

Achieving Predictable, Beautiful Smiles Using a Dento-Facial Esthetic Diagnosis System

The goal of every esthetic dentist is to complete cases with predictable, outstanding results, while ensuring that patients are satisfied with the esthetic outcome. It is important to acknowledge that the patient's satisfaction is not always consistent with the final results; the result may be clinically successful, but the patient may still be unhappy.

The worst possible scenario after an esthetic rehabilitation, either extensive or limited, is to complete a case and the patient is dissatisfied with the esthetic results. This could happen even if the results are clinically acceptable and follow basic dental esthetic guidelines. Lack of proper initial communication is usually the main cause of this unhappy situation, especially when the patient's expectations are too high or unreasonable.¹

Achieving consistent and predictable patient satisfaction requires excellent dento-facial diagnosis and extremely clear communication with the patient before beginning the case. This will allow the dentist to understand the patient's unique esthetic perspective and goals and to assess whether the patient has reasonable expectations. It is important to remember that the patient will have a different perspective than the dental professional. The dental professional focuses his or her attention on the teeth and gums, many times using retracted photographs for diagnosis and evaluation of expected results. On the other hand, the patient is less concerned about the retracted appearance of teeth and gums and more concerned about the overall appearance of the smile and the way the smile enhances the face.² In other words, the patient looks at the "big picture" (Figures 1 and 2).

To satisfy patients' wishes, dentists need to have a

more global view and understand that what they do has an effect on the overall facial appearance of the patient. Dentists know that the teeth support the lips and lower third of the face and also that the final tooth position, incisal edge, can have a dramatic effect on the patient's appearance.³⁻⁵ A dentist who wishes to have consistently satisfied patients must provide excellent dento-facial diagnosis and treatment. Often the treatment requires a multidisciplinary approach including restorative dentistry, orthodontics, periodontics, and oral surgery, with the restorative dentist working as the team leader.⁶



Figure 1—Preoperative photograph of patient in Case 1

DENTAL HISTORY FORM			
PATIENT NAME:		(PREFERRED):	
Please describe the primary reason for your visit (concerns):			
1. _____			
2. _____			
3. _____			
4. How long has this been going on and what would you like done?			

5. If you could rate your smile from 1 - 10, what would it be? _____			
6. Would you like to improve your smile? Y N How? _____			
Have you ever suffered from, or been told you may have any of the following?			
7. Gum disease	Y	N	11. Malocclusion
8. Bruxism or Grinding	Y	N	12. Bad Breath
9. Jaw pain or TMJ	Y	N	13. Headaches or Migr
10. Dental pain	Y	N	

Figure 2—Partial view of dental history form. Note that questions 5 and 6 allow for an open discussion of esthetic concerns.

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DENTO - FACIAL ESTHETIC DIAGNOSIS FORM	
PT Self Smile Score: _____	PATIENT NAME: _____
Concerns: 1. _____ 2. _____	3. _____ 4. _____
Solutions: 1. _____ 2. _____	3. _____ 4. _____
1. DENTO-FACIAL ESTHETICS	
a) Occ. Plane: _____	d) Lip Protrude: _____
b) Midline: _____	e) L 3rd Golden P: _____
c) Symmetry: _____	f) Tooth Show (Smile): _____
	g) Buccal Corridor: _____
	h) Ging. Show: _____
	i) Incisal Plane: _____
	j) Incisal Plane T Lip: _____
	k) Conversational TS: _____
2. GROUP ESTHETICS	
a) Axial Incline: _____	d) U. Inclination: _____
b) Rotation: _____	e) Esthetic Zone: _____
c) Crowl/Spaces: _____	f) O. Jet/O. Bite: _____
d) Embrasure: _____	g) Occ. Place: _____
3. GINGIVAL ESTHETICS	
a) Papilla: _____	b) Ging. SYM: _____
c) Ging. Show: _____	
4. TOOTH ESTHETICS	
	TO
	1
	2
	3
	4
	5
	6
	7
	8
	9
	10
	11
	IDEAL
	Service

Figure 3—DFD Form uses an organized analysis of the photographs to assess the 27 parameters of dento-facial esthetics.

The key to achieving predictable results and patient satisfaction is the dentist's ability to systematically record the patient's goals and preferences and blend them with the known esthetic principles and guidelines. The dento-facial esthetic diagnosis system uses a series of dental records and forms that gives dentists the ability to methodically record the patient's goals, personality, preferences, and conditions, and then combine them with the clinical findings and the 27 parameters of dento-facial esthetic design, gingival esthetics, and the position of the dental structures in relation to the rest of the face (including midline, occlusal plane, lip support, gingival display, and conversational display) or show other well-established dento-facial parameters. The cases reported in this article cover the principles needed to fulfill 2 of the 6 parts of a complete dento-facial esthetic diagnosis.

Case 1

A male patient presented for an initial oral evaluation and reported wanting to improve his smile (Figure 1). The initial examination began with a review of the dental history form (Figure 2), which is part of the dento-facial esthetic design system. This form is used to facilitate communication with the patient. It is completed by the patient as part of the initial information package, which includes health history, financial policy, Health Insurance Portability and Accountability Act compliance, and other forms. The form allows patients to write, in their own words, their main concerns in their order of importance. This also allows patients to do a self-evaluation of their smile and answer a series of important questions to ascertain other concerns and to assess their dental knowledge. In this case, the dentist reviewed the form, which revealed the following:

- Patient wanted to maintain dental health.
- Patient had mild generalized sensitivity to cold.
- Patient's self-assessed smile score was 3 out of 10,

and he was interested in improving his smile. However, he mentioned that he had considered it many times before, but never followed through.

- Patient was concerned about teeth wearing down and spaces forming between his teeth, possibly as a result of grinding.

The findings, after a complete oral examination with basic records (eg, complete x-rays, basic photos, periodontal charting) included that the patient's medical history was unremarkable, his periodontal health was good, and there was no evidence of dental decay. At this point, it was established that the patient was a good candidate for an esthetic rehabilitation. He was offered the choice of a basic restorative dental treatment and maintenance or a complete dento-facial evaluation, including an occlusal evaluation, to develop an appropriate treatment plan that would fulfill his goals and provide maximum health, function, and esthetics. The fee for the comprehensive dento-facial esthetic diagnosis and records was given, and the patient accepted.

To perform a dento-facial evaluation it is necessary to have the appropriate records, which must be of excellent quality. The following records were taken: a full set of periapical x-rays; a panoramic x-ray; 6-point periodontal charting; casts mounted on a semiadjustable articulator^a with specific esthetic features, mounted using the Kois face bow^a; a set of 11 digital photographic views, each with a specific purpose, including a "conversational tooth reveal."⁷ The records were taken by a highly trained dental assistant and a hygienist. The dentist's time required during the record-taking visit is minimal; he or she is only needed for the occlusal records, face bow records, and photographic evaluation.

During this record-taking visit, the pictures were loaded into the computer and the patient was allowed to review them with the dentist. The dentist should take this opportunity to listen to the patient's goals and unique esthetic preferences. Using the dento-facial diagnosis form (Figure 3), the information offered by the patient was recorded. For consistency in the evaluation of the available data, it is desirable to have a form that guides the dentist through the records and allows for systematic decision making as they are evaluated. The form uses drawings of the photographs to assess the 27 parameters of dento-facial esthetics, which are well established in the literature.⁸⁻¹² The purpose of the form is primarily to organize the data. (The reader can develop a form similar to the one described in this article or may contact the author for a complimentary copy.)

Unique to this system is assessing the parameter of "conversational tooth show." This is important because people look at the mouth primarily when we talk, smile, or laugh.⁷ The amount of tooth that should be revealed during a conversation varies with age and gender,¹³ but

^a Panadent Corporation, Grand Terrace, Calif; www.panadent.com



Figure 4—Observe the extreme overbite and overjet present preoperatively.



Figure 5—Compare to Figure 4; observe the improvement on deep bite and anterior teeth retroclination. This was taken before final cement removal.



Figure 6—Observe the angular cheilitis and minimal tooth show.

ideally the patient should show an appropriate amount of tooth when conversing; otherwise it can have a negative effect on the patient's face.

After evaluating the photographs along with the dentist, the patient's observations at the record-taking visit were as follows:

- Patient thought that his front teeth were inclined backward (retroclined).
- The patient previously had orthodontic treatment that caused the retroclination of teeth. He was asked if he would consider additional orthodontics to help facilitate treatment and he declined.
- Not enough teeth were visible during conversation.

After the rest of the records were prepared, the dentist evaluated all the available data including initial examination records and the articulated cast, photos, x-rays, and periodontal charting. Attention was placed on the patient's concerns and goals as recorded on the dento-facial diagnosis form. The high-quality records and form gave the dentist the opportunity to objectively review crucial information without the patient. These records are also an excellent way to communicate among the members of the esthetic team (restorative dentist, specialist, dental technician). After thoroughly evaluating the data in this case, the dentist's findings included:

- Poor embrasures, diastemas, and rotations on upper anterior teeth indicated that the patient needed restorations or orthodontics to improve his smile.
- Patient's deep bite was getting to the point where

the incisal edges of the mandibular teeth were touching the palatal gingiva and missing the palatal surface of the maxillary teeth. This is one reason for the diastema formation.

- Overjet was 4 mm, and the overbite was 110% (Figures 4 and 5). His deep bite Class II relationship complicated treatment because the needed bite opening would increase the overjet. To help control the overjet, it is necessary to include lower anterior teeth and cover the palatal surface of maxillary anterior teeth.
- Angular cheilitis, a sign of loss of vertical dimension of occlusion (VDO). Bite opening is indicated (Figure 6).
- Reduced facial lower third, additional sign of loss of VDO.
- Gingival symmetry was acceptable.
- This case required opening VDO and adding bulk to the teeth. Minimal tooth preparation was desirable, making bonded porcelain the best choice.

On the patient's third visit, he was presented with all the records and diagnostic tools used to arrive at his customized treatment plan. The patient was reassured that the dental team had listened and understood his goals, then presented their observations, and finally presented an ideal treatment plan, which included cost.

The treatment plan presented was a full-mouth rehabilitation using bonded restorations to minimize tooth reduction, open VDO, and gave him fuller teeth. Although the treatment included many more teeth than he had anticipated, by using the records, it was easy to justify the need for extensive treatment. The patient accepted the full treatment plan, but because of financial reasons, he opted to phase the treatment in stages; the 12 anterior restorations would be done first, and the posterior teeth would be stabilized and placed on temporary overlays to hold the new bite.

After the patient accepted the suggested treatment, diagnostic wax-ups were fabricated to allow the dental team to design the teeth with the correct incisal edge position, length, and inclination, then to preview how much bite opening was needed to achieve the patient's goals (Figures 7 and 8). A silicon matrix of the wax-up was used to fabricate the provisional and as a preparation guide.



Figure 7—Preoperative cast mounted on the Panadent articulator.



Figure 8—Diagnostic wax-ups show the desired results, which will be transferred to the mouth using a silicon matrix.



Figure 9—Bellglass provisional onlays are fabricated on the uncut posterior teeth. They are made at the same time as the final veneers, to support the new vertical dimension of occlusion.



Figure 10—Three-month postoperative. Compared with Figure 5, you can note the more acceptable overbite and overjet. Also observe the health of the tissues and long term bellglass provisional onlays.

Traditionally, when bite opening is performed, full crowns are the most used restorations; however, they are radical restorations that require as much as 75% of the coronal tooth structure to be removed.¹⁴ The goal of responsible dental clinicians is to preserve as much dental tissue as possible and to protect the overall health of the supporting oral tissue.¹⁵ There is much evidence in the current literature reporting the success of porcelain onlays.¹⁶⁻¹⁹

Most of the patient's teeth were healthy and unrestored, and for this reason, it was preferable to use tooth-preserving, restorative techniques such as porcelain onlays^{20,21} and porcelain veneers or Lumineers^b. In this case, porcelain onlays and porcelain veneers were used. The patient was informed that he would have a period of adjustment to the new length and shape of the teeth and that his speech would be affected, but that he would adapt after a few weeks. The patient also was informed that he would need to get used to the new appearance of his smile, but after a few days of adjustment, any necessary alterations to the provisionals could be made.

The patient adapted quickly and was very satisfied with the appearance of his provisionals at the 2-week follow-up visit. At this point he approved the fabrication of the final restorations, which were delivered approximately 3 weeks after that. At the time of the bonded cementation of the 12

anterior veneers, the patient also received a new set of temporary posterior onlays made out of Belleglass^c (Figures 9 and 10), which were cemented with Maxcem^d, a self-etch, self-bond resin cement. The patient was aware that he should have the posterior permanent restorations fabricated ideally within 1 year (Figures 11 and 12).

Case 2

A female patient presented for an initial oral examination, with the primary concern of pain at tooth No. 14. The patient's concerns as listed on the dental history form were thoroughly discussed with the patient and revealed the following:

- Main concern was mild pain at tooth No. 14.
- A secondary concern was other cavities.
- Patient's self-assessed smile score was 7 out of 10, and she was interested in improving her smile, but cost was a concern.
- Patient didn't want to have her teeth ground down.
- She knew she was bruxing or grinding, but was not concerned about it.

A complete oral examination and basic records (eg, complete x-rays, basic photos, periodontal charting) found that the patient's medical history was unremarkable, her

^c KerrLab, SybronEndo Corporation, Orange, Calif; www.kerrlab.com

^d KerrHawe, SybronEndo Corporation, Orange, Calif; www.kerrhawe.com

^b Den-Mat Corporation, Santa Maria, Calif; www.lumineers.com



Figure 11—Postoperative photograph of patient in Case 1.



Figure 12—Angular cheilitis has disappeared, and the fuller teeth give more support, making the patient's lip appear fuller.



Figure 13—Preoperative face view of the patient in Case 2.



Figure 14—Preoperative front retracted view of the patient in Case 2.

periodontal health was good, and there were some teeth with decay that required repair (Figure 13). The first goal was to resolve her main concern of pain at tooth No. 14. She was reassured that the dental team would address this tooth first, then follow with basic restorative dental treatment including repair of other teeth with caries and maintenance. She also agreed to complete a dento-facial diagnosis form, smile evaluation, and occlusal evaluation to develop an appropriate treatment plan that would provide maximum health, function, and esthetics. The patient accepted all initially suggested treatment.

As previously discussed, to perform a dento-facial evaluation it is necessary to have the appropriate records. Identical records were taken as noted in Case 1. At the photographic evaluation, the patient raised the following concerns:

- Patient did not like diastemas.
- Patient was happy with length of her teeth and did not want “big teeth,” and she was very apprehensive about ending up with “fake-looking” teeth.
- Patient liked her back teeth the way they were.

Using the dento-facial diagnosis form and with the entire set of records available, the clinician found the following concerns:

- Teeth had signs of wear, consistent with parafunctional habits; this indicated that the patient would

need to wear a night guard after completion of the esthetic rehabilitation, regardless of what material was used.

- Patient didn't have anterior guidance, which may account for the excessive tooth wear.
- Height-to-width ratio was worse than 100% (short, square teeth) (Figure 14). Usually the choice would be to make the teeth longer, but as the patient expressed a clear preference, it was decided by both patient and clinician to make the Lumineers a little shorter than the ideal ratio, additionally the ratio was not a concern for the patient, and she didn't feel crown lengthening surgery was needed.

The dento-facial diagnosis system evaluation and design has the primary goal of achieving an esthetic and harmonious dento-facial treatment outcome, while blending the patient's unique goals with the dentist's goals. After the “ideal” smile is established and recorded on the form, the choice of restorative materials and the engineering of the correct occlusal scheme are established, which will ensure stability and longevity.

At the treatment presentation visit, the patient was informed that the dental team had evaluated all the available data, and her specific wishes and desires were considered. The suggested treatment plan was 8 Lumineers with no tooth reduction or injections, fol-



Figure 15—Postoperative face view of the patient in Case 2; her central incisors are shorter than ideal ratio, but it was the patient's preference.



Figure 16—Observe the excellent tissue health and marginal adaptation of the 6 final Lumineers.

lowed by an occlusal equilibration and a splint. For financial reasons, the patient accepted a partial treatment plan of 6 Lumineers and may do the other 2 in the future.

As customary, a wax-up was developed based on the desired esthetic and functional goals. Using a silicon matrix, the provisionals were placed to allow the patient to wear the provisionals to “test drive” the new shape and length before fabricating the restorations. At the 1-week evaluation, the patient reported being very satisfied with the esthetics and phonetics and gave the approval to start fabrication of the final restorations (Figures 15 and 16).

Conclusion

Achieving consistently beautiful results that patients will love as much as the dentist requires a thorough understanding of the 27 parameters of dento-facial esthetics and an excellent method of communication with patients. This article presents a system of diagnosis, using a series of records and an organized means of

recording the important data available. Armed with this well-organized, valuable information, and using a systematic and well-developed diagnosis and treatment plan, dentists can communicate to patients their commitment to them, their esthetic goals, and overall oral health. This will undoubtedly increase treatment acceptance and patient satisfaction.

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