Evaluation of Dentolabial Parameters As Part of a Comprehensive Esthetic Analysis

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Abstract

Analysis of the facial features and lip movements in relation to teeth, achieved by evaluating the facial, dentolabial, and phonetic parameters, should be the first step in prosthetic rehabilitation. This article focuses on dentolabial analysis, presenting a systematic approach to evaluating the relationship between the teeth and the lips and lower third of the face. The parameters evaluated include tooth exposure, incisal edge position, smile width, labial corridor, interincisal line vs midline, and occlusal plane vs commissural line. Here two parameters of dentolabial analysis are explored in depth: incisal edge position (with regard to both incisal curve and incisal profile) and orientation of the incisal plane, which is a portion of the occlusal plane. Methods for identifying both parameters are outlined, and their role in the achieving successful esthetic results in prosthetic treatment is discussed.

There are some basic, universally recognized principles that govern our ideas about what is considered attractive. An expressive smile is a highly salient form of nonverbal communication, and possessing a smile that leaves a pleasing impression is naturally quite desirable. It is the clinician's task to balance the patient's esthetic needs with functional requirements, while maintaining the individual characteristics unique to each patient. Advances in technology and biomaterials have dramatically expanded the possibilities for esthetic optimization in restorative dentistry.

Too often, however, such treatment focuses exclusively on the dental area and fails to consider the overall facial composition. An evaluation of the patient's expectations and understanding of the possible therapeutic solutions is crucial before embarking upon any treatment plan.

Analysis of the facial features and lip movements in relation to the teeth, achieved by evaluating the facial, dentolabial, and phonetic parameters, is an indispensable first step in prosthetic rehabilitation. \(^1\) \(^4\) Consideration of the dental and gingival aspects complete the esthetic analysis, providing the treating clinician with the information needed to make the most appropriate treatment choices in each individual case. Careful evaluation of these parameters allows clinicians, by means of a practical and rational approach, to improve the quality of their work, helping them to create restorations that are harmonious not only with the smile, but also with the rest of the patient's face. To this end, the creation of a suitable esthetic checklist that includes facial, dentolabial, phonetic, tooth, and gingival analyses is invaluable for optimizing the esthetic appearance of the prosthetic rehabilitation.

Before focusing attention on the teeth, it is necessary to evaluate the facial composition. Frontal and lateral examination of the subject, including analysis of the position of the eyes, nose, chin, and lips, allows identification of the reference points and lines that are indispensable for orienting the occlusal plane and the gingival outline in esthetic rehabilitation.

Dentolabial analysis focuses attention on the lower third of the face. The face and lips together form a dynamic frame for the teeth, with tooth exposure constantly changing during speaking and smiling. A systematic approach to dentolabial analysis evaluating specific parameters (outlined in the box on the next page) allows for an exhaustive assessment that will help the clinician to achieve good esthetic integration of the prosthetic rehabilitation. This article will focus on two parameters: incisal edge position and the orientation of the incisal plane, which is a portion of the occlusal plane.

**Incisal edge position**

Identification of the position of the incisal edge, in both the apicocoronal (incisal curve) and anteroposterior (incisal profile) directions, is a fundamental part of the esthetic diagnosis. Its location significantly affects many of the procedural restorative decisions that the clinician and the dental technician will make; therefore, it is highly important that it is done with accuracy. Table 1 lists considerations for the analysis of the incisal edge position; this article will focus on just a few of these parameters.

Ideally, the incisal crest, when observed from the front, has a convex curve that follows the natural concavity of the lower lip during smiling (Fig 1). A convex incisal
Table 1  Analysis of incisal edge position

<table>
<thead>
<tr>
<th>Type of analysis</th>
<th>Parameter</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentolabial</td>
<td>Exposure of maxillary teeth at rest</td>
<td>Reestablish a minimum exposure of 1 to 5 mm of the maxillary teeth, depending on age and sex</td>
</tr>
<tr>
<td></td>
<td>Incisal curve</td>
<td>Reestablish an incisal curve that is parallel with the lower lip</td>
</tr>
<tr>
<td>Phonetic</td>
<td>S sound</td>
<td>Limit the modification to the tooth position in the buccolingual direction in the case of horizontal mandibular movement</td>
</tr>
<tr>
<td></td>
<td>F and V sounds</td>
<td>Position the incisal profile inside the vermilion border of the lower lip</td>
</tr>
<tr>
<td>Tooth</td>
<td>Overjet/overbite</td>
<td>Restore an adequate amount of overjet/overbite to allow disclusion of the posterior teeth through correct incisal canine guidance</td>
</tr>
</tbody>
</table>

curve that closely follows the shape of the lower lip produces a radiating symmetry that is increasingly evident the more dominant the central incisors are in relation to the laterals. Radiating symmetry creates a pleasing smile and is normally found in young people.

Sometimes, abrasion of the incisal edges can lead to a flat or even a reverse incisal curve, producing unpleasant effects from an esthetic point of view (Figs 2 to 4). These effects include a negative anterior space, created by the discrepancy between the incisal plane and the curvature of the lower lip, and the reduction—or in some cases even the disappearance—of the interincisal angles, which are a significant factor in the appearance of the smile.¹

Parameters to examine during dentolabial analysis

- Tooth exposure at rest
- Incisal edge position
- Smile width
- Labial corridor
- Interincisal line vs facial midline
- Occlusal plane vs commissural line

*Fig 1*  The incisal curve is normally convex, following the concavity of the lower lip and producing a radiating symmetry.
Orientation of the incisal plane

In prosthetic rehabilitation, the occlusal plane represents an important craniofacial point of reference, the orientation of which is fundamental for developing correct function and achieving ideal esthetics. It is established by the incisal surfaces of the anterior teeth and the occlusal surfaces of the posterior teeth.

The incisal plane is the anterior portion of the occlusal plane. When viewed from the front, it should be parallel to the horizontal reference lines, such as the interpupillary line and the commissural line, to maintain natural facial harmony.

Overlooking this parallelism during the esthetic facial examination is currently one of the most common diagnostic errors in dentistry. Some investigators have found that a lateral inclination of the occlusal plane is immediately noticeable from the front, even by lay observers; however, others have found a lesser ability to recognize this inclination.

A marked lack of parallelism between the occlusal plane, the commissural line, and the interpupillary line can have different etiologies; the particular cause must be identified in each individual case. In some cases, the problem can be resolved using orthognathic therapy, often in combination with orthodontic treatment. In the case of prosthetic rehabilitation, discrepancies between the occlusal plane and the other horizontal reference lines can be corrected by a variety of clinical approaches, which can be adapted to the individual patient needs.

Prosthetic applications and considerations

The ideal esthetic treatment involves re-establishing an incisal curve that is in harmony with the concavity of the lower lip by restoring adequate tooth shape and proportion. An increasing number of patients wish to rejuvenate their appearance and therefore request teeth that are more prominent. Whenever possible, the clinician should test a new tooth length intra-orally, either by means of an in-office rapid composite mockup (Figs 5 to 9) or with an indirect acrylic mockup, fabricated by the laboratory. The in-office method is more time- and cost-efficient, but either technique can be used to simulate an increase in den-
Fig 4  The lack of anterior guidance (due to the reduced maxillary incisal length) determines contact in the molar areas during protrusive movements.

Fig 5  A composite mock-up was performed to idealize tooth lengths and proportions. During the same appointment, selective grinding was performed in centric relation to ensure adequate occlusal stability.

Fig 6  From the frontal view, the incisal edge now has a convex shape and follows the curve of the lower lip.

Fig 7  Adequate posterior disclusion is achieved during excursive movements.

Fig 8  An alginate impression of the mock-up was taken so that the ideal incisal edge position could be communicated to the technician, who could then replicate it in the provisional restorations.

Fig 9  A transparent stent was fabricated based on the waxup to guide the clinician during tooth preparation.
tal volume without damaging the teeth. A mockup is highly useful as a preview of esthetic results before any irreversible clinical procedures are initiated, and also as a method for evaluating phonetics and the suitability of the anterior guidance. Phonetic tests are a reliable aid in evaluating and establishing the incisal edge position. During pronunciation of the F/V sounds, for example, the maxillary incisal edge and the lower lip should touch slightly, and, from the incisal profile, the incisal margins of the restorations should be positioned within the vermillion border of the lower lip.

Figs 10 and 11 Six anterior veneers were fabricated to finalize the case. (Ceramist: Mr Giancarlo Barducci.)

Fig 12 The new tooth lengths and proportions now appear adequate.

Fig 13 The incisal edge is in harmony with the lower lip.

Fig 14 The frontal intraoral view of the final result shows satisfactory esthetic, functional, and biologic integration of the restorations.
When the final prosthetic rehabilitation (Figs 10 and 11) has been created, it can be considered to be well integrated when (1) the occlusal plane is correctly correlated with the interpupillary and commissural lines (from both the profile and frontal views) and (2) the incisal curve is in harmony with the lower lip (Figs 12 to 14). This is important not only for esthetic but also for functional purposes, eg, the reestablishment of appropriate anterior guidance to allow discusion of the posterior teeth. 

Conclusion

It is essential that the clinician concentrate on a meticulous facial and dentolabial analysis before focusing on the teeth in order to effectively determine what modifications are necessary during the treatment planning phase. The incisal edge position and the orientation of the incisal plane play vital roles in a successful prosthetic rehabilitation and therefore are among the parameters that should be carefully evaluated. Finally, it must be remembered that to achieve a predictable satisfactory esthetic result, the accurate transfer of all information gathered from the esthetic-functional analysis to the laboratory is of utmost importance.

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References