

# Smile Design II





# مرکز تخصصی پروتزهاک دندانے هاک دند

طراحی و ساخت انواع پروتزهای دندانی بویژه ایمپلنت  
برگزار کننده دوره های آموزشی تخصصی و جامع دندانسازی و...

**با ما همراه باشید...**

**[WWW.HIGHDENTlab.com](http://WWW.HIGHDENTlab.com)**



A close-up photograph of a person's mouth, focusing on the upper teeth and gums. The gums are a healthy pink color with a slightly textured appearance. The teeth are white and have a smooth, polished surface. The lighting is bright, highlighting the natural contours and colors of the oral tissue.

# Smile Design II

## The Gingiva

# The Five Esthetic Keys\*

- Midline
- Incisal Edge Position
- Incisal Plane/Smile Line
- Occlusal Plane
- Gingival Level

\*Kokich VO Jr., et al: Comparing the Perception of Dentists and Lay People to Altered Dental Esthetics.

*J Esth Dent 1999;11(6):311-324*



# Gingival Levels Are Driven By:

- Tooth size
  - width:length ratios
- Desired gingival display

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لابراتوار دندانسازی های دنت



# Smile Design: Critical Elements of Composition

- Symmetry
  - Balance
  - Dominance
  - Proportion
- 
- (Asymmetry)
  - (Imbalance)
  - (Haphazard)





# Smile Design

## The “Golden Proportion”:

- Attributed to Pythagoras
- Used by ancient Greeks in sculpture & architecture



# Smile Design

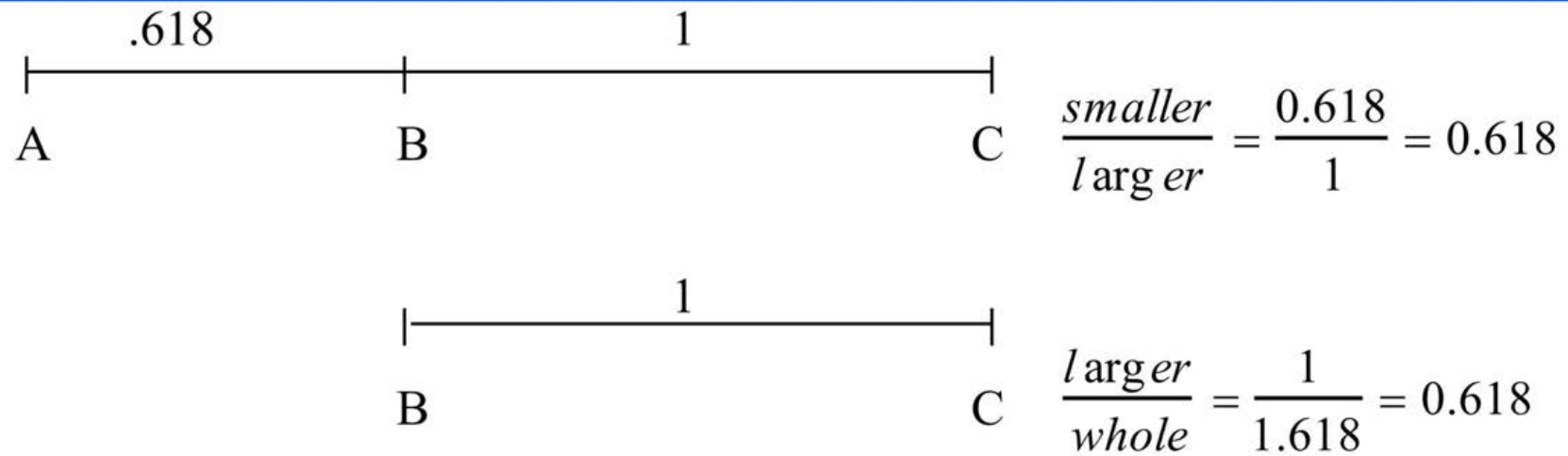
## The “Golden Proportion”:

- In the golden proportion,

$$\text{ratio of } \frac{\text{smaller}}{\text{larger}} = \text{ratio of } \frac{\text{larger}}{\text{whole}}$$

# Smile Design

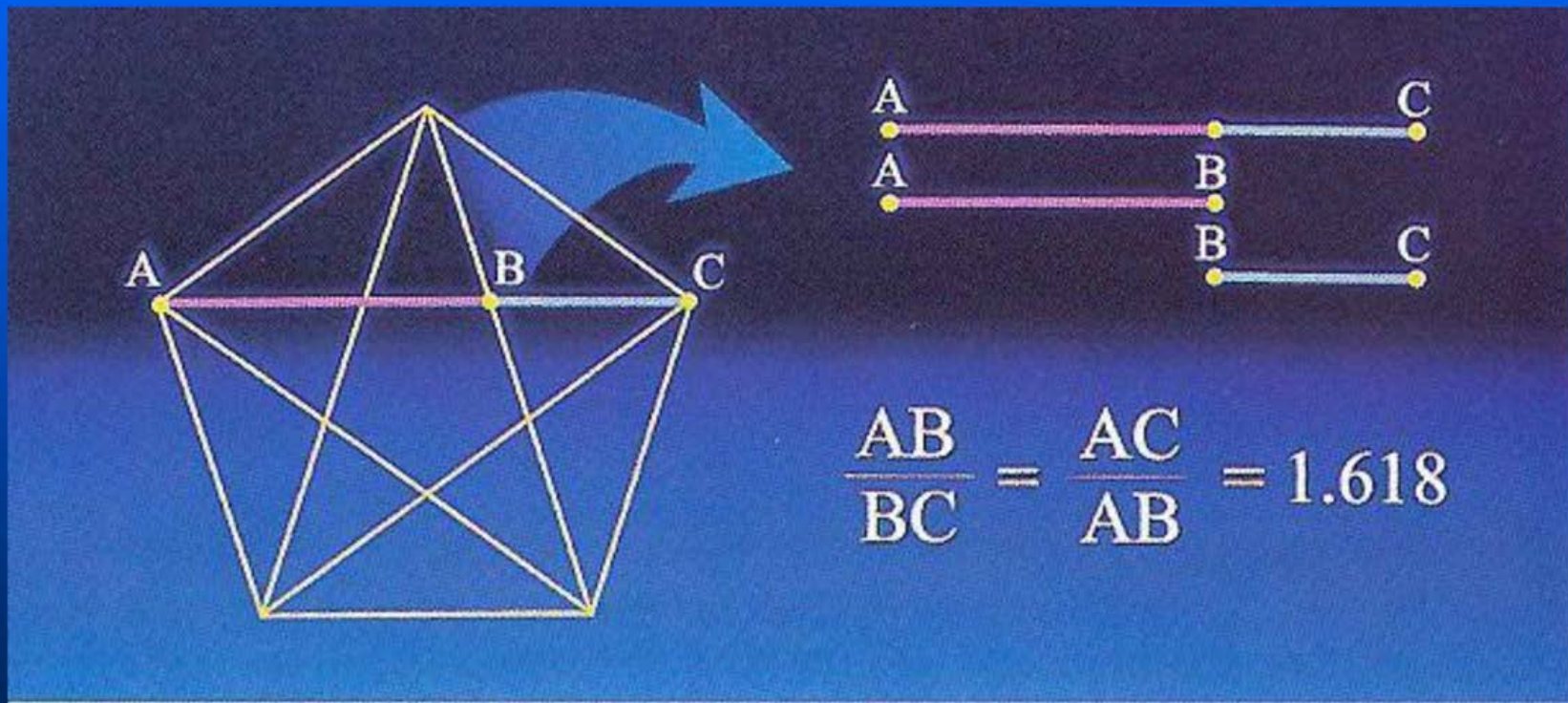
## The “Golden Proportion”:



Lines divided into the golden proportion

# Smile Design

## The “Golden Proportion”:



\*



# Smile Design

Anterior teeth in golden proportion to each other:



# Smile Design

Anterior teeth in golden proportion to each other:



lateral is approx. 60% as wide as central  
canine is approx. 60% as wide as lateral

- Golden Proportion applied to smile design:
  - Based on *apparent* M-D width of anteriors
  - Assessed only with photos!
  - *Not* an absolute criterion of optimal esthetics





# همیار دندانسازان و دندانپزشکان Smile Design

- Golden Proportion applied to smile design:
  - *A starting point* for designing relative widths
  - A diagnostic tool



- Golden Proportion analysis:
  - Divide apparent widths of central, lateral, and canine by apparent width of lateral

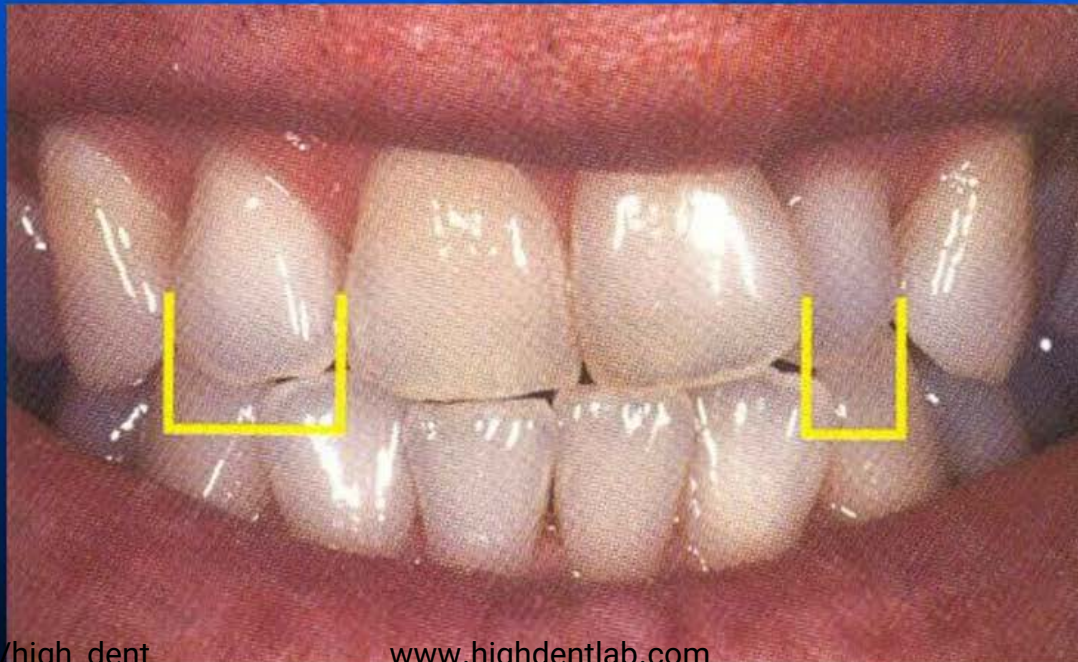


- Golden Proportion analysis: **Flawed!**
- Divide apparent widths of central, lateral, and canine by apparent width of lateral





- Golden Proportion analysis:
  - What if apparent widths of right and left laterals are *different*?



- Golden Proportion analysis:
  - What if apparent widths of right and left laterals are *different*?





- Golden Proportion analysis:
  - What if apparent widths of right and left laterals are *different*?





# Smile Design

## The Golden Percentage\*

- Not dependant on width of laterals alone
- Evaluates each tooth for its contribution to symmetry, dominance, and proportion
- Teeth with identical widths generate identical percentages
- Asymmetry is clearly identifiable and *quantifiable*

# Smile Design

## The Golden Percentage

TABLE 1. CONVERTING GOLDEN PROPORTION TO GOLDEN PERCENTAGE.

Maxillary Tooth	Golden Proportion Ratio	Golden Percentage Calculation (Ratio)	
Right canine	0.618	0.618/6.472	(10%)
Right lateral incisor	1.000	1.000/6.472	(15%)
Right central incisor	1.618	1.618/6.472	(25%)
Left central incisor	1.618	1.618/6.472	(25%)
Left lateral incisor	1.000	1.000/6.472	(15%)
Left canine	0.618	0.618/6.472	(10%)
Total	6.472	6.472/6.472	(100%)



# Smile Design

## The Golden Percentage





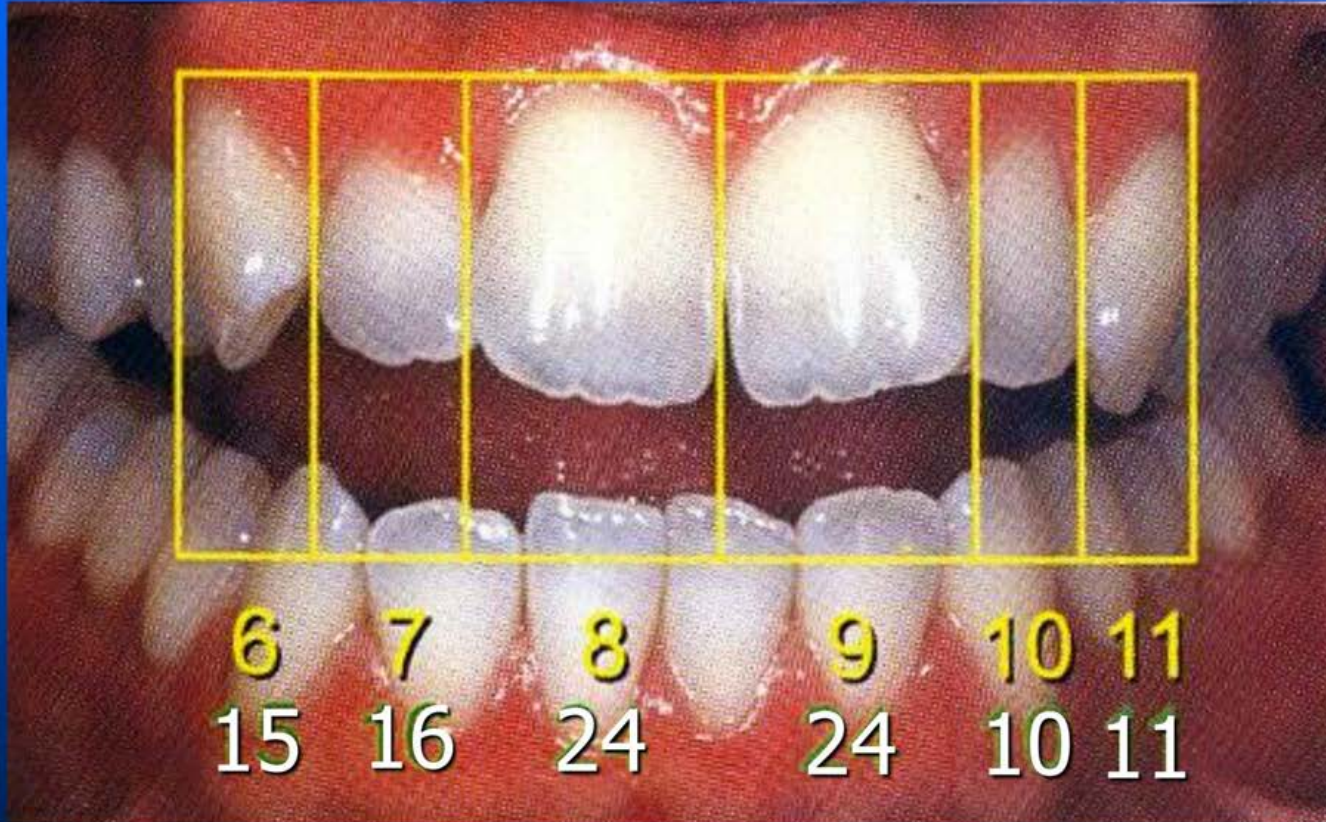
# Smile Design

## The Golden Proportion



# Smile Design

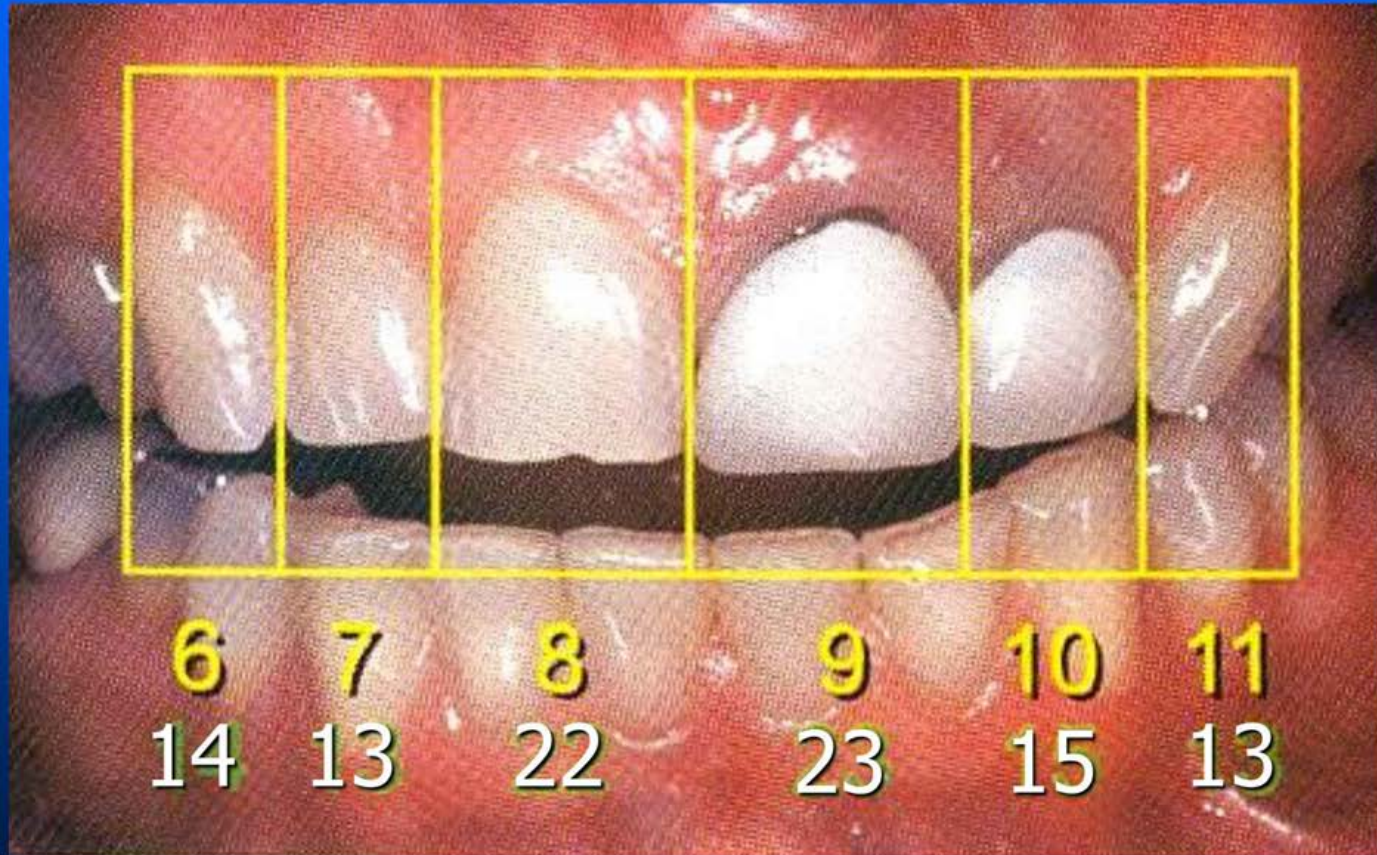
## The Golden Percentage





# Smile Design

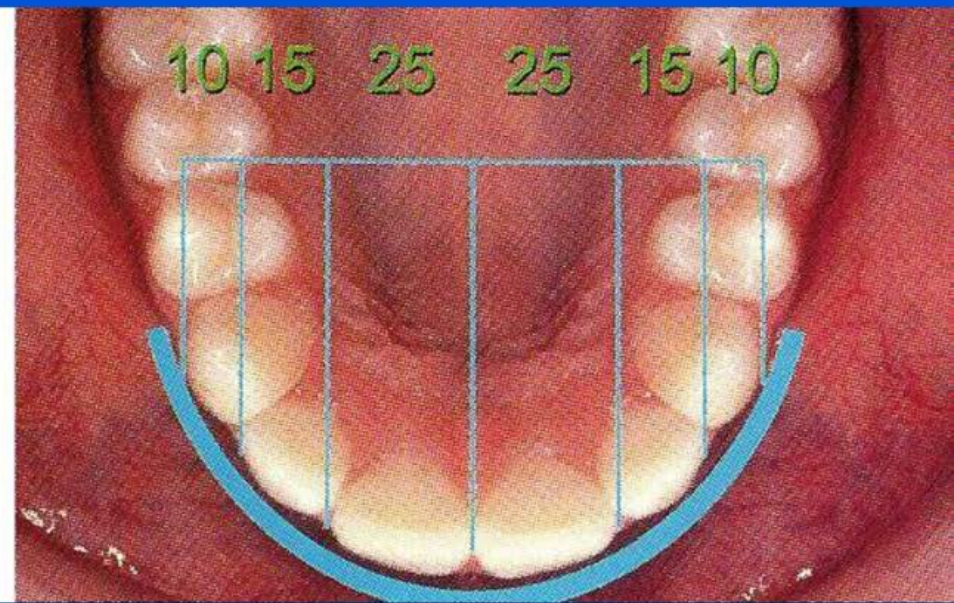
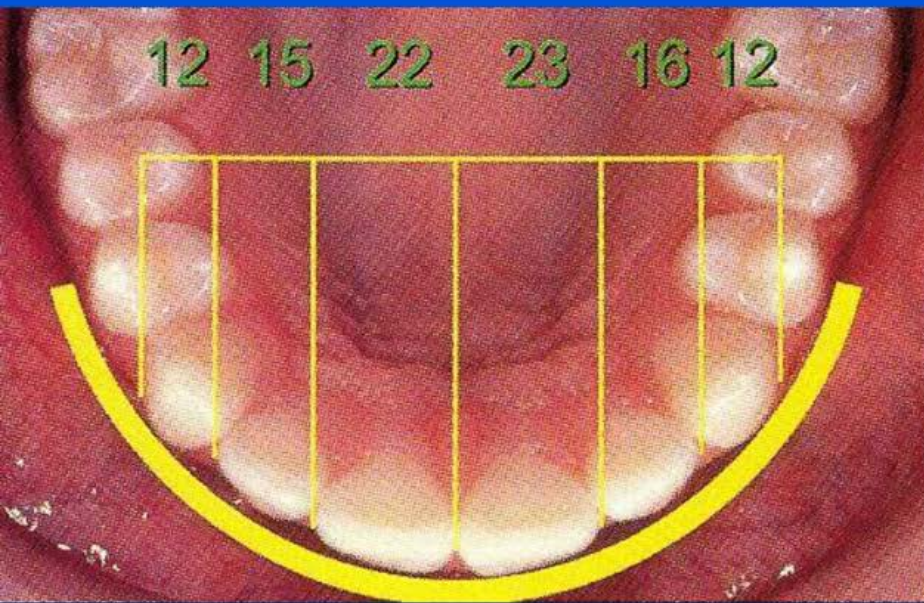
## The Golden Percentage





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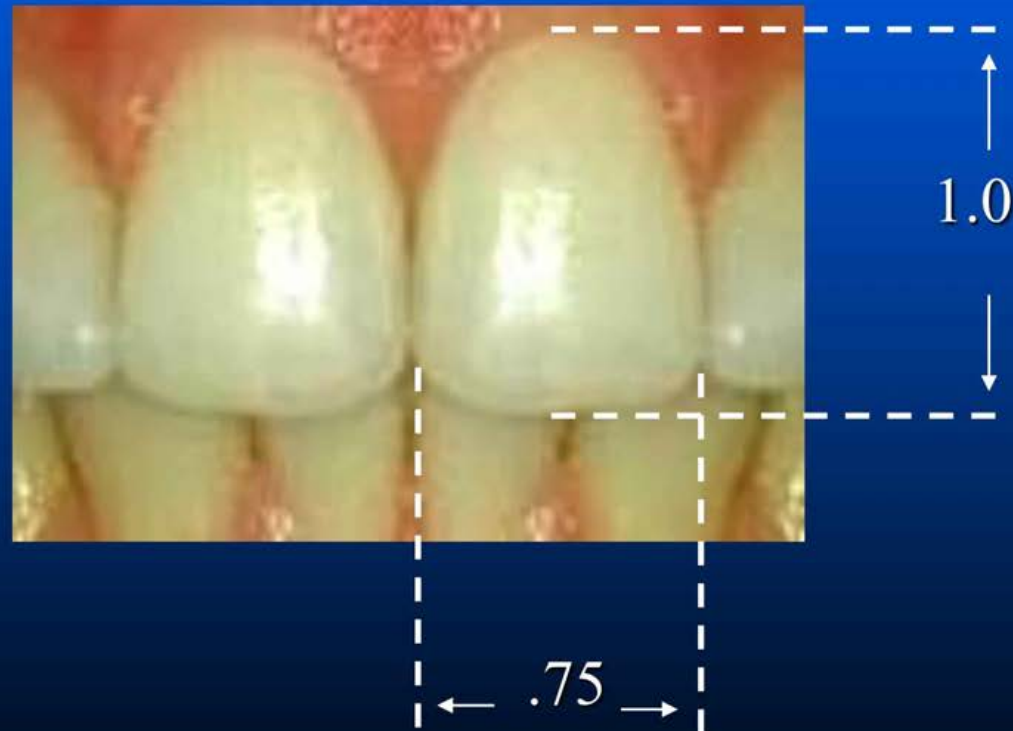
- Influence of arch form on golden proportion/percentage:



# Smile Design

## Width vs. Length

- A “normal/ideal” width:length ratio for the central incisor is 75% to 80%:





# Smile Design – tooth size

## Central Incisors are the KEY

- Make centrals IDEAL
- Start at midline, then move distally
- Symmetry and dominance of centrals are CRITICAL





# Smile Design – tooth size

## Central Incisors are the KEY

- Moving gingiva to optimize W:L ratio:
  - Determine incisal edge position
  - Measure width of tooth
  - Identify gingival level which will result in a pleasing width:length ratio



# Smile Design – tooth size

Central Incisors are the KEY

- W:L ratios of 65% - 85% can look acceptable
- W:L ratios of 75% - 80% are “ideal”



# Smile Design – tooth size

## Central Incisors are the KEY

- To calculate correct length for a given width, use the following formula:

width  $\times$  1.25 = 80% width:length ratio

width  $\times$  1.38 = 73% width:length ratio

width  $\times$  1.50 = 67% width:length ratio



# Smile Design – tooth size

## Central Incisors are the KEY

- Example: How long should an 8 mm central incisor be?

$8 \times 1.25 = 10 \text{ mm}$  (80% width:length ratio)

$8 \times 1.38 = 11 \text{ mm}$  (73% width:length ratio)

$8 \times 1.50 = 12 \text{ mm}$  (67% width:length ratio)

- The central can be 10 – 12 mm long and still look acceptable.

# Smile Design – tooth size

## Priority #2 = Lateral Incisors

- Make wider or narrower to accommodate centrals
- Inadequate or excessive space?
  - Use illusion



\*



\*



# Smile Design – tooth size

## Does width of laterals matter?

Kokich, et al., 1999:



0 mm



1.0 mm



2.0 mm



3.0 mm



4.0 mm

*Figure 2. Crown width of maxillary lateral incisors was decreased in 1.0-mm increments in test photographs to assess esthetics of crown width.*



# Smile Design – tooth size

Does width of laterals matter?

Kokich, et al., 1999:

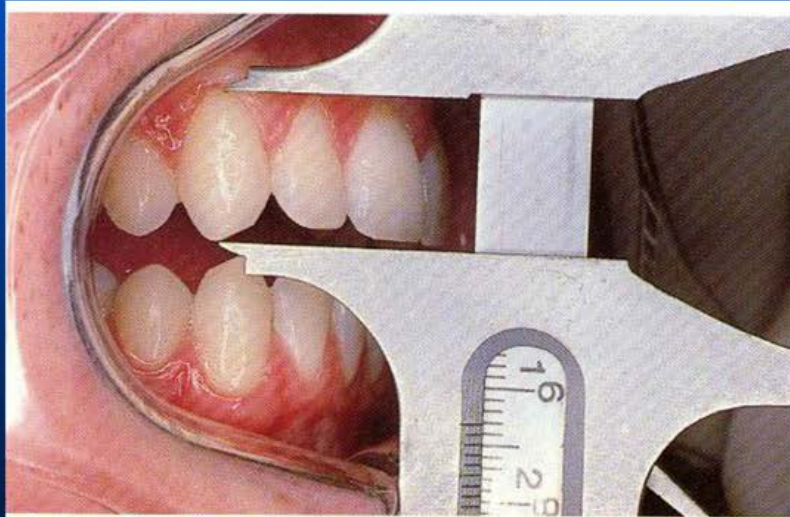
- Threshold values for distance from ideal:
  - GPs and Orthodontists: 3 mm less than ideal
  - Lay people: 4 mm less than ideal
- Bottom Line: *Symmetry* of laterals, not size, is KEY.

# Smile Design – tooth size

## Priority #3 = Canines

- Create functional elements first and preserve
- Adjust visual width with illusion (incisal embrasure form, line angles, labial anatomy)

\*





# Gingival Levels

- Determine tooth size/position *first*.
- Gingival margins are positioned to create the desired tooth size relative to the incisal edge.
- The incisal edge is NOT positioned to create the correct tooth size relative to FGM levels.



# Gingival Levels

- Determine tooth size/position *first*.
- Avoid using gingiva as a reference to position incisal edges – gingiva can move with eruption or recession.
- Tooth asymmetry is more noticeable than gingival asymmetry.

# Gingival Levels

What is the desired gingival display?

# What is a “Gummy Smile”

Kokich, et al., 1999:



-2.0 mm



0 mm



2.0 mm

*Figure 8. The distance from the upper lip to the gingival margin was altered in 2-mm increments above and below the labial gingival margins of the maxillary central incisors in test photographs to assess the esthetics of gingiva-to-lip distance.*



4.0 mm



6.0 mm



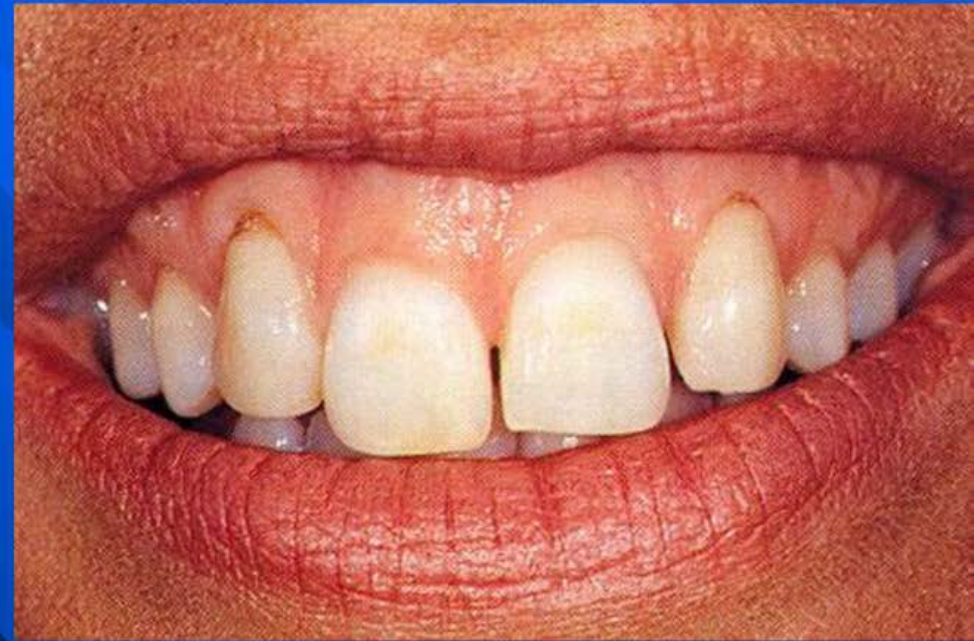
# What is a “Gummy Smile”

Kokich, et al., 1999:

- How much gingiva can show?
- Threshold values for distance from ideal:
  - GPs and lay people will accept up to 3 mm
  - Orthodontists will accept up to 2 mm
- Bottom Line: Gingival display of up to 3 mm will be acceptable for most patients.

# Gingival Levels: Differential diagnosis for a gummy smile

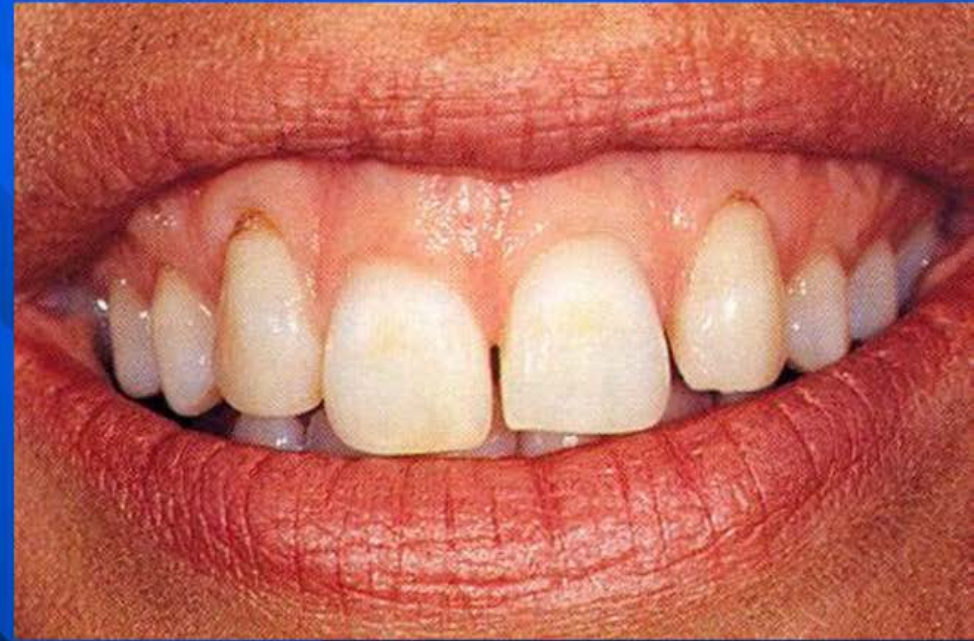
1. Short upper lip
2. Hypermobile lip
3. Vertical maxillary excess (VME)
4. Anterior over-eruption
5. Wear + compensatory eruption
6. Altered active eruption
7. Altered passive eruption





# Gingival Levels: Differential diagnosis for a gummy smile

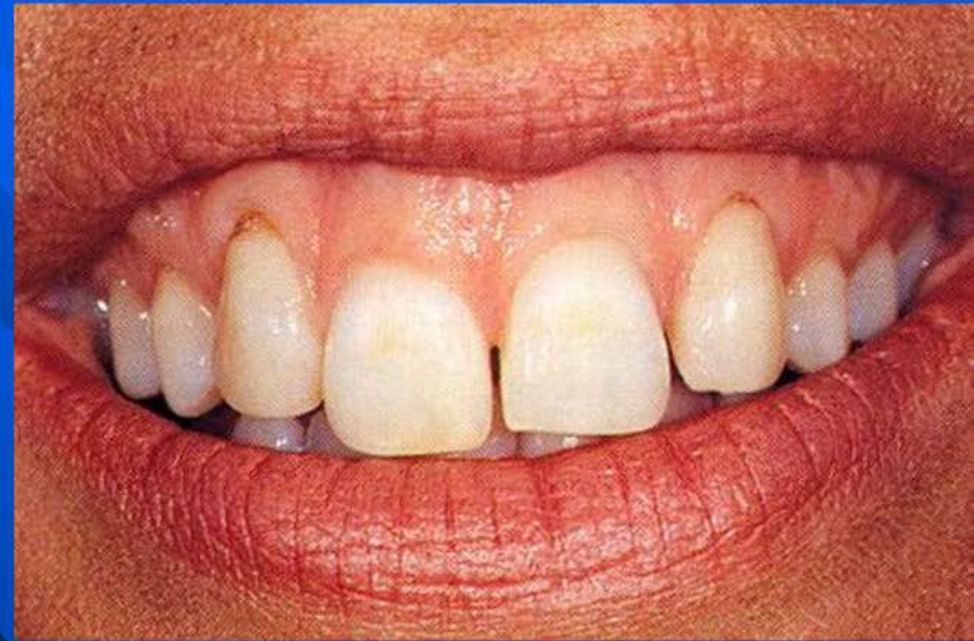
- A. If excessive gingiva is present, evaluate crown length.





# Gingival Levels: Differential diagnosis for a gummy smile

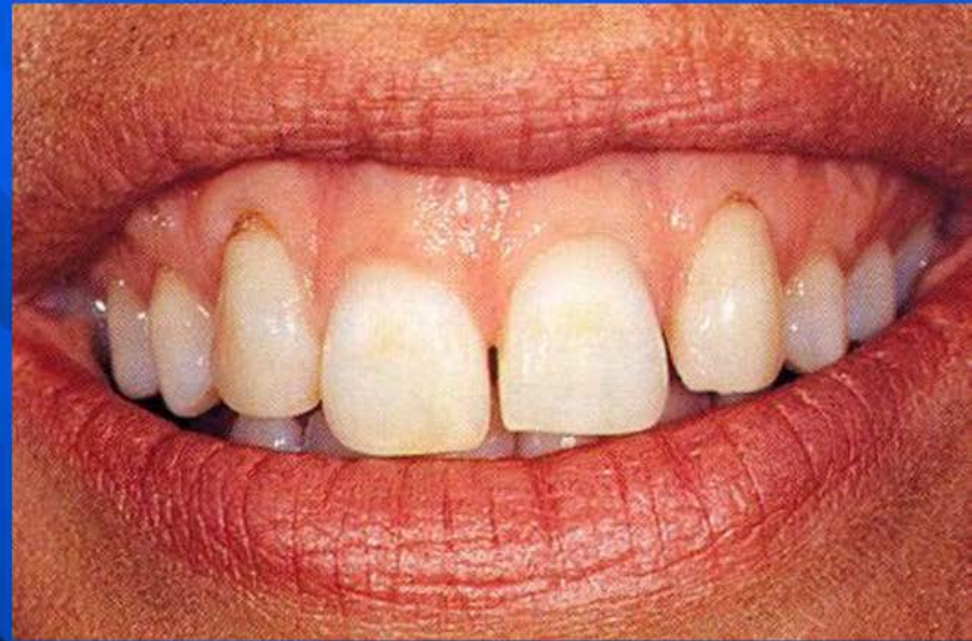
- Short crown length:
  1. Wear/comp. eruption
  2. Altered eruption
  
- Normal crown length:
  1. Short upper lip
  2. Hypermobile lip
  3. VME
  4. Anterior over-eruption



# Gingival Levels: Differential diagnosis for a gummy smile

B. Is excessive gingiva present in high smile in anterior only?

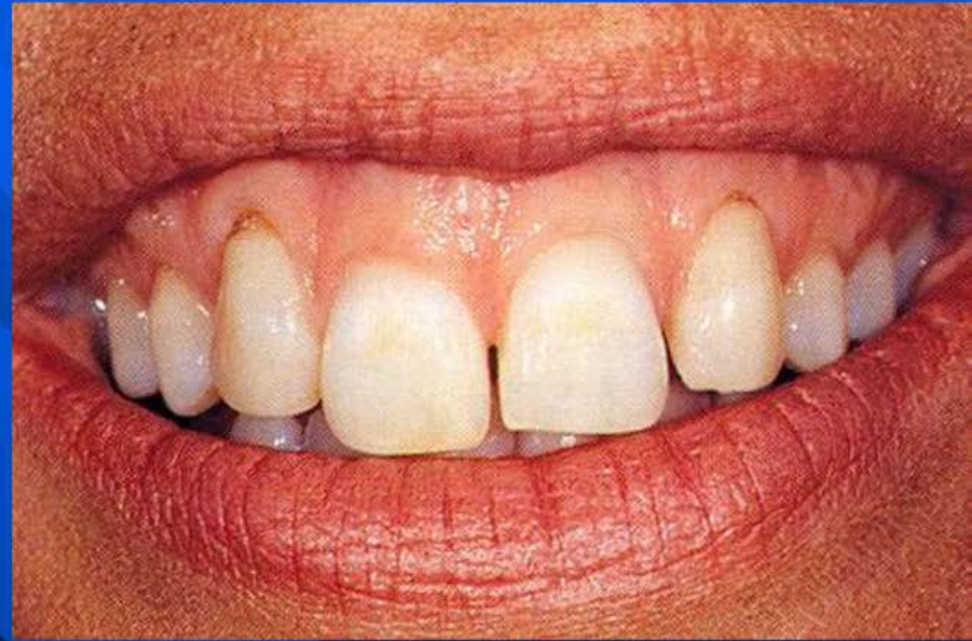
In anterior and posterior?





# Gingival Levels: Differential diagnosis for a gummy smile

- Excessive gingiva visible only in anterior?
  - Anterior over-eruption
- Visible in anterior and posterior?
  - short or hypermobile lip, or VME





# Gingival Levels: Differential diagnosis for a gummy smile

- C. Evaluate incisal plane to occlusal plane.

Are anteriors and posteriors erupted equally?



# Gingival Levels: Differential diagnosis for a gummy smile

1. Planes coincide:
  - short or hypermobile lip, or VME
2. Incisal plane coronal to occl. plane, and excessive gingiva visible in anterior only:
  - anterior over-eruption



# Gingival Levels: Differential diagnosis for a gummy smile

3. Planes coincide, and excessive gingiva visible in anterior and posterior :
  - short or hypermobile lip, or VME





# Gingival Levels: Differential diagnosis for a gummy smile

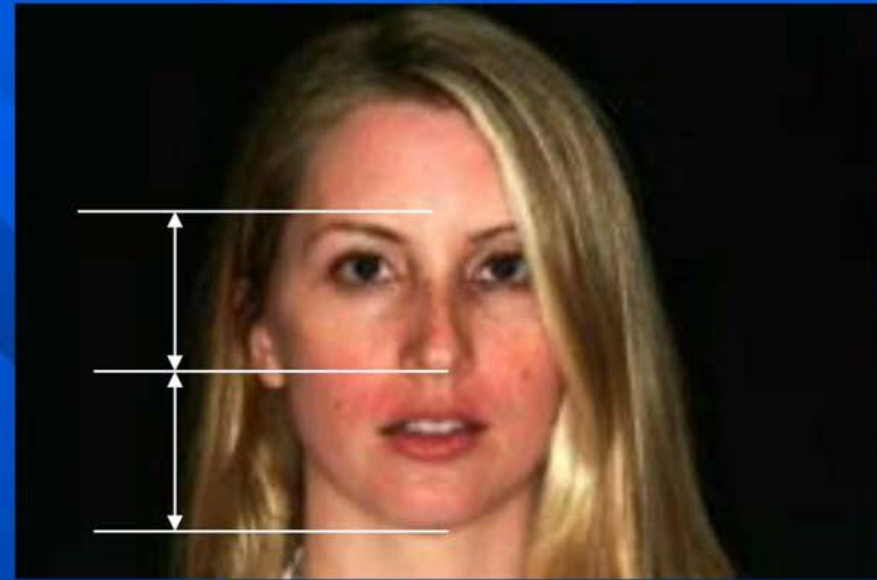
- D. Evaluate tooth display at rest.
- Normal:
    - hypermobile lip
  - Excessive tooth display at rest:
    - VME, short u. lip, ant. over-eruption



# Gingival Levels: Differential diagnosis for a gummy smile

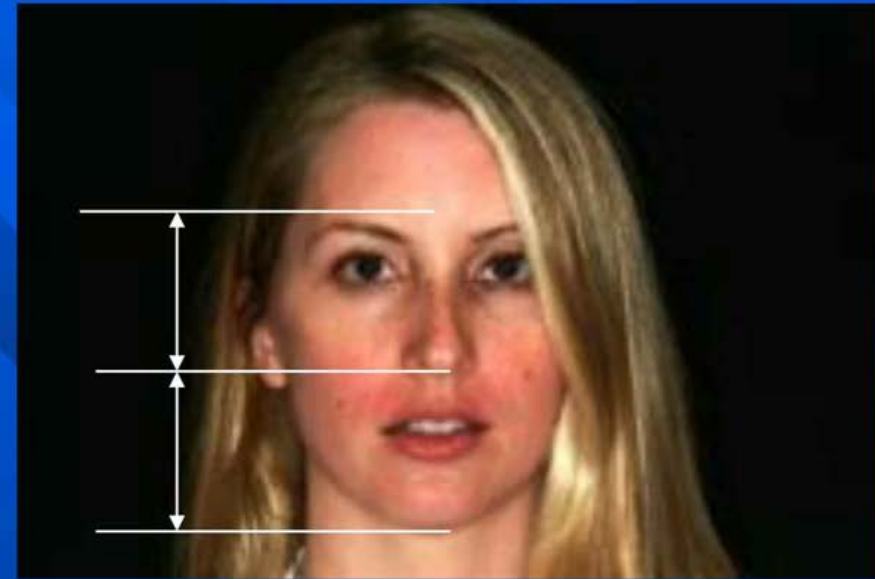
## E. Evaluate facial height.

- Glabella to base of nose should = base of nose to bottom of chin with face at rest and teeth in occlusion.



# Gingival Levels: Differential diagnosis for a gummy smile

- Lower face > midface:
  - probably VME
- Lower face = midface:
  - short u. lip or anterior over-eruption





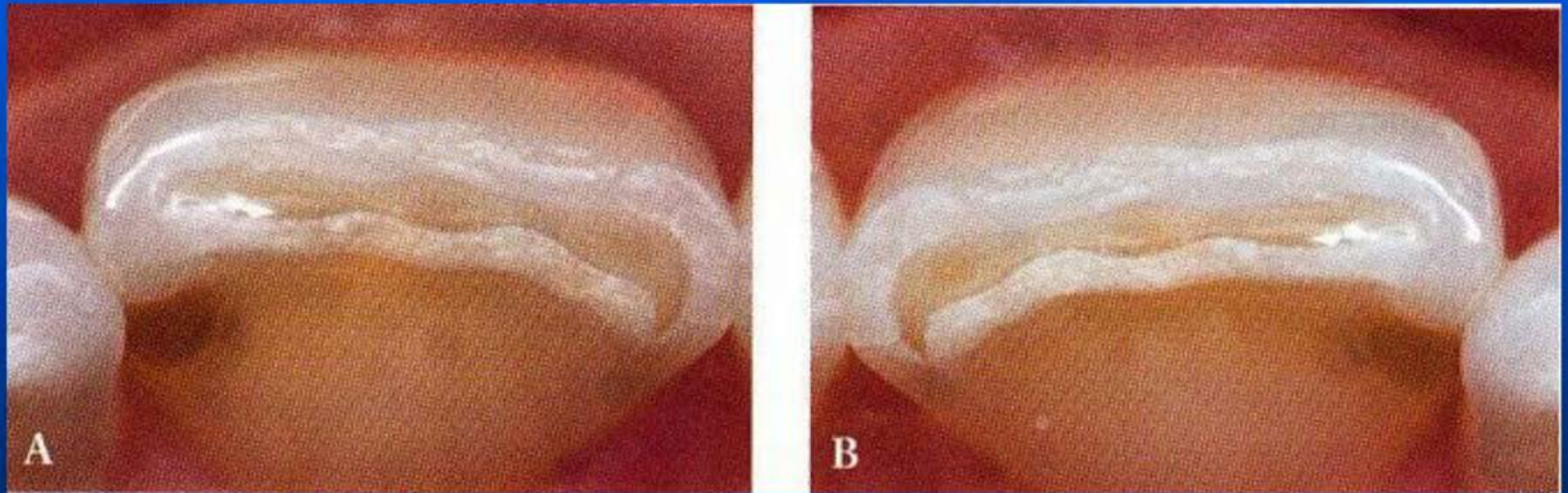
# Gingival Levels: Differential diagnosis for a gummy smile

- A. Evaluate lip length.
- Measure from base of nose to bottom of lip during smile w/teeth in occlusion.
- Normal range:
- Female 20-22 mm
  - Male 22-24 mm



# Wear vs. Altered Eruption

- Examine incisal edges





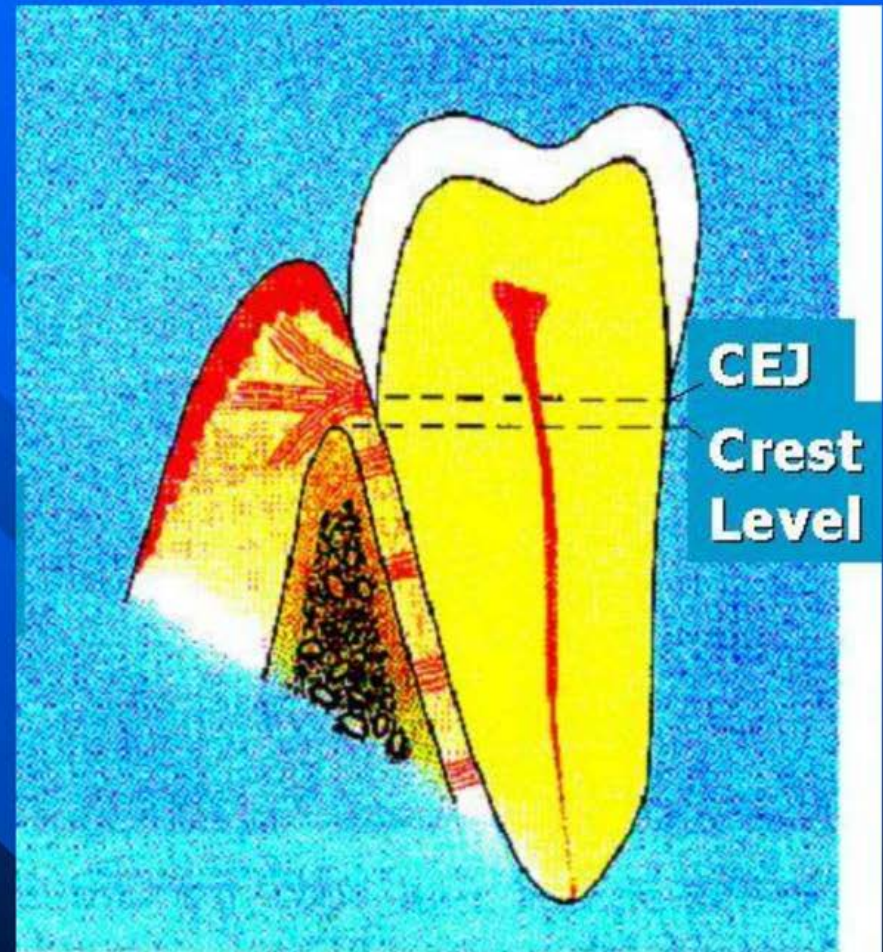
# Normal Eruption

- Active: Anatomic crown erupts out of alveolus until CEJ is 1.5 – 2 mm from crest of bone.
- Passive: Gingiva recedes until sulcus depth is 1 – 2 mm.
- Diagnosis: Facial probing of 1 – 2 mm w/ CEJ easily probed.



# Altered Active Eruption

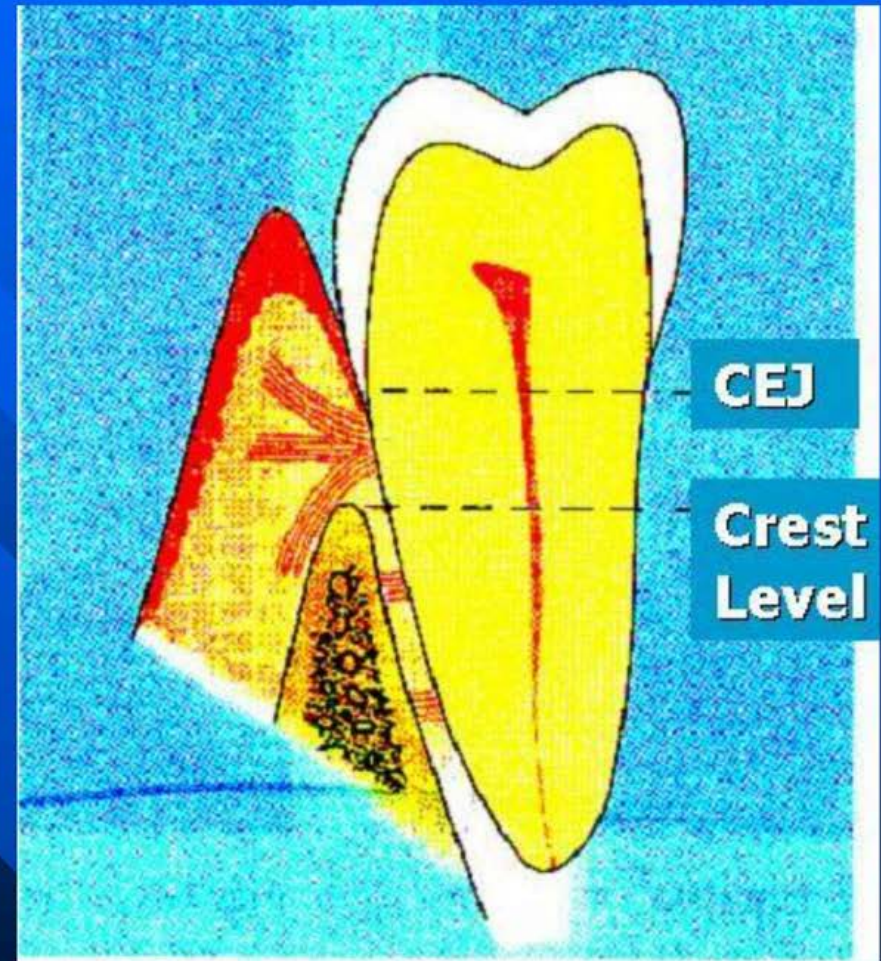
- Crown does not erupt completely out of bone.
- CEJ remains covered by or in close proximity to bone.
- Diagnosis: unable to locate CEJ w/probe.





# Altered Passive Eruption

- Normal active eruption
- Gingiva fails to recede normally, leaving sulcus of 3-4 mm or greater.
- Diagnosis: Facial probing of 3-4 mm w/ CEJ easily probed.



# Alteration of Gingival Levels

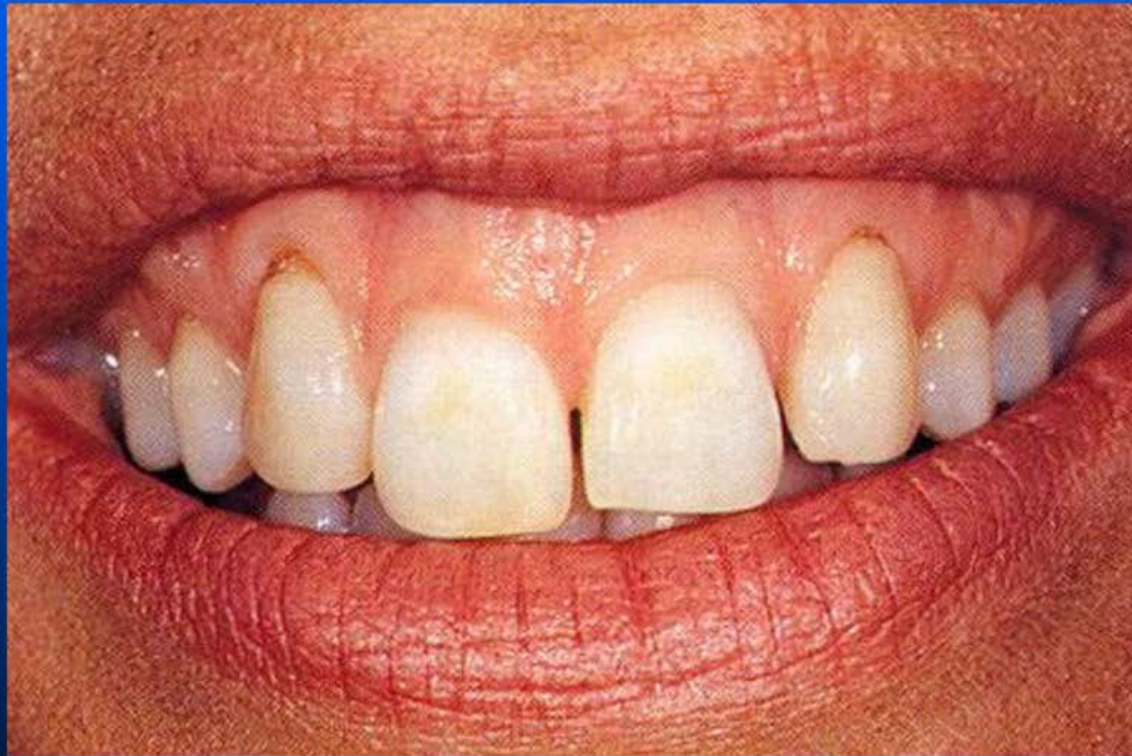
- |                                    |   |
|------------------------------------|---|
| 1. Short upper lip                 | 1. No tx. available                             |
| 2. Hypermobile lip                 | 2. No tx. available                             |
| 3. Vertical maxillary excess (VME) | 3. Orthognathic surgery                         |
| 4. Anterior over-eruption          | 4. Orthodontics, crown lengthening, restoration |
| 5. Wear + compensatory eruption    | 5. Crown lengthening or intrusion + restoration |
| 6. Altered active eruption         | 6. Crown lengthening w/ osseous                 |
| 7. Altered passive eruption        | 7. Mucogingival surgery                         |



# Ideal Goals in Tooth/Gingiva Relationships

- Tissue on centrals is at same level and even with or apical to tissue on canines
- Tissue on laterals is same height on each side and coronal to tissue on centrals by 0.5-1.5 mm
- Tissue on canines is at same level on each side and equal to or slightly apical to tissue on centrals.

# Fabrication of a stent for pre-periodontal surgery esthetic mock-up and use as a surgical template

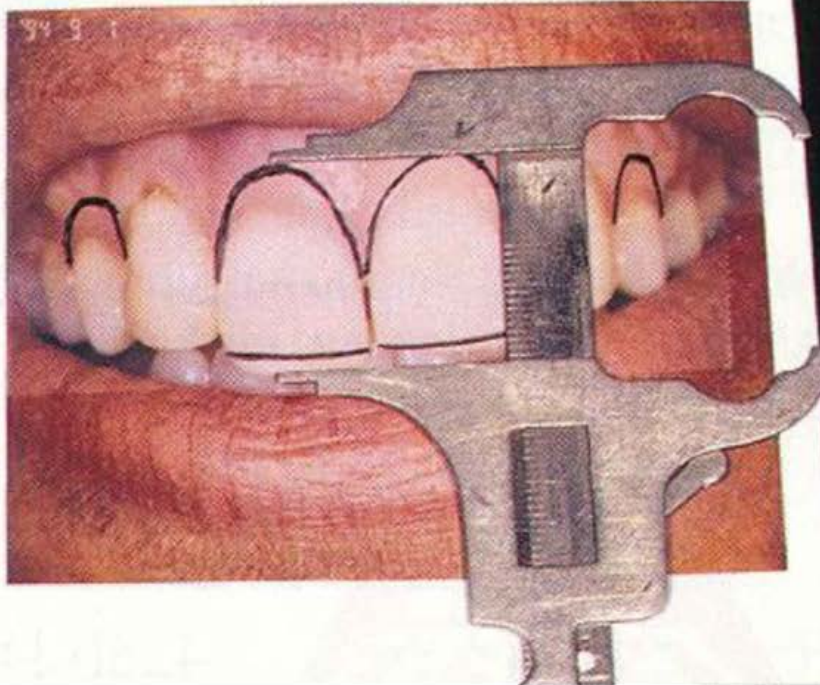


Pre-treatment condition: gummy smile

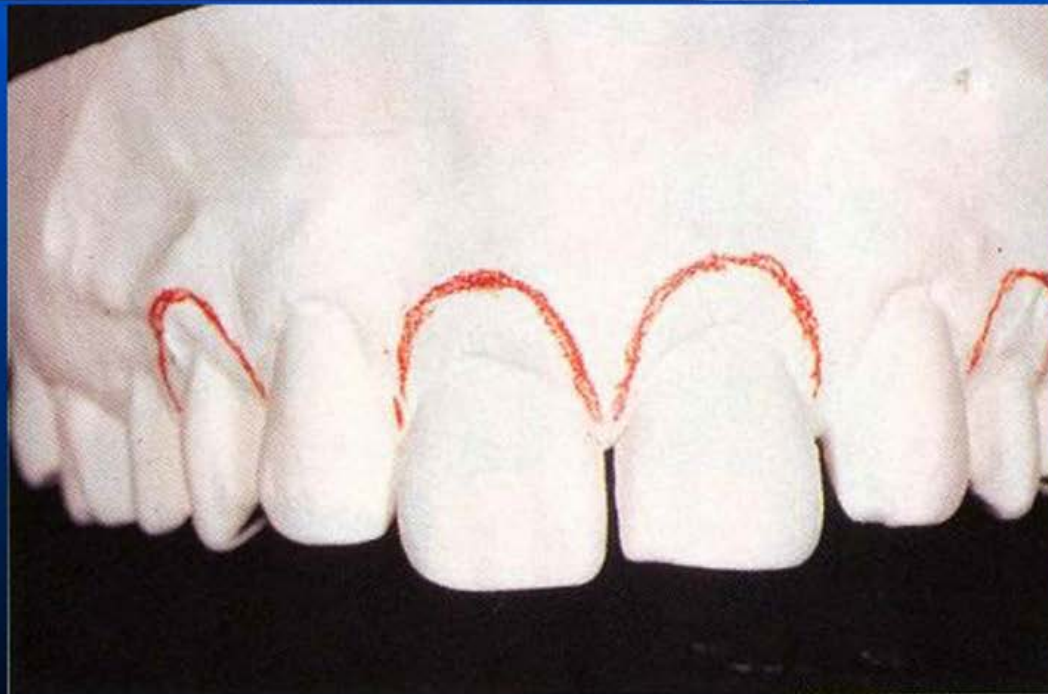




Esthetic treatment planning using smile design principles (w:l ratios, desired tooth display at rest, desired gingival display at full smile, etc).



Transfer of smile  
design outcomes to  
plaster duplicate of  
unaltered study cast







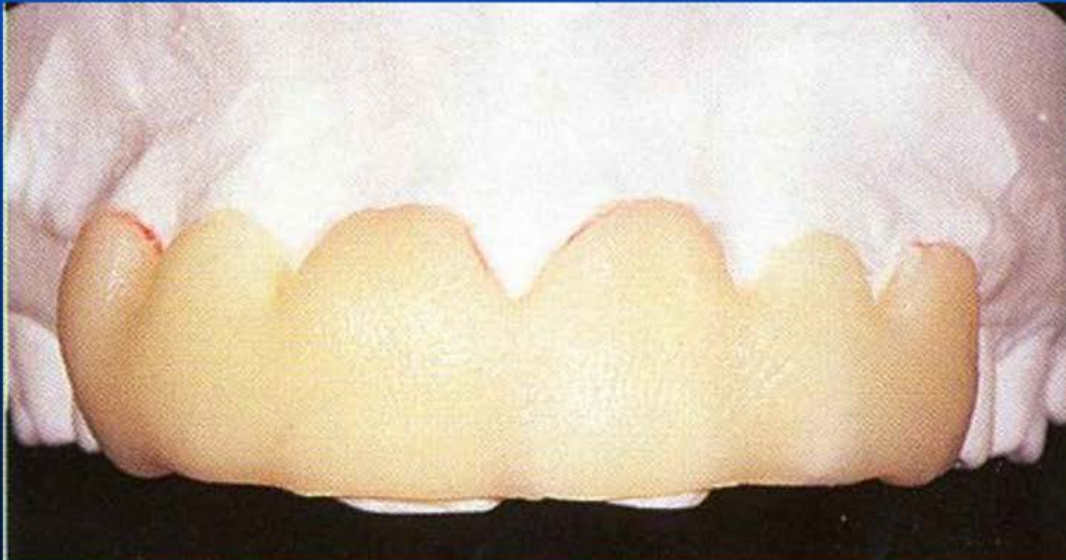
Application of  
separating medium  
(e.g. Alcote)



Adaptation of a light-  
cured, tooth-colored  
material (Triad).  
Can also use methyl  
methacrylate (Jet) or  
composite resin



Careful adaptation to  
labial tooth contours

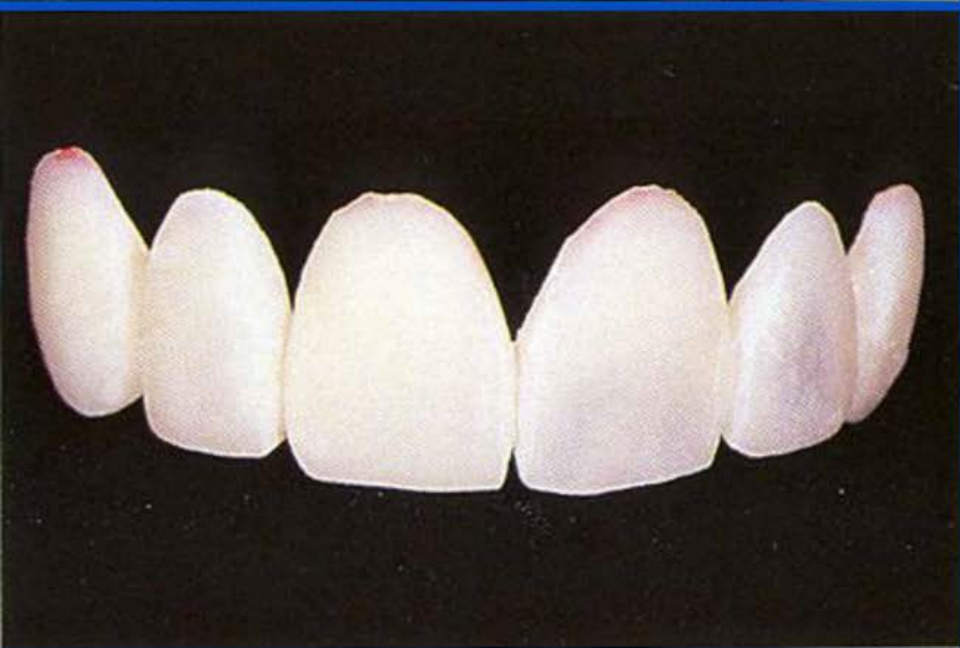


Trimmed to level of  
desired gingival  
contours (as marked in  
red pencil)

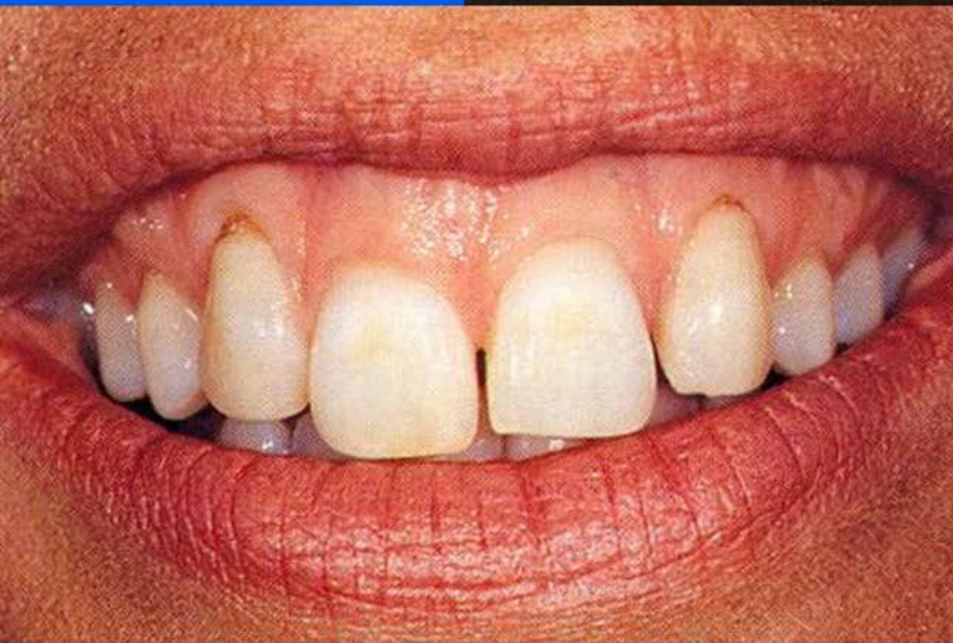
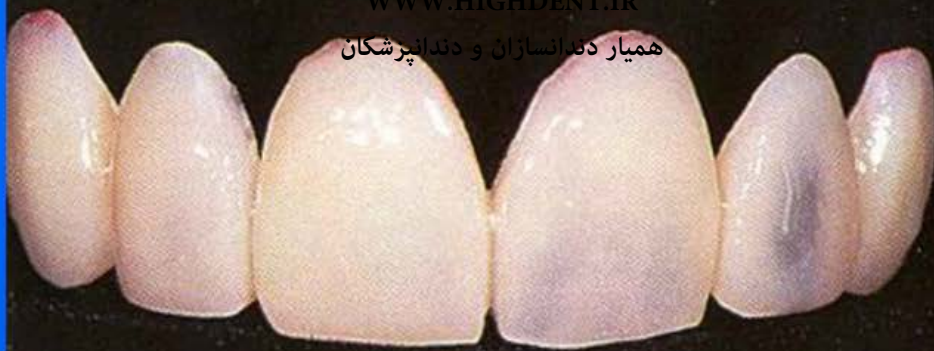




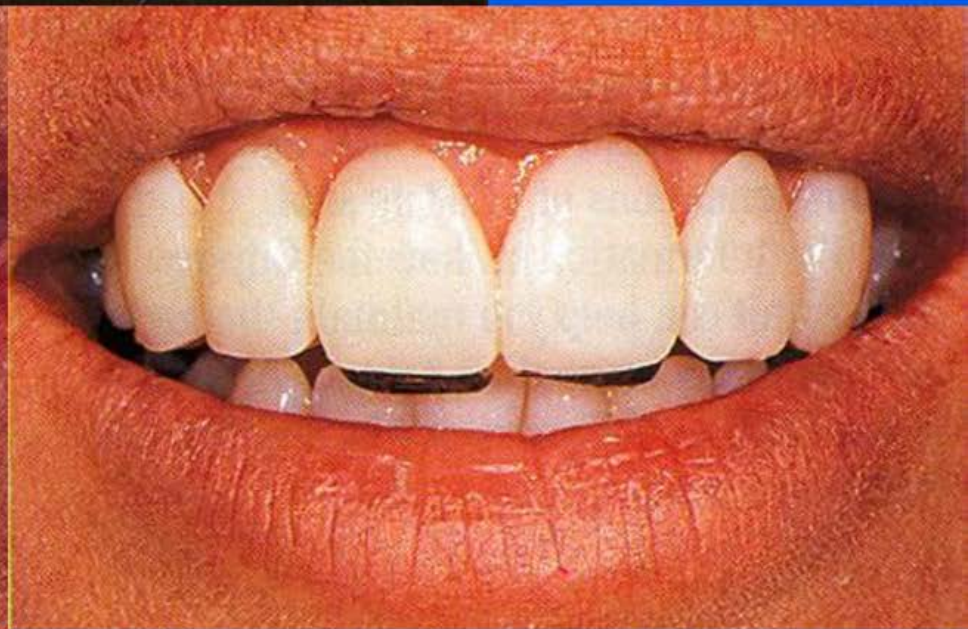
Stent removed from  
cast immediately after  
polymerization



Completed stent after  
trimming flash,  
contouring and polishing



Stent is tried-in for patient to preview intended treatment outcome.



Incisal tooth areas to be shortened are blacked-out with a Sharpie pen.

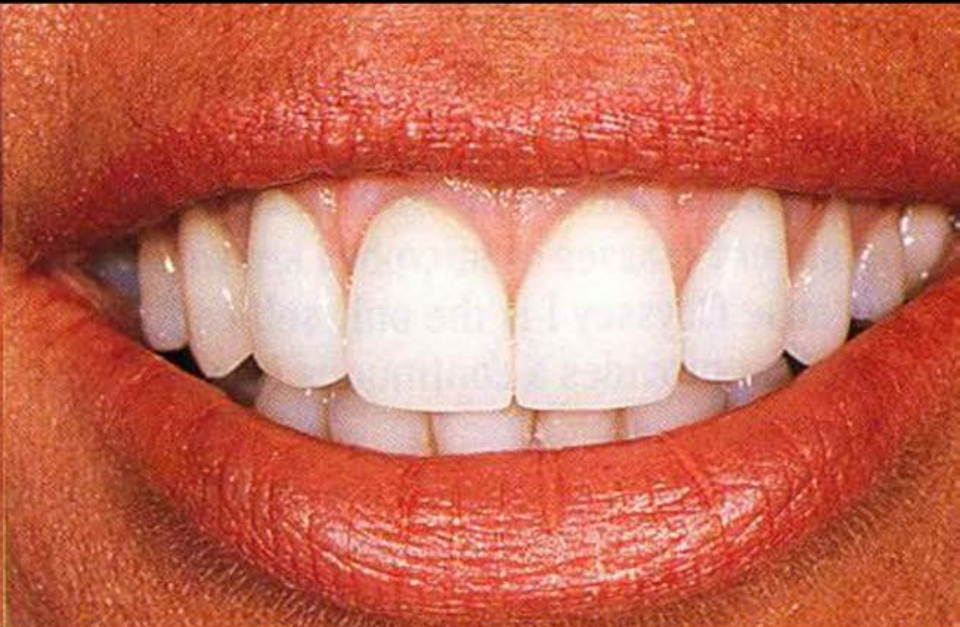




Pre-treatment



Preview w/stent



Final result



Pre-treatment



Final result

