

Esthetics and Anterior Tooth Position: An Orthodontic Perspective. Part I: Crown Length

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Figure 1. A, Proper bilaterally symmetrical display of the maxillary, anterior gingival margins. B, The crown length of the right central incisor is shorter than the left. Notice the alteration in the gingival heights. C, Full smile showing uneven gingival heights.

Orthodontics plays a major role in dental esthetics, other than aligning malposed anterior teeth. Factors such as anterior crown length, crown width, midline proportions, tooth angulations, and vertical tooth positions may be critical to anterior dental esthetics and treatable with orthodontic therapy. This article discusses the evaluation and treatment of discrepancies in anterior crown length.

EVALUATING CROWN LENGTH DISCREPANCIES

Ideally maxillary central incisors are equal in length and the lateral incisors are slightly shorter.¹ The gingival margin of the lateral incisor is located more incisally than the central incisor (Fig. 1A). The maxillary canines are about the same length as the central incisors, and their cusp tips are located at the same level as the incisal edges of the centrals. The gingival margins of the canines are at the same height as the central incisors.

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Figure 3A. Discrepancy between the crown lengths of the central incisors.

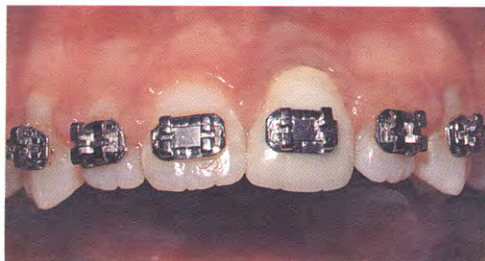


Figure 3B. Initial orthodontic alignment with persistent crown length discrepancy.



Figure 3C. Gingival surgery to establish equal crown lengths.



Figure 3D. Aligned gingival heights following surgery.

The most common crown length discrepancy occurs when one maxillary central incisor is shorter than the other, but the incisal edges are even (Fig. 1B). The difference in crown heights is due to uneven gingival margins. Depending on the height of the patient's lip line, the difference may be noticeable during smiling (Fig. 1C).

The following options exist for correcting crown length differences:

1. Gingival surgery to correct the soft tissue form;
2. Intrusion and restoration of the shorter tooth; or
3. Slow extrusion and equilibration of the longer tooth.

In order to choose the proper treatment the clinician must evaluate these factors (Fig. 2):

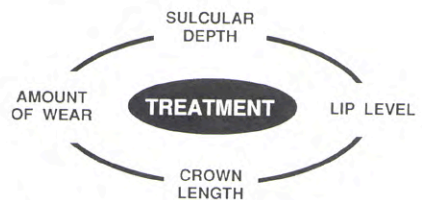
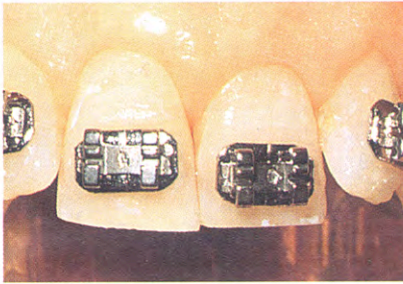


Figure 2. Factors that influence treatment corrections of anterior crown length discrepancies.

1. Sulcular depth of the central incisors;
2. Inferior border of the upper lip height during smiling;
3. Relative crown lengths; and
4. Amount of incisal wear of the central incisors.



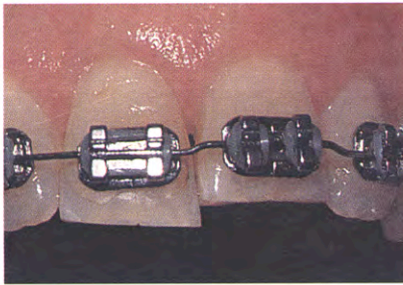
Figures 4A and 4B. Unequal maxillary crown heights and uneven gingival margins.



Figures 4C and 4D. Intrusion of maxillary, left central incisor.



Figures 4E and 4F. Bracket removal and final restoration of the left central incisor showing equal gingival margins and crown heights.



The following descriptions will help the clinician choose the proper treatment for each situation.

CORRECTING GINGIVAL FORM

When there are differences in crown lengths prior to orthodontic treatment (Fig. 3A), simple alignment will not solve problems due to improper gingival forms (Fig. 3B).

If the incisal edges are even, probe the labial sulci.^{2,3} If the CEJs are level, the shorter tooth has extra gingival tissue, which will be confirmed on probing. Perform a gingivectomy in this case, if there is an adequate band of attached gingiva (Fig. 3C).^{2,4-7} When the zone of attached gingiva is narrow or a difference exists in the labial bone heights, a flap procedure with osseous recontouring is preferred.

Gingival surgery is performed prior to removal of orthodontic appliances to allow fine tuning of crown lengths. The final case should have a proper gingival display, in addition to orthodontic alignment of the incisal edges (Fig. 3D).



Figure 5A. Overerupted, short maxillary central incisors with incisally placed gingival margins.

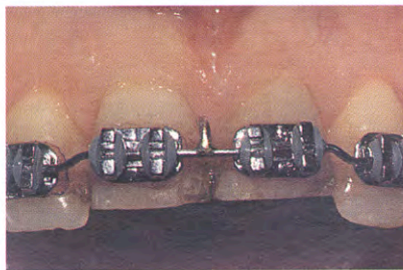


Figure 5B. Intrusion of central incisors.



Figure 5C. Final result illustrating proper gingival margins and crown heights.

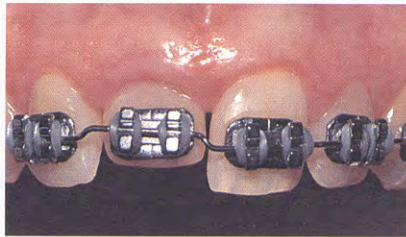
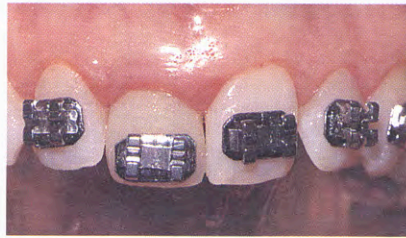
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Figure 6A. Pretreatment view of unequal gingival heights and crown lengths. Right central incisor is restored with a porcelain-fused-to-metal crown.

INTRUDING SHORT OR ABRADED TEETH

When the probing depths of the central incisors are the same, the incisal edges are relatively even, and the crown lengths are different (Figs. 4A and 4B), an evaluation of the incisal edge of the shorter tooth may indicate the solution. If the edge is wider or thicker than the other central incisor, the tooth has been previously reduced in size and has supererupted, thereby creating the discrepancy in crown heights.



Figures 6B and 6C. To facilitate intrusion mechanics, the bracket is placed at the edge of the right central incisor.

There are two alternatives for treatment. One choice is to slowly extrude the longer tooth and equilibrate it to equal the size of the shorter tooth. As the longer tooth is extruded, the gingival margin will come down with it. This option is viable as long as the centrals remain longer than the lateral incisors after treatment.

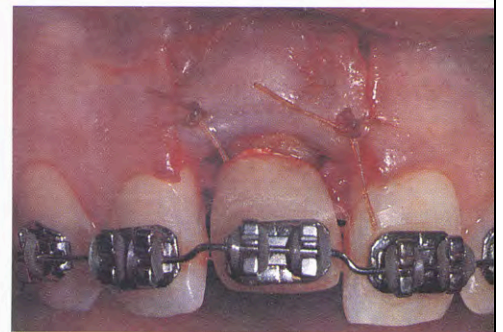


Figure 6D. Osseous surgery to align gingival margins.

A second solution is to intrude the shorter central incisor until the gingival margins are aligned (Figs. 4C and 4D), and then restore the incisal edge of the intruded central to its pre-abraded length (Figs. 4E and 4F).

If both central incisors are shorter than the lateral incisors (Fig. 5A), treatment consists of simultaneous intrusion to apically reposition the gingival margins and create space for the incisal restorations (Fig. 5B and 5C).



Figure 6E. Gingival margins aligned, and new right central incisor restoration balances crown heights.

COMBINED INTRUSION/GINGIVAL SURGERY

When a crown length discrepancy exists between two central incisors, and the shorter tooth has been restored with a full crown (Fig. 6A), the response to intrusion varies with the placement of the crown margin, because the gingival margin does not always move apically. If the crowned tooth is intruded, and inflammation occurs because of a violation of the biologic width (Figs. 6B and 6C), surgery is necessary to complete the repositioning of the gingival margin (Fig. 6D).

For each millimeter that the tooth is intruded, the gingival margin moves apically the same distance. The amount of intrusion needed is estimated by measuring the pre-treatment differences in the gingival heights. Surgery is recommended when the tooth is intruded a distance greater than the original gingival discrepancy, and the gingival margins are not yet aligned. Tooth intrusion is monitored by measuring the change in distance between the incisal edges.

It is best to perform periodontal surgery prior to the removal of the orthodontic appliances. If there is incomplete alignment of the gingival margins, the central incisors can still be adjusted accordingly.

Any final restoration should be inserted no sooner than 6 months following orthodontic treatment (Fig. 6E).

SUMMARY

The relationship between maxillary incisor crown lengths and anterior dental esthetics is discussed. Discrepancies in crown heights are common in adult orthodontic patients, and unesthetic in the presence of a high lip line.

Differences in incisor crown lengths are corrected with gingival surgery, intrusion and restoration of the shorter incisor, or extrusion and equilibration of the longer incisor.

Selecting the most appropriate treatment choice depends on (1) the sulcular depth of the central incisors, (2) the level of the upper line during smiling, (3) the amount of incisal wear of the central incisors, and (4) the relative crown lengths of the lateral and central incisors.

This article emphasizes the need for orthodontic consultation in evaluating discrepancies in maxillary anterior crown height, so that predictable esthetic results can be achieved.

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