****Handout****

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Applied Principles and Treatments for Esthetic Success

Dental Esthetic Factors

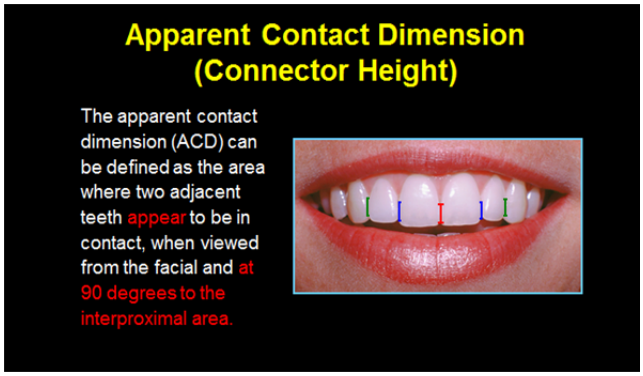
- Important to remember that **patient satisfaction** determines success or failure with esthetic procedures
- Various esthetic factors are categorized via the following hierarchy:
  - **Macroesthetics**: esthetic factors that include the face as a whole (facial proportions, maxillo-mandibular relations, profile, etc.)
  - **Miniesthetics**: factors that focus on the frontal smile (teeth, lips, philtrum, etc.)
  - **Microesthetics**: factors pertaining to individual anterior teeth and periodontal tissues (tooth shape, height : width ratios, gingival heights, etc.)
- Wide range of acceptable thresholds for "ideal" values for various esthetic factors
- Important to use evidence-based threshold values as guidelines for success—not absolute targets
- Perceptions of esthetic factors vary between dentists of different specialties and lay people

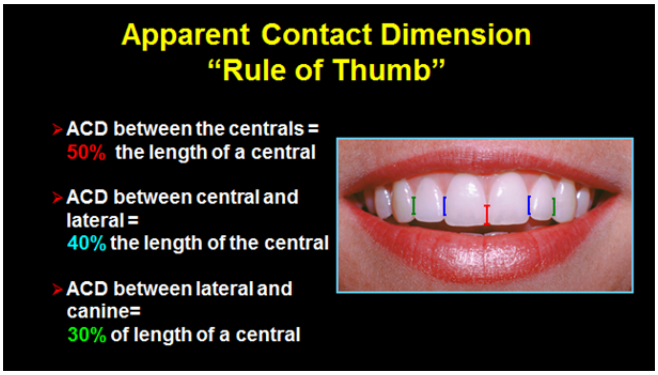
References:

-Witt M, Flores-Mir C. Laypeople's preferences regarding frontal dentofacial esthetics *Tooth-related factors.* JADA 2011;142(6): 635-45.

-Witt M, Flores-Mir C. Laypeople's preferences regarding frontal dentofacial esthetics *Periodontal factors.* JADA 2011;142(8): 925-37

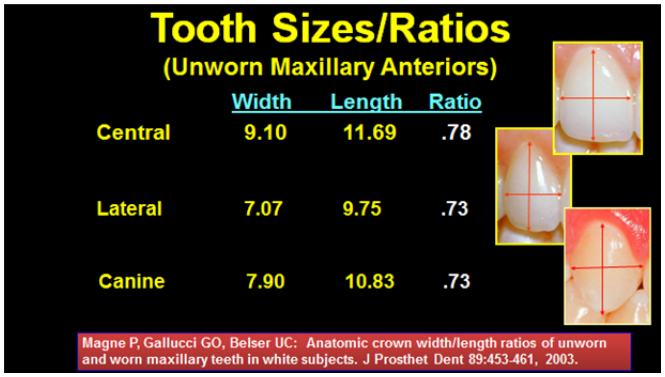
Apparent Contact Dimension:

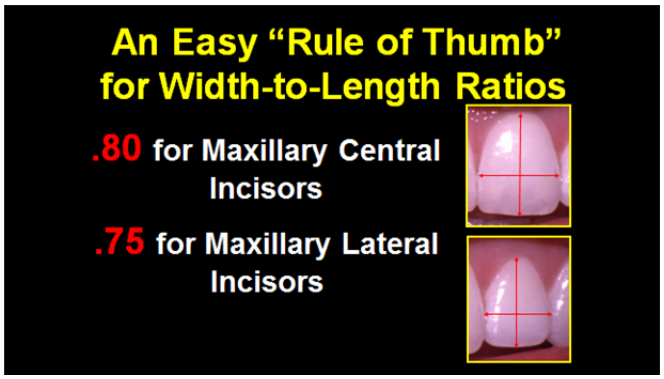




Reference: Raj V, et al. The apparent contact dimension and covariates among orthodontically treated and nontreated subjects. J Esthet Restor Dent. 2009;21(2): 96-111.

Width to Length Ratio is one of most frequently used parameters in dental esthetics:





Interarch Tooth Size Discrepancy (ITSD)

- **Definition:** a disproportion in the mesiodistal dimensions of teeth of opposing arches
- **Prevalence:** clinically significant ITSD exists in 17-30 % of orthodontic patients
    - Appears to have a strong genetic component
- **Clinically significant ITSD** is defined as greater than 1.5-2 mm and requiring alteration of tooth width
- **Diagnosis**
    - Gold standard is a diagnostic set-up
    - Screening can be done using ratio of summed mesiodistal widths of mandibular to maxillary teeth
    - Digital model set-ups and screening are possible and accurate
- **Classification of ITSD**
    - Discrepancies can fall into four categories that can be either generalized or localized problems:
        - Maxillary teeth too wide
        - Mandibular teeth too wide
        - Maxillary teeth too narrow
        - Mandibular teeth too narrow
- **Treatment of ITSD**
    - Treatment approach is dictated by magnitude and type of discrepancy
        - Less than 2.0 mm: clinically insignificant—overcome via orthodontic compensation
        - Generalized or localized excess: Reduction treatment (decrease in tooth width)
        - Generalized or localized deficiency: Addition treatment (increase in tooth width)
    - **Considerations for reduction treatment**
        - Conservative interproximal enamel reduction procedures are a necessary part of orthodontic treatment when ITSD exists due to tooth size excess
        - When conservative protocol is followed evidence suggests that there are no long term negative effects on oral health
    - **Considerations for addition treatment**
        - Restorative augmentation of undersized teeth requires careful planning and communication between orthodontist and restorative dentist
        - Timing of restorative treatment is important and should be decided in advance
            - Intra-ortho restorations involve creating excess space mesial and distal to undersized tooth, restoration to ideal width, and then orthodontic closure of residual space
            - Post-ortho restorations involve ideally positioning undersized teeth prior to completion of ortho, and allows for final restorations once braces are off
            - Orthodontic positioning of undersized teeth
                - Maxillary lateral incisors should be positioned in the center of the edentulous space with 50% of excess space on the mesial and 50% on the distal

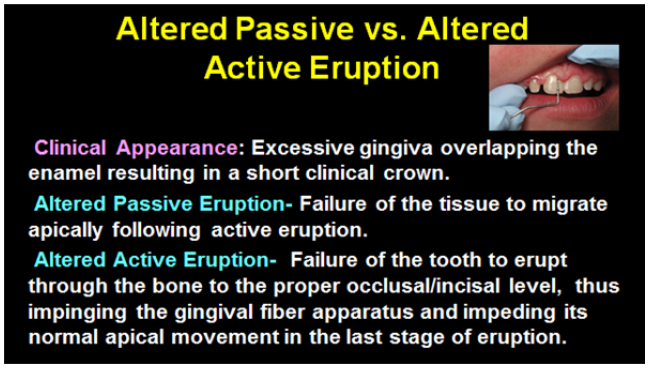
    - This allows for ideal restorative contours
- Management of gingival contours with consideration to clinical crown length and width : length ratio is critical
- Crown lengthening procedures may be necessary to gain adequate length so that natural emergence profiles can be achieved

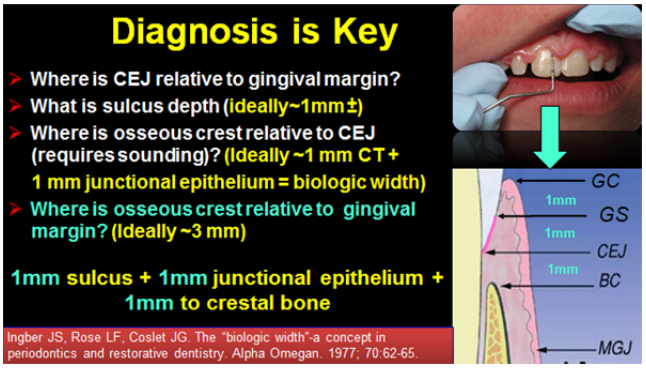
Reference:

-Grauer D, Heymann G. Clinical management of tooth size discrepancies. J Esthet Restor Dent 2012; 24(3):155-9.

Considerations for Esthetic Crown Lengthening

- Diagnosis is essential for determining appropriate treatment approach
- **Altered passive eruption**: short clinical crown due to excessive gingival coverage, with appropriate position of osseous crest
    - Treatment is focused on idealizing the dimension and/or position of gingival tissue
- **Altered active eruption**: short clinical crown due to excessive gingival coverage, with osseous crest positioned more incisal than ideal
    - Treatment is focused on idealizing the position of the osseous crest and dimension and/or position of gingival tissue





Reference: Coslet JG, Vanarsdall R, Weisgold A. Diagnosis and classification of delayed passive eruption of the dentogingival junction in the adult. Alpha Omegan. 1977;10:24-8.

Open Gingival Embrasures (black triangles)

- **Etiology**
    - Increased distance from crest of bone to proximal contact
    - Divergent root angulation of adjacent teeth
    - Triangular or tapering crown form
    - Orthodontic correction of previously malaligned anterior teeth
- **Treatment options**
    - Orthodontic root uprighting to achieve more convergence

- Conservative interproximal recontouring and orthodontic space closure to move contact point more gingival
- Restorative alteration of proximal contours

- **References:**

-Tarnow DP, et al. The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. J Periodontol. 1992;63(12):995-6
-Kurth JR, et al. Open gingival embrasures after orthodontic treatment in adults: prevalence and etiology. Am J Orthod Dentofacial Orthop. 2001;120(2):116-23.

Management of Missing Maxillary Lateral Incisors

- **Epidemiology**
  - Prevalence is 1-2% of population
  - Bilateral agenesis more common than unilateral
  - Commonly associated with malformation of other teeth (usually microdontia)
- **Treatment Options**
  - In general there are only two common approaches to management of missing lateral incisor(s): Space Closure (canine substitution) or Space Opening (for implant(s) or other restorative replacement options (resin bonded bridge, fixed partial denture, etc.)
  - There are multiple factors that contribute to the decision of which approach is best
  - **Factors that favor space closure (canine substitution)**
    - Class II occlusion with overjet
    - Minimal mandibular crowding
    - Canines that are not overly bulbous
    - High smile line or increased gingival display on smile
    - Financial considerations
      - **Clinical Considerations for space closure**
        - Successful esthetic outcomes will require recontouring of canines to more closely resemble lateral incisors as well as conservative esthetic restorative procedures (alteration of canine and first bicuspid contours via selective composite augmentation or indirect restoration
        - Proper orthodontic positioning of first bicuspids and canines can enhance appearance of gingival margin heights as well as apparent widths of teeth
        - Evidence does not warrant long term periodontal or occlusion-related concerns

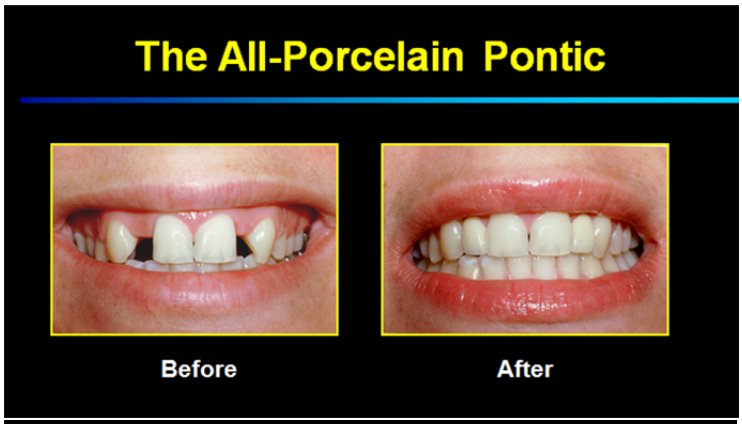
- **Reference:**

-Zachrison B, et al. Congenitally missing maxillary lateral incisors: canine substitution. Am J Orthod Dentofacial Orthop. 2011;139(4): 435

  - **Factors that favor space opening (for implant(s) or other restorative replacement options (resin bonded bridge, fixed partial denture, etc.):**

- Class I or III occlusion
- Lack of dental protrusion
- Canines that are bulbous in shape
- Low smile line / minimal gingival display on smile
    - **Clinical Considerations for space opening**
        - Adequate inter-coronal space to allow for appropriate replacement tooth width
        - Adequate inter-radicular space (root divergence) to allow for placement of implant
        - Excellent communication between orthodontist, restorative dentist, and surgeon to place implant is essential prior to removal of braces to ensure all goals have been met

- **Reference:**
  -Kokich, VO, et al. Congenitally missing maxillary lateral incisors: restorative replacement. Am J Orthod Dentofacial Orthop. 2011;139(4):435
    - **Considerations for interim replacement of missing laterals**
        - Interim replacement options include:
            - Hawley retainer with pontic(s) or flipper—poor at maintaining root positions
            - Thermoplastic (Essix style) retainer with pontic(s)
            - Bonded pontic with wire wings
            - Bonded denture tooth pontic (no wings)
            - All porcelain bonded pontic ("Carolina Bridge")
            - Resin bonded FPD
        - Relapse of root positions (convergence) into edentulous sites can occur in between completion of ortho and time for implant placement
        - <u>Fixed or bonded retention appears to be best approach to preventing this relapse</u>
        - Concerns exist about use of orthodontic miniscrew-supported pontics as interim solution to missing lateral incisors.
    - **All-porcelain bonded pontic**
        - Best for single incisor replacement
        - Case selection critical (minimum 5 mm connector height)
        - Provides fixed retention of post ortho cases
        - Highly esthetic
        - 100% reversible
        - <u>Must inform patient of possibility of swallowing or aspiration if dislodged (true for all bonded pontic types)</u>



Reference:

*Heymann HO. The "Carolina Bridge:" A Novel Interim All-Porcelain Bonded Prosthesis.*J Esthet Restor Dent* 2006; 18(2): 81-91.

Take Home Messages

- Patient perception of dental esthetic factors is critical to their satisfaction with treatment and dictates success.
- No one treatment approach is best for all patients with missing maxillary lateral incisors—treatment plans should be tailored to fit individual patients.
- Fixed retention is important for preventing relapse of root positions in young patients with missing lateral incisors.
- Conservative interproximal enamel reduction procedures are a safe and effective way to manage inter arch tooth size discrepancies due to excessive tooth width.
- Proper interdisciplinary communication regarding timing and precise positioning of undersized teeth to be treated by addition to tooth width is essential.
- Crown lengthening procedures may be necessary to enhance restorative outcomes even if gingival display is not a concern.
- Appropriate determination of etiology of open gingival embrasures is critical to choosing best treatment approach.

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