Clinical excellence



Smile design principles: part two

Rahul Doshi and **Ashish Parmar** discuss the three factors that determine the anterior tooth position

The anterior tooth position defines the final smile of a patient. The three factors are:

- 1. The dental aesthetics
- 2. The phonetics
- 3. The occlusion i.e. the anterior guidance.

The dental aesthetics

This has been described in detail in the previous article (see March *Private Dentistry*). When looking at dental aesthetics in determining anterior tooth position, we need to consider the following factors:

The position of the anterior teeth

• Establishing the incisal edge curvature of the upper anterior teeth, parallel to the lower lip

• Establishing the inter-incisal line is vertical in relation to the facial midline

• Establishing the incisal plane in relation to the interpupillary line and the commisures of the lips or other horizontal features on the patient's face

• To establish a correct vertical dimension to create an adequate height of the lower third of the face

• To achieve the correct naso-labial angle by modifying the dental arrangements without interfering with the active muscular area

• To achieve the correct dominance of the anterior teeth in relation to the profile and thickness of the lips.

The arrangement of the teeth

• The anterior teeth should have correct alignment and positioning

• The final aesthetics smile should have no gaps between the teeth, no dental crowding or mal-alignment.

The size and shape of teeth proportion

• The width/length ratio of the central incisor should be between 75 and 80%

• To establish the correct dimensions between the central incisor, the lateral incisor and the canine, the golden proportion guidelines are followed (see Figures 1a and b).

The phonetics

This function is closely affected by the relationship between the teeth. It can be significantly compromised by the presence of restorations incorrectly positioned. Phonetic analysis can be an invaluable aid in identifying some of the functional and aesthetic parameters to be followed when creating a prosthetic treatment plan.

Phonetic tests are reliable and give useful information in establishing position and length as well as determining a suitable vertical dimension of occlusion.

The 'M' sound

• The 'M' sound is a method used to view the patient with the mandible at rest. It can provide useful information regarding incisal length by having the patient repeat words containing this consonant at regular intervals e.g. Mmm, mmm, mmm

• Many dentists use the 'M' sound to identify the amount of tooth visible, when the patient and mandible are at rest. The degree of central incisor normally visible in young patients in this rest position is approximately 3 to 4mm in female subjects, and 2mm in males. The possibility of shortening or lengthening the incisal third of the anterior teeth must be assessed based on the amount of tooth exposed in this rest position. The age of the patient, their gender and their appearance requirements; whether it be to have a youthful or natural appearance; determine the amount of the incisal edges exposed at rest. A more youthful appearance will show more than average exposure of the incisal third, in the rest position (see Figures 2a and b).

The 'E' sound

• While saying 'E' continuously, the position of the incisal



Figure 1a: Before



Figure 2a: Inadequate teeth visible with lips at rest after 'M' sound made (<3mm)

edges in relation to the upper and lower lips should be viewed from the lateral aspects of the face. In a youthful smile, the maxillary teeth should occupy more than 50% of this space and up to as much as 80%. In elderly patients, because of the reduced tonicity of the peri-oral tissues, the maxillary teeth should not take up more than 50% of this space so the anterior teeth do not seem excessively long in patients who would like to have a natural smile (see Figure 3).



Figure 1b: After (using the philosophies of dental aesthetics)



Figure 2b: Excessive teeth visible with lips at rest after 'M' sound made (>3mm)

The 'F' and 'V' sounds

Correct pronunciation of the sounds 'F' and 'V' is produced by light contact between the incisal edges of the central incisors and the vermilion border of the lower lip. This gives us clues to the incisal length and the incisal profile of the anterior teeth.

• Incisal length: when pronouncing the 'F' and 'V' sounds, the maxillary incisal edges should touch gently on the lower lip.





Figure 3: Maxillary teeth occupy 50% of space between upper and lower lip when saying 'E'

Figure 4: The majority of the teeth just touch the vermillion border when producing 'F' and 'V' sounds. In this case, the upper left lateral incisor is positioned beyond the vermillion border



Diagram 1: The anterior teeth relation shows typical anterior guidance (left), compared to a 'steeper' anterior guidance (right)

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anterior guidance:

reshaped or restored first.

• Incisal profile: the vermilion border of the lower lip is a maximum buccal limit within which the incisal edges of the teeth should be positioned on saying the letters 'F' and 'V'. Excessive labial positioning of the incisal profile (when the incisal edge is positioned beyond the vermilion border) can result in the patient feeling a sense of excessive dental bulk and it may cause difficulty when closing the lips (Figure 4).

• The vertical dimension: the use of this sound is a practical way to determine vertical dimension. In dental rehabilitation, if a large space is found between the two arches, an increase in vertical dimension should be considered. Excessive increase in the vertical dimension may lead to a marked difficulty in pronouncing the 'S' sound because the teeth completely invade the free space when the two arches come into contact. During the provisional phase, the clinician is able to test the patient's adaptability to the new occlusal height. If the patient had difficulty in saying the letter 'S', the vertical dimension must be altered until the correct 'S' sound is achievable. As

a general rule, teeth should not make contact in order to

mandibular movements during pronunciation of the letter 'S'. Some patients keep the mandible in a retruded position and others, in contrast, protrude the mandible until it reaches an edge-to-edge position, the maxillary anterior against the mandibular teeth. This anterior movement is typically found in class III patients and a proportion of class I. Class II patients normally maintain a retruded position. For those patients who protrude their mandible when pronouncing the letter 'S', any tooth lengthening, slight buccal positioning of the mandibular teeth or lingualisation of the maxillary teeth may cause unwanted contact between the anterior teeth. This will lead to incorrect phonetics, and possible discomfort. In contrast, excessive buccal-palatal distance between the mandibular and maxillary teeth can create too large a space, during the pronunciation of the letter 'S', producing the

Dentists who do not currently make use of these methods for establishing precise anterior guidance can make a quantum improvement in patient satisfaction through their restorative efforts and verify the accuracy of every anterior restoration. The relationship of the anterior teeth with function is also the principal determinant of posterior occlusal form. The contour and position of upper and lower anterior teeth is so critical that even a millimetre in incisal edge location can be

It is logical that if we are to copy the anterior guidance for the definitive restorations, then the anterior guidance that is being duplicated must be correct for the mouth. There are several steps involved in correcting and harmonising the

• Step one: When indicated, lower anterior teeth should be

• Tooth position: there is considerable variation in

The 'S' sound

produce the 'S' sound.

typical lisping sound.

Anterior guidance

unacceptable to some patients.

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Figure 5a: Before smile (patient had only 2-3mm tooth height due to tooth wear)



Figure 5b: After smile (this requires the consideration of all the techniques mentioned in this article to determine the correct position of anterior teeth including anterior guidance)

• **Step two:** If restorations are not required on the posterior teeth, they must be equilibrated before the anterior guidance can be calculated.

• **Step three:** Establish co-ordinated centric relations stops on all anterior teeth.

• **Step four:** Establish group functional contacts on anterior teeth in protrusion.

• **Step five:** Establish ideal anterior stress distribution in lateral excursions.

When there is harmony in the anterior guidance, a customised anterior guide table should be fabricated by the ceramist, if and when restoring anterior teeth. Use of a customised anterior guide table is the most reliable and practical procedure we can use in restorative dentistry to duplicate the anterior guidance.

An increase in steepness of the anterior guidance can produce increased occlusal stress on anterior teeth leading to increased possibilities of fracture, wear and decementation of these anterior teeth (see Diagram 1).

A decrease in steepness of the anterior guidance will offer reduced protection during protrusive movement of the mandible to the posterior teeth, often leading to fracture, wear and decementation of these posterior teeth.

Summary

Phonetic analysis, in addition to other dental facial assessment, must still be compared with occlusal analysis (see Figures 5a and b). Sometimes it may be necessary to choose between apparently conflicting findings. In such cases, after evaluating the test results as a whole, the clinician will have to make a choice based on clinical experience and insight into the patient's realistic wants and needs. Any decision, compromising one of the three determinants, needs to be clearly communicated to the patient prior to treatment so that there are no surprises for the patient once treatment is finished in terms of functionality, aesthetics and speech.

The next article in this series to be published in May's *Private Dentistry* will look at smile design principles.

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