Esthetics

Esthetic Factors
- The Science of Color
- Facial Analysis
- Golden Proportion
- Soft Tissue Factors
- Tooth Color and Staining
- Restorative Options
- Esthetic Factors

The Science of Color
    Hue
    Value
    Chroma
Hue - name of the color
Chroma - intensity/strength of the hue
Value - lightness or darkness of the hue

Which is the most important in determining or matching esthetics?
Form #1, followed by Surface Texture, then Color

Science of Color
Color Wheel
Deceptive Color Perception
Metamerism - seemingly the same color but appears different under a different light source

Color blindness: defects in color visionaffects men > women (9.8% vs. 0.1%)

Shade SelectionConsiderations:
Surface texture
Background:
    lip stick
    make-up
Reflective qualities:
    translucency
    opacity
    craze lines

Metamerism
Light Source: 5500K
Recommendations for Shade Selection
Recommendations for Shade Selection
Esthetic Factors

Facial Analysis
    Facial Proportions, Symmetry
    Facial Proportions, Symmetry, and Teeth
Smile Contour
Facial Analysis
Anterior Incisal Plane

Posterior Occlusal Plane
Interpupillary Line
Smile Line
Cupid's Bow
Golden Proportion

Smile vs. inter-pupillary line

Midline vs. inter-pupillary line

Smile line vs. mid-line

Facial Thirds
Hairline
Glabella
Base of Nose
Chin

Facial Proportions:
Base of Nose, Max Incisal Edges,Chin
Lip length?
- Males= 22-24 mm
- Females= 20-22 mm

Consider a ceph

Mid-Line Symmetry:
Central incisors critical
Dental mid-line same as facial mid-line?
Dental mid-line vs. closest facial feature?

Facial Proportions,
Symmetry and Teeth
The Smile in Harmony with the Face
Facial Proportions,
Symmetry and Teeth
Incisal edges usually follow curvature of lower lip

Facial Proportions,
Symmetry and Teeth
Normal display:
Maxillary anterior and premolar teeth
Young patients display nearly all of their entire maxillary incisors and almost none of their mandibular incisors
Conversely,

Older patients display much less of their maxillary incisors
- and show more of their mandibular incisors

Facial Proportions,
Symmetry and Teeth
Golden Proportion
Found throughout Nature

Human Body

Classic Architecture

Mona Lisa
Golden Proportion
Central should appear 1.618 X as wide as lateral

Canine should appear 0.618 X as wide as lateral
Mack, J Prosthet Dent, 1991
Lombardi, J Prosthet Dent, 1973

Facial Proportions,
Symmetry and Teeth
Ideal tooth proportions:

-"Golden Proportions": 1.6/1.0/1.0 (1.6)
Individual tooth proportions: 1.2-1.4 long x 1.0 wide
Centrals = Canines in length and are 20% longer than Laterals

Centrals are 25% wider than Laterals and 10% wider than Canines
Length/width ratio of Canines and Laterals = 1.2 : 1
Length/width ratio of the Centrals = 1.1 : 1

Tooth Arrangement and
Dento-Facial Relationships
Length of maxillary incisors:
Not established by esthetics alone!

"E" sound: 50-70% of available space filled by max centrals
<50%: can consider lengthening >70%: lengthening not indicated
"F" sound: incisal edges positioned at the wet-dry line
"S" sound: inter-incisal distance ≈ 1 mm
Occlusion and soft tissue relations may also effect tooth position

Tooth Arrangement andDento-Facial Relationships
Incisal Length: Ends 1-2 mm above lower lip line
Use "every other tooth" technique when prepping anterior teeth
Interpupillary line parallels edges of maxillary central incisors
Judge appearance both sitting and standing
Should follow curve of the lower lip

Surface Texture

Younger Patients
- High surface texture
- Decreases with age
- Low luster

Older Patients
- Low surface texture (smoother)
- High luster

Facial Proportions,

Symmetry and Teeth
Natural dentitions are asymmetrical

Anterior teeth are mesially inclined

Apical crest of soft tissue is to the distal

Contours of a Smile:
Proximal Contact Progression
Contact Point Location
Incisal Embrasures: Young
Soft Tissue Considerations
The "Gummy Smile"
Definition:
>2mm of gingival display in full smile
The "Gummy Smile"
Differential diagnosis:

Insufficient (short) lip length…… Soft tissue problem
Hyperactive lip musculature…… Soft issue problem
Vertical maxillary excess…… Skeletal problem
Dento-alveolar extrusion…… Dento-alveolar problem
Short clinical crowns, altered passive eruption……
Gingival problem

Tissue Thickness
Thin tissue associated with increased risk for recession
Thin tissue may necessitate periodontal augmentation
Esthetic compromise with visible substructure possible

Recession
Predicting Recession
Key Point in margin placement:
Where is the base of the sulcus?
Where is the osseous crest?

Quality and quantity of keratinized tissue?

Remember that sulcus depth varies: .69 mm average

Key Dimension:
Free Gingival Margin → Osseous Crest
Predicting Recession
High Osseous Crest (short sulcus):
Greater chance of biologic width violation

Low Osseous Crest (long sulcus):
Greater chance of recession

Bone Sounding
Prudent pre-operatively in
esthetically critical cases
"Black Triangles"

"Black Triangles"
Keys in attempting to restore the papilla:
Is there a proximal contact, or
can we establish one?

What is the distance from the contact to the osseous crest?
5 mm: Papilla present 100% of the time
6 mm: Papilla present 56 % of the time
7 mm: Papilla present 27 % of the time

Pre-op bone sounding is prudent
Bone and Soft Tissue
Alveolar Ridge Defects
Siebert's Classification
Type 1:Loss of facial-lingual width
Type 2:Loss of occluso-gingival height
Type 3:Loss of both height and width

Many techniques available
Osseous grafting
Soft tissue grafting
RDP
Tooth Color and Staining
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Tetracycline exposure
Fluorosis
Systemic Illness/Condition
Pulpal Degeneration
Restorative Materials
Aging/Calcific Changes
Secondary Dentin
Tetracycline Staining
Discoloration as a result of Restorative Materials
Discoloration Secondary to Pulpal Degeneration
Esthetic Factors

Vital Bleaching:
Mechanism of Action
Action by oxygen free radical (oxidation reaction)?
Organic molecules are broken down to smaller, less-coloredmolecules ?
Alteration of the enamel changes light reflectance to cause an apparent lightening?

Bleaching: Indications
Generally mild to moderate staining
Yellow, orange and brown fluorosis
First and second degree tetracycline (variable success)
Aging-related discoloration

Bleaching: Contraindications
Severe staining of most types
Sensitive teeth (recession)

Smokers (relative)
Extensive restorative history
Unrealistic patient expectations
Known sensitivity to bleaching agent
Pregnant or nursing women

Bleaching: Advantages
Non-invasive
Easy, economical, predictable
Good patient acceptance
Minimal chair time required
Low toxicity, safe
Good longevity
Titratable
Easy post-treatment maintenance

Bleaching Agents
Hydrogen Peroxide (HP)

Carbamide Peroxide (CP)
Acidic pH of 4-7

CP breaks down into HP and urea
10% CP 1/3 HP and 2/3 Urea
HP oxygen and water
Urea ammonia and CO2
Materials: In-Office Bleaching
35%-50% Hydrogen Peroxide
HiLite(Shofu)
Opalescence Xtra (Ultradent)
Superoxol

35-40% Carbamide Peroxides
Accelerate (Den Mat)

Hydrogen Peroxide/Carbamide Peroxide Combos
White Speed (Discus Dental)

New Light-Assisted
Chairside Techniques
Materials: Home Bleaching
10% carbamide peroxide with Carbopol®
Longest track record
Most prevalent concentration
Only concentration with ADA acceptance
Examples:
Opalescence (Ultradent)
Nupro Gold (Dentsply)
Colgate Platinum (Colgate)
Nite White Classic (Discus)
Rembrandt Lighten (Den Mat)
Radiant (SciCan)

Proxigel(Block Drug)

Carbopol®Noveon, Inc. (formerly B.F. Goodrich Co.)
High molecular wghtpolyacrylic acid
Carboxymethylene polymer
Thixotropic nature
Thickening Agent
Binds to CP
Prolongs oxygenationpotential 4X
Less replenishment

Non-Vital Bleaching
Long track record
(a.k.a. "walking bleach")
Must remove all composite from access
External cervical resorption concerns!
Correlated with use of: heat, concentrated bleaching agents
Ensure adequate seal over RCT
Consider using:saline/perboratevs. superoxol/perborate

Does Bleaching Work?
Depends on the type/degree of stain
Haywood advocates 4-6 months for severe TCN cases
Should see lightening within 3-4 days
Pt's compliance before and after treatment is key
Effective 75 - 90% of selected cases
Depends on study
Longevity is reasonable, but variable
May require re-treatment periodically

Effects on Gingiva
Little to no irritation with well fitting trays and use of rubber dam when indicated (in-office systems)
May irritate tissue at higher concentrations
Indices, gingival biopsies report no lasting effect
Some patients gingival health improves due to increased oral hygiene and O_2 tension

Enamel Bond Strength
No long term significant difference in bond strength after bleaching
Residual peroxide or oxygen may effect bonding
Wait 24-48 hrs if bonding is indicated

Effects on Restorative Materials
Minimal to no effect on composite or porcelain
Change in color of composites insignificant
Increased release of mercury from amalgam,(2 reports)
Methacrylate temporary resinsdiscolor (orangish)
Bis-acryl and polycarbonate not affected

Effects on Tooth Structure
Most SEM studies of enamel surfaces show little or no change in morphology
Studies show no significant effects on physical properties of enamel

Salivary remineralization might reverse any physical changes that occur
Slight surface pitting with 50% H_2O_2 office bleach

Tooth Sensitivity
Bleaching frequently causes minor tooth discomfort
Sensitivity is transient
Related to agent strength / exposure time

Tooth sensitivity can be controlled by:
- Reduction of exposure time/concentration
- Fluoride treatment
- Use of desensitizing agents
- Desensitizing agents being added by manufacturer

Esthetic Factors
Tooth Color and Staining
Bleaching
Microabrasion

Enamel Microabrasion
Chemo-mechanical removal of superficial enamel discoloration through the use of acid/abrasive solution with mechanical means or rotary instruments

Enamel Microabrasion: Indications
Enamel lesions only: especially brown fluorosis lesions
Superficial enamel hypoplasia or hypocalcification
Chemo-mechanical removal of superficial tooth structure
Acid and abrasive mixture

Multiple systems available:
Prema®, Opalustre®, home-made
Enamel Microabrasion: Advantages
Conservative
Permanent
Short treatment time
No apparent pulpal effect
Can be used in conjunction with other techniques (e.g. bleaching, veneers)

Enamel Microabrasion: Disadvantages
Elbow grease required
Limited to shallow defects (<200 microns)
Caustic chemicals, excellent isolation required
Macroabrasion with discs or burs as effective?
Safety concerns for patient & operator
Esthetic Factors

Tooth Colored Options
Direct Resin Composites
Crowns
Inlays / Onlays
Porcelain Veneers