The Modern Restorative Practice

Modern Anesthesia Technique

- 850 of those injections are lower blocks
- We spend 10-12 minutes waiting for profound anesthesia and miss 25% of the time
- That's 24 full 8 hour days of wasted time

Average dentist gives 2,000 injections per year

Practice Building Topical

PEG Gel
- 10% Lidocaine
- 10% Prilocaine
- 04% Tetracaine

DYC rinse

PEG Lite gel
- 05% Lidocaine
- 05% Prilocaine
- 02% Tetracaine
Color in Dental Terms

Value (V) - Represents the brightness of a color independent of its hue.

Chroma (C) - The intensity or saturation of a color.

Hue (H) - The color tone; e.g., red, yellow, green, blue.

Infinite Shades of Color

The same color can appear different due to:

- Light Sources
- Size Differences
- Background Differences
- Directional Differences
Other Factors in Determining a Proper Shade Match

- Surface Texture
- Characterizations
- Incisal Shape

VITA 3D Linear Guide

VITA Easyshade Compact

Shade Selection Video

Current Shade Systems: All Empirically Derived
- The Vitapan Classical Shade Guide. The industry standard since 1956.
- No standardized method used for measuring color.

The Tooth Color Space
Current Shade Systems in the Tooth Color Space:

Limitations of Current Shade Systems:

- Color Gaps - Shades are not uniformly positioned throughout tooth color space
- Inaccurate Interpolation - Intervals between shades do not yield a single discernable intermediate shade
- Not Systematic - Shades are not schematically organized to reflect all three color dimensions

Modern Preparation

Electric Handpiece
KaVo ELECTROtorque

Porcelain Adjusting & Polishing Set - LS-7582

Axis Dental
800-355-5063
Reverse Preparation Technique

• Predictable reduction through the use of depth cuts.
• Nearly perfect margin formation that is incredibly simple.

Depth Control Burs from Axis Dental

- MADC-006 0.6 mm 1 ring
- MADC-010 1.0 mm 2 rings
- MADC-015 1.5 mm 3 rings
- MADC-020 2.0 mm 4 rings

Modern Restorative Materials

• Monolithic Restorations vs Bilayered Restorations
• Lab industry appears to have been permanently changed by these materials
• Look at Pacific Dental’s 200+ practices...
IPS E.max CAD LT

“Cementable Empress”

IPS e.max CAD (Ivoclar Vivadent)

• Introduced in 2006.
• Structural Ceramic
• Lithium Disilicate
• 360 MPa of flexural strength.
• 70% crystallized post-crystallization.

IPS e.max CAD blocks

• Available in different opacities as LT, MT and HT.
• Partially crystallized to 130 MPa for milling, the same flexural strength the other blocks.
• Milled, tried in mouth and adjusted. Restoration then fully crystallized during a 20 minute firing cycle using a two-step ceramic furnace. Restoration carried to 1,550 degrees F helping it reach its final flexural strength of 360 MPa. This is approximately four times the strength of leucite-reinforced glass ceramic (IPS Empress).
• This makes IPS e.max cementable
• Can be cut back and layered, but then it is no longer monolithic.

IPS e.max: lithium disilicate

• Available as a homogenous ingot for hot pressing or a pre-crystallized block for milling.
• Either one can be used full contour or can be cut back and layered.

IPS e.max Units Sold (2007-2011)

16,862 units

IPS e.max Units Sold (2007-2010)
Lithium Disilicate vs. Zirconia

- IPS e.max Press
- IPS e.max CAD
- 40% lithium meta-silicate
- Crystal size of 0.5 microns

Veneered Zirconia Failure Pattern

- 40G Bar base 1100 MPa
- Veneering Ceramic 90 MPa

IPS e.max CAD

- 19 minute crystallization cycle
- 40% lithium meta-silicate
- Crystal size of 0.5 microns
IPS e.max CAD

70% volume lithium disilicate crystals
Crystal size of 1.5 microns

BruxZir

Solid Zirconia Restorations

BruxZir Solid Zirconia

- Ideal for bruxers & grinders who have destroyed other restorations thanks to its virtually chip-proof durability.
- An esthetic alternative to metals with CAD/CAM consistency of contacts and occlusions.
- Conservatively prepare as thin as 0.5 mm with feather edge margins, much like you would cast gold.
Before

After

High Strength Ceramic Options

BruxZir Adjustment & Polishing Kit - LS-7579

Axis Dental
800-355-5063

Anterior Units December 2011

BruxZir is now 15% of our anterior restorations.

The three questions every dentist asks...

- 1) What does it do to the opposing tooth?
- Hardness vs. roughness
- Concern disappears after they adjust and polish their first restoration, preferably out of the mouth on a sample unit
The three questions every dentist asks...

- 2) How do I cut it off? How do I do an endo access through it?
  - Zirconia-optimized burs make it straightforward
  - Dentists use porcelain chipping off crowns during endo access, this is another advantage of monolithic restorations

- 3) How do I cement BruxZir?
  - How do I bond BruxZir?

Modern Build-ups

Advantages of Core Build-ups

- Decrease porcelain fracture in PFM cases due to homogenous thickness of metal under the ceramic, which allows for uniform cooling of porcelain (less trapped tensile forces).
- Decrease porcelain fracture in porcelain to zirconia cases due to homogenous thickness of metal under the ceramic, which allows for uniform cooling of porcelain (less trapped tensile forces).
- Decrease in amount of precious metal.
- Decrease in post-op sensitivity.
- Decrease in need for endo treatment.
- Decrease cement failures due to inadequate retention.
- Decrease line of draw problems.
- Increase retention of provisionals.
Advantages of Core Build-ups

- Increase ease of fabrications of provisional fabrication (no undercuts).
- Decrease effect of microleakage under both provisional and definitive restorations.
- Increase predictability of impression making.
- Decrease fracture potential of stone dies.
- Allow cementation without anesthesia 95% of the time (if provisional cement is easy to remove).

Modern Impression Technique

"In reality, a crown and bridge impression is merely a reflection of the dentist's integrity, nothing more and nothing less."
Perfect Impression Requirements

1. Must capture 360 degrees of easily identifiable tooth structure apical to the margin with no guess work in die trimming.
2. The impression must capture all of the necessary esthetic and functional aspects of the unprepared teeth.
3. Making the impression must not irreversibly damage the patient’s biology including connective tissue.
4. The impression must be free of organic and inorganic contaminants such as: blood, serum, saliva, grinding debris.
5. The set of the impression material must not have been inhabited—no slime.
6. The impression material must not have been dislodged from the tray during removal or lab handling.

Predictable Impressions: 2-Cord Technique

1. Select proper size GingiCap.
2. Express GingiCap around tooth like impression material.
3. Fill GingiCap with GingiTrac and place onto prepared tooth.
4. Have patient bite down with medium pressure for 3-5 minutes.

GingiTrac

- Cordless gingival retraction
- Polyvinylsiloxane material
- Controls bleeding with aluminum sulfate
- Removes cleanly in one piece with no rinsing
- Used in combination with GingiCap
ViscoStat Clear

- 25% aluminum chloride gel
- Causes collagen in capillaries to swell and close off
- Will not stain hard and/or soft tissues
- Especially useful in esthetic zone

ViscoStat Plus

- 22% ferric chloride
- Rapid hemostasis when scrubbed with Dento-Infusor tip
- Can cause temporary discoloration of soft tissue
- Will typically work when ViscoStat Clear is not strong enough

The Perfect Impression...

And The Not So Perfect Impression

Double Arch Trays

Almost 80% of teeth restored are single-units and utilize double arch trays.
Double Arch Trays

- Only one prep or two adjacent preps, no bridges.
- Occlusal prematurities should be eliminated, if present, prior to prepping.
- Upper and lower teeth must be firmly together in maximum intercuspation with the tray in place, try it in!
- Posterior DA impressions should extend from most posterior tooth to include upper and lower canines on that side.

- Anterior DA impressions should include all four canines.
- Interocclusal wafer must be extremely thin and non-absorbing. The QUAD-TRAY Xtreme from Clinicians Choice is 0.002 inches thick.
- Posterior connector of facial and lingual aspects must be thin and not interfere.

- Tray contact with teeth, preps or tori can produce distortions in DA impression. Occasionally soft tissue can touch without complications.
- Combination of tray and impression should make a rigid unit—metal tray with flexible material, plastic tray needs rigid material.
- If no distal molar is present, over closure might occur.

“Research has shown that properly made DA impressions for simple clinical conditions can be as good as or better that when using much more time consuming and difficult full arch impressions and interocclusal record.”

Dr. Gordon Christensen

Lab Technique for Double Arch Trays

1. Wash out impression and dry it.
2. Pour the arch which includes the tooth preparation(s) in dies stone, place the appropriate dowel pin(s), and let stone set.
3. Pour the opposing arch in regular stone and let the stone set.
4. With arches still unseparated from impressions, mount the upper and lower casts on a small hinge articulator using low-expansion mounting stone (Mounting Stone by Whip Mix) and let it set.
5. Trim all excess anterior and posterior overlapping stone to eliminate the possibility of stone debris restricting closure to proper occlusion when arches are separated.
Lab Technique for Double Arch Trays

- Open the articulator, separate the arches, saw the dies(s) from the working cast, trim the dies, and make the restoration(s).

Enhanced Design Considerations

- Anatomical Design
  - “The Accurate Fit”
  - Two trays for different arch sizes (S&L)
  - Fits into patient’s mouth comfortably
  - Controls the tongue
  - Allows for flatter palates

- Smooth finish for patient comfort

Enhanced Design Considerations

- Well-supported canine to help with excursions
- Even support along the arch
- Back seal
  - Ensures molar is captured in the distal aspect
  - Prevents the impression material going backwards

- Buccal wall taller at the front to support the canine
- Narrower at the back to not impinge on the tissues

Digital Impressions
Digital Photography

Necessary Skill to Create Successful Esthetic Restorative Dentistry...
10 Pictures for a Great Case

1) Portrait shot

2) Non-retracted smile

3) Non-retracted smile left lateral

4) Non-retracted right lateral

5) Retracted smile
6) Retracted left lateral

7) Retracted right lateral

Retracted black background

8) Maxillary occlusal mirror shot

9) Shade tab--cervical third to cervical third

10) Shade tab--incisal third to incisal third
Real Time Digital Photography

Digital Photography Benefits

- Using digital images for enhanced laboratory communication & improved restorative results.
- Printing, faxing & emailing images and developing your own “office art.”
- Marketing to attract new patients and create a loyal customer base with existing patients.

Digital Photography Benefits

- Publishing photos to your website.
- Eliminate buyers remorse with 8X10 inch before on seat date.
- Use to evaluate try-ins.

Modern Cementation

History of Cements

Zinc Phosphate Cement

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Areas of Application</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 100 years of clinical experience</td>
<td>Routing application in metal supported crowns and bridges</td>
<td>Occasional postoperative sensitivity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low hardness</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Solubility</td>
</tr>
</tbody>
</table>
Polycarboxylate Cement

- 25 years of clinical experience
- Low fluoride ion release
- Molecular bonding to the tooth surface
- Low postoperative sensitivity

Areas of Application:
- Acceptable for retention of metal supported crowns and bridges
- Long-term postoperative sensitivity

Weaknesses:
- High solubility
- Low hardness

Strengths:
- Acceptable for retention of metal supported crowns and bridges
- Long-term postoperative sensitivity

Areas of Application:
- Minimal dimensional change
- Simplicity of use
- Medium material strength
- Good routine cement

Weaknesses:
- Routine application for metal supported crowns and bridges
- Limited application with high strength ceramics

Occasional post operative sensitivity due to water mechanical sensitivity

Conventional Glass Ionomer Cement

- 20 years of clinical experience
- Fluoride ion release
- Molecular bonding to the tooth surface
- Minimal dimensional change
- Simplicity of use
- Medium material strength
- Good routine cement

Areas of Application:
- Routine application for metal supported crowns and bridges
- Limited application with high strength ceramics

Weaknesses:
- Occasional post operative sensitivity due to water mechanical sensitivity

Current Cement types

1. Resin-Modified Glass Ionomer -- most popular for routine use with strong crowns and FPD's (PFM, metal, zirconia-based, all-zirconia, etc.).
2. Resin with a Separate Self-Etching Primer -- when strength is needed: inlays, onlays, low retentive crowns and bridges, post and core, routine use.
3. Resin with Incorporated Self-Etching Primer -- same as #2, but often used for situations with expected sensitivity challenges, or for routine use.
4. Resin Used with Total Etch -- mainly for ceramic veneers on enamel, potential for sensitivity for onlays and crowns.

Resin-Modified Glass Ionomer

- 10 years of clinical experience
- Fluoride ion release
- Molecular bonding to the tooth surface
- Low solubility or erosion of cement margins
- Simplicity of use
- Medium material strength
- Good routine cement

Areas of Application:
- Low postoperative sensitivity

Weaknesses:
- Routine application for metal supported crowns and bridges

Current Cement types

2. Resin with a Separate Self-Etching Primer
Current Cement Types

3. Resin with Incorporated Self-Etching Primer

- New self-adhesive technology
- High adhesion without use of etchant, primer or adhesive
- Ease of use
- Capsule delivery system
- Low potential for postoperative sensitivity
- High hardness
- Low solubility
- High mechanical properties
- Good esthetics
- Easy clean up
- All metal-based, ceramic and indirect composite restorations with the exception of veneers
- Limited long-term clinical history
- Available only in capsule delivery
- Low fluoride release

4. Resin Used with Total Etch

- 10-20 years of clinical experience
- High adhesion with use of pretreatments (etching, priming, bonding)
- High hardness
- Low solubility
- High mechanical properties
- Good esthetics
- All metal-based, ceramic and indirect composite restorations
- Difficult to use
- Requires use of separate primers or adhesives

Shortfall's of Today's Dental Materials....

- Postoperative sensitivity
- Secondary caries
- Shrinkage
- Susceptibility to the oral environment
  - Water uptake
  - Bacteria – acid attacks
- Mechanical degradation
- Micro leakage
The Answer: Nanostructurally Integrating Bioceramics

<table>
<thead>
<tr>
<th>Properties/Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural</td>
<td>Biocompatible/environmental friendly</td>
</tr>
<tr>
<td>Permanent sealing</td>
<td>Protects the tooth over time</td>
</tr>
<tr>
<td>Easy to use</td>
<td>Self-adhesive, self-curing, easy excess removal, not sensitive to moisture</td>
</tr>
</tbody>
</table>

Ceramir: The Next Generation

- Bioceramic powder
- Reacts with water
- Dissolution
- Nano crystals formed on:
  - Tooth walls
  - Filler particles
  - Pre-existing crystals
  - Prosthetic construction
  - Stable sealing of the interface

Ceramir Crown & Bridge

Basic properties

- Working time: 2 min
- Net Setting time: 5 min
- Film thickness: 15 µm
- Compressive strength (24 h): 160 Mpa
- Radio Opacity: 1.5 mm Al

Chemically Stable

- All studies on Ceramir Crown & Bridge have shown minimized leakage
- Alkaline (pH > 7) resist attacks from both acid and acid-producing bacteria

Shear Bond Strength

Shear bond strength (MPa) to different substrates

<table>
<thead>
<tr>
<th>Substrate</th>
<th>Ceramir Crown &amp; Bridge</th>
<th>Ketac Cem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dentine</td>
<td>11</td>
<td>4.7</td>
</tr>
<tr>
<td>Enamel</td>
<td>8.4</td>
<td>8.4</td>
</tr>
<tr>
<td>Gold</td>
<td>10.2</td>
<td>3.8</td>
</tr>
<tr>
<td>Alumina</td>
<td>7.5</td>
<td>8.6</td>
</tr>
<tr>
<td>Zirconia</td>
<td>8.2</td>
<td>3.7</td>
</tr>
</tbody>
</table>

In all tests the standard deviation was about 2 MPa.

Unique Handling Properties

- Likes some moisture
- No extra steps (etching, priming, bonding)
- Easy to:
  - Seat the unit on the abutments (unique viscoelasticity)
  - Remove excess material
Ceramir Crown & Bridge