functional interferences it may be necessary to alter the shape of the teeth. In such cases it is necessary to start the entire photographic-assisted prosthetic design technique from the beginning again.

It is only when esthetics and function are in perfect harmony that a positive esthetic and functional prognosis can be made. This is no more than a checklist of changes to be carried out and possible problems that may occur, identified during the prototype testing. This checklist will be used by the clinician to create the tooth preparations according to the technician's needs (Figs 19a to 19d).

The concept of reliability of the prosthetic design means being certain of repeating the changes made to the natural teeth with the personalized prototype, both in the provisional and in the definitive prosthesis (Figs 20a to 21b).



Figs 21a and 21b Case I: Final outcome in line with the prosthetic design.

Photographs of previsualization mask taken as guideline for creating provisional and definitive prosthesis

Once the functional and esthetic prognosis has been made, a final set of coded photographs of the previsualization mask are taken and the impressions of the previsualization mask are made:

- Photo with frontal previsualization mask of the face with smile.
- Photo with frontal previsualization mask of smile.
- Photo with intraoral previsualization mask from 8 to 8.
- Photo with intraoral previsualization mask from 4 to 4.
- Photo with intraoral previsualization mask from 4 to 4 with black occlusal background.

Once the esthetic and functional target is reached, the team proceeds to prepare the teeth. The APT technique[7,8] is used when it is necessary to prepare porcelain laminate veneers.

Results

The results have been divided into two criteria:

- Degree of patient acceptance according to the system of presentation of the prosthetic design.
- Need to make changes to the definitive prosthesis with respect to the prosthetic design.

Table 1 shows the results of the degree of acceptance of the Digital Smile Design technique. Only 30% of patients would have accepted undergoing prosthetic therapies after having only examined the simulations of the alterations on the computer monitor. Of the patients who refused the therapeutic proposal, 75% reported not having enough information to accept the therapeutic proposal. The remaining 25% reported that they did not consider the changes to be correct.

Table 2 shows the results of the degree of acceptance of the proposed

Table 1 Acceptance of the therapeutic proposal according to the Digital Smile Design technique

Years	Patients									
	1	2	3	4	5	6	7	8	9	10
20–30	No									
30–40						No				No
40–50				No	No				No	
50–60										
60–70		No	Yes				Yes	Yes		

Table 2 Acceptance of the therapeutic proposal according to the photographic-assisted prosthetic design technique

Years	Patients									
	1	2	3	4	5	6	7	8	9	10
20–30	Yes									
30–40						Yes*				Yes
40–50				Yes*	Yes				Yes*	
50–60										
60–70		Yes	Yes				Yes	Yes		

Table 3 Need to make changes to the definitive prosthesis with respect to the prosthetic design

Changes	Patients									
	1	2	3	4	5	6	7	8	9	10
Yes										
No	X	X	X	X*	X	X*	X	X	X*	X

technique. All the patients accepted the prosthetic proposals after having fitted the previsualization mask. Further, they all reported that they had enough information to accept the therapeutic proposal. Thirty percent of patients (*) requested further alterations to the prototype before giving their consent to proceed with the prosthetic therapy. These changes proved more pleasing for both the patient and the team.

Table 3 shows the results regarding the need to make changes to the definitive prosthesis with respect to the

prosthetic design. None of the patients required any alterations to be made from the time of finalizing the provisional to the definitive cementation of the ceramics. It should be pointed out that 30% of patients (*) asked for further alterations to the prototype before giving their consent to go ahead with the prosthetic therapy. All these patients were below the age of 50.

Discussion

The photographic-assisted prosthetic design technique consists of a detailed analysis of the intraoral and facial photos of the patient in order to diagnose the inesthetic aspects. Based on the results of the analyses, some prosthetic design prototypes are created to make a functional and esthetic prognosis.

All the subjects who accepted the simulation performed with the graphic previsualization technique are in the 60 to 70 year range. Despite the limits imposed by the small number of subjects taking part in this study, this may suggest that they are less demanding with regard to esthetics than younger subjects. On the other hand, 30% of the subjects who accepted the therapeutic proposal, having evaluated the photographic-assisted prosthetic design technique, requested alterations to be made. These subjects were all in the 30 to 50 year range. One theory for these results is that younger subjects are more demanding regarding esthetics and more attentive to detail than older subjects.

We are of the opinion that the patients' involvement in the decision-making process may not have been possible to attain using a computer simulation alone. Moreover, the intraoral functional and esthetic trial systematically results in the dental team not having to make changes to the definitive work when compared to the personalized previsualization mask technique.

Conclusion

The photographic-assisted prosthetic design technique has the fundamental aim of systematically attaining a reversible intraoral check of the prosthetic design. The instruments to make an esthetic diagnosis and a functional esthetic prognosis are extremely simple and the technique is very repeatable.

The proposed technique is easy to perform since the conducted examinations are straightforward and the results, aimed at detecting and correcting inesthetic elements, do not need any particular artistic skill but are within everyone's grasp. Hence, the principles of repeatability and standardization are respected.

We consider that the proposed technique is the only possible way to actively involve the patient in the decision-making process, as the patient is able to see the proposed result directly in the mouth and therefore has enough information to decide whether or not to move onto the realization stage. Further, the possibility of previsualizing cases with subtractive needs or functional doubts enables us to treat all cases.

With regard to other techniques of smile analysis, we believe that presenting the patient with nothing but images of the possible esthetic changes might

raise expectations that may not be met in the realization stage. This is due to the fact that this technique only elaborates on images, whereas the technique we propose, operating both on chalk models and in the oral cavity, confronts the functional and morphological issues. This very often leads to the need to make adjustments that would not otherwise have been detectable. Besides, by increasing the esthetic demands of the patients (perhaps inversely proportional to age), and hence their attention to detail, it becomes fundamental to do a thorough intraoral trial. By not doing so, the risk increases of causing structural, functional, and phonetic defects in the final restoration.

What is indisputable is that the proposed technique requires a substantial work commitment from the team, with several sessions at the dentist for the patient. This results in higher costs when compared with the techniques that use simple graphic processing. We believe this is why it is difficult to convince patients who do not think that a therapeutic proposal is necessary to accept the proposed technique. However, we think that the photographic-assisted prosthetic design technique should be applied to patients who already intend to undertake therapies to improve the functional and esthetic outcome.

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