

Australian Society
of Orthodontists



University of Sydney

Aesthetics & Teamwork



Creating Brighter Futures

Aesthetics & Teamwork

Utilizing an Interdisciplinary Approach to Enhance Anterior Dental Aesthetics

The general goals of orthodontic treatment are to establish a good occlusion, enhance periodontal health, and improve dental and facial aesthetics. In the past, greater emphasis has been placed on achieving ideal alignment and a good occlusal result, with less emphasis being placed on periodontal health and the aesthetic appearance of individual teeth. In some patients, well-aligned teeth may still look unaesthetic. A “gummy smile”, uneven gingival margins and crown heights, worn teeth, missing papillae and abnormal tooth morphology can jeopardize the aesthetic appearance of teeth. In many cases, these unaesthetic situations can be improved through a coordinated teamwork approach of orthodontics, periodontics and restorative dentistry.

What Contributes to an Aesthetically Pleasing Smile?

Having well-aligned teeth is not the only factor that contributes to an aesthetic smile. Anterior dental aesthetics is also highly dependent on the smile arc, the amount of gingival exposure during smiling, the relationship of the gingival margins of the six maxillary anterior teeth and the shape and size of the maxillary anterior teeth.

The ideal smile arc has the maxillary incisal edge curvature parallel to the curvature of the lower lip upon smiling¹. Ideally, the upper lip should rise slightly apical to the gingival margins of the maxillary central incisors, where 1-2mm of gingival display is apparent².

Four characteristics contribute to ideal gingival form³:

- The gingival margins of the two central incisors should be at the same level.

- The gingival margins of the central incisors should be positioned 0.5-1mm apical to the lateral incisors and should be at the same level as the canines.
- The contour of the labial gingival margins should follow the CEJ of the teeth.
- There should be a papilla between each tooth, which occupies the apical half of the interproximal contact.

The following situations can detract from an aesthetically pleasing smile.

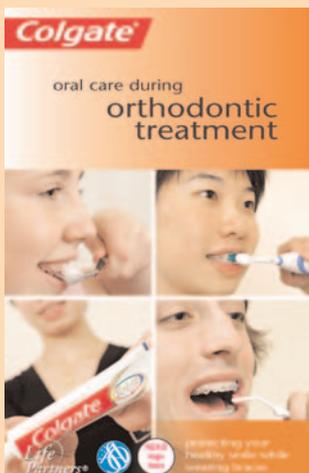
1. The “Gummy Smile”

The “gummy smile” has three potential causes. It may be the result of excessive vertical maxillary growth, which is most often managed with a combined orthodontic and orthognathic surgery treatment approach. Secondly, a “gummy smile” may be caused by delayed apical migration of the gingival margin, or thirdly, overeruption of the maxillary anterior teeth. The management of the latter two causes is determined by probing the sulcular depth of the maxillary anterior teeth. During adolescence, the gingival margin migrates apically until it reaches its adult position of 1mm coronal to the cemento-enamel junction^{4,5}. Thick, fibrotic gingival tissue tends to migrate more slowly than thin gingival tissue.

In a patient displaying a “gummy smile” not related to vertical maxillary excess, if the sulcular depth of the anterior teeth is 1mm, then there has been overeruption of the anterior teeth and orthodontic intrusion of the overerupted teeth would reposition the gingival margins to a more aesthetic level.

If the sulcular depth is 3-4mm and the tissue is fibrotic in a patient displaying a “gummy smile” not related to vertical maxillary excess, then the patient has a delayed migration of the gingival margin that could benefit from an excisional

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gingivectomy. Moving the gingival margins apically to expose the entire crown length of the anterior teeth not only enhances the esthetic appearance of the anterior teeth, but reduces the gingival display on smiling (Figure 1).



Figure 1: This patient demonstrated a "gummy smile" from delayed apical migration of the gingival margins. After orthodontic treatment, an excisional gingivectomy was performed on the six upper anterior teeth to reduce the gingival display on smiling.

2. Gingival Margin Discrepancies

Some patients have gingival margin discrepancies between adjacent teeth, which contribute to an unaesthetic smile. These discrepancies may be a result of abrasion of an incisal edge with subsequent overeruption, or delayed apical migration of the gingival tissue. Again, there are two main clinical solutions and the appropriate treatment is dependent on evaluating the depth of the labial sulcus.

(i) If the shorter tooth has a deeper sulcus, excisional gingivectomy is indicated to move the gingival margin of the shorter tooth apically (Figure 2).



Figure 2: The upper right lateral incisor demonstrated a delayed migration of the gingival margin as indicated by a 3mm sulcus depth. A gingivectomy was performed to enhance the aesthetic result.

(ii) If the central incisor is shorter than the adjacent lateral incisor, or if incisal wear is evident, orthodontic intrusion of the shorter tooth to reposition the tooth and gingival margin apically, followed by restoration of the incisal edge is indicated (Figure 3).



Figure 3: Orthodontic intrusion of the worn upper right central incisor to the correct gingival margin height permits restoration of proper crown length.

3. The "Missing Papilla"

The presence of a papilla between the maxillary anterior teeth is a key factor for an aesthetic smile. The presence of a space or "black triangle" above the interproximal contact is most often caused by abnormal tooth shape, where the crowns of the central incisors are much wider at their incisal edge than at the cervical region. It is also commonly seen in patients with advanced periodontal disease, or in patients with longstanding overlapped anterior teeth. This situation is best corrected by recontouring the proximal surfaces of the teeth. A diastema is created and orthodontics is used to close the space (Figure 4). As this occurs, the contact is lengthened and moved toward the papilla.



Figure 4: Interproximal stripping and orthodontic space closure eliminates the black triangle gingival to the central incisor contact.

4. Small or Malformed Teeth

A common orthodontic-restorative problem is peg-shaped, malformed or small maxillary lateral incisors. Maxillary central and lateral incisors look best if their widths are aesthetically proportioned, and classically, restorative dentists rely on the Golden Proportion of 1.618 to 1 for the relationship between the central and lateral incisors⁶. The aesthetic appearance of these small or malformed maxillary lateral incisors can be greatly enhanced through a teamwork approach involving the orthodontist and



Figure 5: Orthodontic treatment was used to open space distal to the upper right lateral incisor, permitting the restorative dentist to veneer this tooth to its correct dimensions.

restorative dentist. Orthodontics can be used to open space mesial and/or distal to the lateral incisor, prior to aesthetic restoration by the restorative dentist (Figure 5).

5. Missing Anterior Teeth

Another situation that can adversely affect anterior dental aesthetics is where an anterior maxillary tooth is missing, and an adjacent tooth is used as a substitute. The most common situation is where the maxillary canine has been substituted for a missing lateral incisor. Again, aesthetics can





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be enhanced through a team approach involving the orthodontist and restorative dentist. The orthodontist can align the canine adjacent to the central incisor, ensuring ideal gingival margin heights, prior to aesthetic recontouring and often restoration of the canine by the restorative dentist to replicate lateral incisor crown form. Recontouring the maxillary canine to substitute a lateral incisor usually involves flattening of the canine tip to produce an incisal edge, mesiodistal reduction, rounding of the disto-incisal edge, reduction of the canine eminence on the labial surface, and reduction of the palatal surface (Figure 6). Aesthetic veneering is often required to establish a mesio-incisal angle and extend the proximal contact incisally. Alternatively, the orthodontist can realign the canine to a normal (Class I) position thereby opening optimum space for the prosthetic replacement of the missing lateral incisor, ideally with an implant.



Figure 6: This patient was congenitally missing the upper right and left lateral incisors. The maxillary canines were orthodontically extruded to improve the gingival margin heights and then recontoured to improve their appearance.

Occasionally a maxillary lateral incisor may be used to substitute for a maxillary central incisor, where the maxillary central incisor has been lost through trauma, or impaction (Figure 7).



Figure 7: This patient lost the upper central incisors through impaction. The lateral incisors were used to replace the central incisors, and the maxillary canines were used to replace the lateral incisors. The lateral incisors and maxillary canines were orthodontically positioned to ensure more correct gingival margin heights, space was opened mesial and distal to the lateral incisors to permit restoration to the correct central incisor dimensions and the canines were recontoured to the morphology of lateral incisors.

Summary

Anterior aesthetics is not only dependent on good alignment of the anterior teeth. In order to significantly enhance the aesthetics of the anterior teeth, attention should also focus on the gingival display when smiling, gingival contour and crown morphology. This should be undertaken in a co-ordinated multi-disciplinary approach involving the orthodontist, periodontist and restorative dentist.

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