THE HORIZONTAL POSITION OF THE MAXILLARY INCISAL EDGE: The Key to Optimum Esthetics, Phonetics, and Function

Since the early 1990s, general and prosthodontic practitioners have witnessed a steady increase in the number of patients interested in making an elective change to their smile. With this increased demand, seminars and educational programs have sprouted up to teach restorative team members the necessary diagnostic and procedural skills they need to meet the expectations of this population.

One of the most important decisions clinicians have to make, with regard to optimum esthetics and function, is the precise position of the maxillary incisors. Volumes of information have been written about this, and yet most of the information is about where the incisal edge should be placed vertically. The rest position and the “E” sound are both excellent (and important) considerations when designing a smile, yet they cannot be used to determine if the incisal edge is too far forward (in the patient’s lip) or too far to the lingual (interfering with the patient’s occlusion). This article discusses the importance of finding the correct incisal edge position from both a vertical and horizontal perspective. Doing so will ensure not only beauty, but also functional harmony.

THE ERUPTION OF ANTERIOR TEETH

Most clinicians can easily identify the forces that guide teeth into the correct vertical and anterior-posterior relationship. For example, a careful inspection of a skeletally correct child whose central incisors have erupted shows the position of the anterior teeth from the frontal and side views. The incisal edges point to the inner vermillion border of the lip (Figure 1 and Figure 2). As the maxillary anterior teeth erupt, they travel through a space created by the lips on the facial and the tongue on the lingual (Figure 3). This zone of neutrality guides the incisal edge to its final stopping point—the inner vermilion border of the lower lip (Figure 4).

By studying the ideal phonetic, functional, and esthetic positions that exist in nature, healthcare professionals can duplicate those parameters in elective cosmetic procedures. Positioning the incisal edge too far to the facial will interfere with the lip; positioning it too far to the lingual will cause issues with the occlusion (envelope of function).

LIP CLOSURE PATH/LIP SUPPORT

The maxillary teeth need to be far enough forward to provide proper lip support, and have a proper two-plane contour to allow for proper closure of the lips. The lip closure path, as described by Peter Dawson, DDS, allows the lower lip to comfortably close around the incisal third of the maxillary incisors. Figure 5 illustrates a patient who had been restored with the maxillary incisal edges too far to the labial. Notice the thickness of the incisal edges, and that the trajectory of the edges is pointed to the top of the lip.

The patient complained of dry maxillary teeth, tired facial muscles, and the inability to say the “F” sounds properly. Figure 6 shows the lip strain that was evident when the patient closed her mouth. This patient

Figure 1. Rest position of an 8-year-old patient. Note the 3 mm of tooth structure displayed at rest.
has a short upper lip and a vertical chewing pattern. Figure 7 shows the completed case. Her incisal edge is now a normal thickness and aimed at the inner vermilion border of the lip. The incisal third has a second plane that easily allows for proper lip support and a proper lip closure path. Common complaints of patients with problems with the lip closure path include:

- The teeth feel “too long.” Teeth that feel too long are often too far to the labial. Always check the horizontal position of the maxillary incisal edge before shortening teeth.
- The anterior teeth feel dry. When patients cannot close their mouth easily it causes dry facial surfaces of the maxillary incisors, which will exacerbate this problem.
- The patient has difficulty saying “F” or “V” sounds. Patients say the “F” or “V” sound by squeezing air between the maxillary incisal edge and the inner vermilion border of the lip. In the provisional phase, saying soft “F” sounds is a great way to verify the correct horizontal and vertical incisal position.
- The patient complains of tired facial muscles. Patients who have to strain to put their lips together will feel fatigue by the end of the day.

Working out the correct vertical and horizontal incisal edge position should be done in the provisional phase. This is the only way it can be predictably communicated with the dental laboratory. Figure 8 illustrates the try-in phase of a full-arch provisional restoration. The incisal edge has purposely been created thick to allow for proper contouring. Notice how the trajectory of the incisal edge is pointing toward the top of the lip; this would infringe on the lip closure path. Figure 9 and Figure 10 show the incisal third after proper contouring (on this patient), and the ease with which she can now close her mouth without strain.

ANTERIOR GUIDANCE IN HARMONY WITH THE ENVELOPE OF FUNCTION  
Positioning the incisal edge horizontally is also critical for creating a lingual contour that will provide func-
tional harmony. The lingual contour has to be steep enough to disclude the posterior teeth, and be in harmony with the envelope of function (Figure 11). Common signs and symptoms of problems with the envelope of function include:

- Restorations feel “high.” If the incisal edge is too far to the lingual, the lingual contour is likely to be too thick. Patients feel that the restorations are high because they are striking them first during closing.
- Diastemas appear between the maxillary anteriors. Again, teeth that are in the way of closing will not be stable; they will move to a new zone of neutrality.
- Restorations fracture or debond. Porcelain veneers that are in the way of the functional envelope of the mandible are at risk for fracturing or debonding.
- The patient has difficulty saying “S” sounds. The “S” sound is made by squeezing air between the upper and lower incisors. Anything that moves the maxillary incisors out of position will alter the “S” sound.

CASE EXAMPLE
A patient came into the office wanting to update her elective dentistry (Figure 12 through Figure 16). She had had direct resin veneers placed 20 years previously. As time went on, the veneers became discolored and lost their individual shape. Her desire was to have a brighter, full, more youthful smile.

A comprehensive examination was performed that included a temporomandibular joint (TMJ)-occlusal evaluation, restorative charting, full periodontal probing, and an oral cancer examination. She had a history of popping and clicking without pain in her right TMJ, a history of muscle tension headaches, and a slide from centric relation (CR) to centric occlusion (CO). Teeth Nos. 2, 3, 30, and 31 had class I mobility, with minimal signs of wear. Caries existed around old amalgam restorations on teeth Nos. 3 and 14. Periodontally, she had no probing depths greater than 3 mm, and mild localized gingivitis.

Finding her maxillary incisal edge position was the first critical step in her esthetic evaluation. Her rest position from the frontal and lateral views (Figure 14 and Figure 15) exhibited an incisal edge that was deficient and too far to the labial. The goal was to add 1.5 mm of length vertically, while positioning the edge slightly more lingually to allow for a harmonious lip closure path. Diagnostic models were mounted with a facebow in CR on...
a SAM® 3 articulator (Great Lakes Orthodontics, Ltd, Tonawanda, NY). The models were equilibrated to CR, and the esthetic goals were waxed into position. This was used to fabricate provisional matrices and preparation guides.

Teeth Nos. 3 through 14 were prepared for porcelain bonded restorations (teeth Nos. 3 and 14, onlay veneers; teeth Nos. 4 through 13, veneers). The dentition was equilibrated to CR. After tissue retraction, final impressions, and jaw relation records, the teeth were provisionally restored with Protemp™ 3 Garant™ (3M ESPE, St. Paul, MN). Then, the provisional restorations were systematically contoured to provide all of the requirements of a stable occlusion. Additionally, they were contoured to fulfill the esthetic goals of the patient.

The patient was seen for a 48-hour postoperative appointment to re-evaluate the esthetic and functional parameters of the provisional restorations. Time was spent fine-tuning the vertical and horizontal positions of the maxillary incisal edge for optimum esthetic placement, to provide ease of the lip closure path, and to eliminate any chance of interfering with the envelope of function. When all of the esthetic and functional elements were satisfactory to both the dentist and the patient, an impression was made of the provisional restorations to be cross-mounted with the die model in the laboratory. This became the blueprint for the final restorations.

At the delivery appointment, the restorations were tried in and then bonded in place following contemporary standards. Figure 17 through Figure 21 illustrate the final restorative result. Note the optimum incisal placement from both a vertical and horizontal perspective. Precise placement toward the inner vermillion border of the lip established the previously described zone of neutrality.

CONCLUSION
This article highlighted the importance of finding and verifying the horizontal position of the maxillary incisal edge. Missing this all-important position will lead to failures that will be esthetic, phonetic, or functional. Spending a little extra time in the diagnostic and provisional phases of treatment will add tremendous predictability and stability to the end result.

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Figure 17 through Figure 22 Postoperative photographs.