

# **“Bad Bounces and Broken Teeth”**

## **The Sports Dentistry Side of Your Practice**

### **Kentucky Dental Association**

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We are in an age of active lifestyles, with an emphasis on participating in sporting activities at both the youth and adult levels. Not surprisingly, athletic injuries to the orofacial region and the dentition are on the rise. Unique and timely techniques employed for diagnosing, treating, and restoring these accidents are paramount in the successful long-term results. Are you prepared for immediate action following a dental trauma?

- I. Sports-related injuries and classifications
- II. Dental Trauma
  - Fractures, luxations and avulsions
  - Treatment planning considerations
  - Splinting – rationale, materials, technique
  - Use of composite resins as conservative techniques and materials to restore the active athlete
  - Direct fiber reinforced composite bridges
  - Photography – essential to proper documentation
- III. Prevention and Mouthguards
  - Defining a quality, protective mouthguard
  - Fabrication technique for a custom mouthguard
  - New performance enhancing appliances
- IV. Concussions
  - Myths and facts
  - Where are we going?

#### **DENTAL-BASED INJURIES:**

- Luxations
- Crown Fracture
- Crown/Root Fracture
- Root Fracture
- Alveolar Bone Fracture
- Avulsions

#### **LUXATION TYPES: The tooth is loose...so now what?**

- Concussive-not loose or displaced, but tender to percussion
- Subluxation-loose, but no displacement
- Extrusive Luxation-partially out of socket
- Lateral Luxation-displaced usually toward the palate
- Intrusive Luxation-clinical crown appears shorter

## **REQUIREMENTS FOR A SPLINT:**

1. Internal Application: Splint should be placed intraorally in a timely manner without additional steps such as impressions or laboratory procedures.
2. Placement and Removal: Splinting should be a simple procedure due to emergency nature, age of patient and compromised working field.
3. Tooth Stabilization: Adequate stabilization necessary to be effective. Splint loosening or loss should be avoided.
4. Tooth Physiology: Physiologic tooth mobility should be preserved following splint placement to allow for functional repair or regeneration of the PDL. Semi-rigid or flexible splints are preferred to rigid splints to avoid ankylosis.
5. Occlusion: Should not interfere with jaw movements or occlusion.
6. Endodontic Access: Splint should allow for access for endodontic treatment if warranted.
7. Oral Hygiene: Should allow for proper hygiene...not be placed too close to the gingival.

## **AVULSED TOOTH:** The “true” dental emergency!

- ☀ Single most important factor is SPEED!
  - Replant within 5-20 minutes (60+ is poor)
  - Clean and undamaged root surface is best
  - If unable to replant at site, transport to dental office in appropriate media

### Storage Media (in order of acceptability):

1. Hank’s Balanced Saline Solution
2. Milk
3. Saliva-soaked gauze
4. Saline-soaked gauze
5. Water

## **CATAGORIES OF MOUTHGUARDS:**

- TYPE I: Stock Mouthguard – out of the box and into the mouth
- TYPE II: Mouth-formed – “boil and bite”
- TYPE III a and b: Custom-fitted – vacuum formed and heat/pressure laminated
- Performance-enhancing appliances

## **CONCUSSIONS and SPORTS:**

- 1.5 million cases of TBI per year
- 300,000 are sports-related...1/2 of these are from football...40% chance of a football player being concussed during his career
- Most common ages 15-24
- 75% classified as “mild”, 9% are hospitalized
- After one concussion, the risk for another increase 3x-6x – Second Impact Syndrome (SIS)
- Equipment and mouthguards = prevention (?)

## **SPLINTING AND MOUTH GUARD ARMAMENTARIUM SUGGESTIONS:**

### **Splinting Systems:**

Connect/Construct (Kerr)  
Ribbond (Ribbond)  
GrandTEC (Voco)  
Titanium Trauma Splint TTS (Metaris)

### **Mouthguard Materials:**

Ethyl Vinyl Acetate (2mm)-Great Lakes Ortho  
Ethyl Vinyl Acetate (2mm)-Dentsply/Raintree Essix  
Polypropylene (0.040 in.)-local plastics distributor

## **RESTORATIVE ARMAMENTARIUM:**

### **Burs and Diamonds:**

**Kits:** Belvedere/Lambert Esthetic Kit CCV (Axis Dental)  
Lambert Conservative Veneer Preparation Kit (Brasseler)  
Lambert Composite Workshop Kit (Axis)

**Carbides:** Finishing/Shaping: H 48L-010, H 379-023 (Axis and Brasseler)  
Prepping: 330, 332 or similar (Brasseler)

**Diamonds:** Margin bevel/Preparation: 862-010-8ML, F, and UF thin flame (Diatech)  
Gingival area trimming: 889-009-3.5 ML and F flame (Diatech)  
853-008-3.5 XF fine point (Diatech)

**Occlusal Adjustment:**  
899-027-7 ML pointed ball (Diatech)  
856-025-7 ML round end cylinder (Diatech)

**Fiber Bridge Prep:** Lingual preparation: 856-025-7 MLX (Diatech)

### **Matrices/Retainers:**

Margin Perfect Matrix – MPM (CVR Enterprises)  
Palodent Plus matrix retainer system (Dentsply/Caulk)  
Cure-Thru Mylar band (Premier)  
V3-Ring, V-4 Ring and Wave Wedges (Triodont)  
WedgeGuard (Triodont)  
Composi-Tight 3D (Garrison)

### **Dentin Bonding Agents**

Prime & Bond NT – requires acid etch (Caulk)  
Prime & Bond Elect – Universal (Caulk)  
AdHESE – self-etching (Ivoclar/Vivadent)  
Optibond Solo – requires acid etch (Kerr)  
Xeno IV – self-etching (Caulk)  
Bond Force – self-etching (Tokuyama)  
Clearfil SE Bond – self-etching (J Morita)

### **Antimicrobials/Desensitizers**

Consepsis (Ultradent)  
Gluma (Heraeus-Kulzer)  
5% Sodium Hypochlorite (Chlorox bleach)

### **Caries Detecting Stains**

Seek (Ultradent)  
Caries Detector (Kuraray)

## **Bleaching:**

Opalescence – At Home (Ultradent)

Sheer White Strips (CAO Group)

Opalescence Boost – In Office (Ultradent)

## **Composites (Flowables):**

Heliomolar Flow and Tetric Flow (Ivoclar/Vivadent)

PermaFlo (Ultradent)

SureFil SDR Flow (Caulk)

EsthetX Flow (Caulk)

X-Tra Base and X-Tra Flow (VOCO)

Tetric EVO Bulk Flow (Ivoclar)

## **Composites (Traditional):**

Esthet.X HD – microhybrid (Caulk)

TPH Spectra – microhybrid (Caulk)

Heliomolar – microfill (Ivoclar/Vivadent)

Empress Direct – microhybrid (Ivoclar/Vivadent)

Filtek Supreme Ultra – nanoparticle (3M/Espe)

Tetric EVO Ceram – nano-hybrid (Ivoclar/Vivadent)

Tetric EVO Ceram Bulk Fill nano-hybrid (Ivoclar/Vivadent)

Estilite Sigma Quick – nanoparticle (Tokuyama)

Vit-I-essence – microhybrid (Ultradent)

## **Resin Cements (for veneers):**

Variolink Esthetic and Variolink II (Ivoclar/Vivadent)

Calibra Esthetic Resin Cement (Caulk)

## **Cements (for full coverage)**

Multilink (Ivoclar/Vivadent)

Fuji Cem (GC America)

Ceramir (Doxa)

## **Dentin Replacements:**

Fuji II LC capsules (GC America)

Fuji Filling LC (GC America)

ChemFil Rock (Dentsply/Caulk)

## **Curing Lights: Minimum of 900 mw/cm<sup>2</sup>**

Bluephase Style (Ivoclar/Vivadent) – LED

SmartLite Focus (Dentsply/Caulk) – LED

Valo (Ultradent) – LED/PlasmaLike

Demi Ultra (Kerr) – LED

## **Minimally Invasive/Remineralization**

ICON (DMG)

MI Paste/MI Paste Plus (GC America)

NovaMin (Dentsply/Caulk)

Etchmaster (Groman, Inc.)

MicroEtcher (Danville Engineering)

## **Fiber Systems:**

Connect and Construct (Kerr)

Ribbon (Ribbon)

GrandTEC (Voco)

## **Impression Material**

Aquasil Ultra (Caulk)

Medium-Heavy Body and XLV light body

## **Magnification**

Designs for Vision (2.5x, 3.5x and 4.5x)

Feather Light (Ultralight Optics)

## **Temporary C & B Material**

ProTemp Plus (3M/ESPE) - bisacrylic

Integrity (Caulk) – bisacrylic

TuffTemp (Pulpdent) – urethane dimethacrylate

Luxatemp (DMG America)

## **Minor Tooth Movement (MTM)**

Dentsply Raintree Essix System

## **Finishing and Polishing:**

PoGo and Enhance Finishing Systems – composite – disposable - (Dentsply/Caulk)

OptraPol polishing cups/points – composite – autoclavable - (Ivoclar/Vivadent)

ProPolisher – cups and points – single step – autoclavable (Axis)

Dialite – ceramic – (Brasseler USA)

## **Photography:**

[www.CliniPix.com](http://www.CliniPix.com)

## **Ancillary Products and Instruments:**

Heliobond – unfilled bond resin (Ivoclar)

1 ½ “ Indianhead mirror – front face

P-1 Plugger (Ivoclar)

Composite Contact Former – CCF (American Eagle)

Orthodontic divider (Miltex)

Expasyl retraction paste (Kerr)

G-2 Ceramist brush (Ivoclar)

OptraSculpt hand instruments (Ivoclar)

Calset composite warming unit (Addent)

Veneer Tray warmer (AdDent)

Composite Repair (All Dental ProdX)

Cuticle pusher (Jonel)

InTerra : in-office bruxism and nightguard system (Caulk)

Orange Cello Soft Toothbrush (PHB, Inc.) [www.phbinc.com](http://www.phbinc.com)

CoMax composite dispenser (AdDent)

Smile Reminder patient system (Solution Reach)

## **A “Recipe for Success” – Anterior Technique:**

- Cut marginal enamel with a diamond and a metal abrasive strip
  - Secure appropriate matrix – Margin Perfect Matrix (MPM)
  - Clean and scrub surfaces with an antibacterial solution
  - Flush and dry – do not desiccate
  - Etch all surfaces with 30+% orthophosphoric acid – first 5 seconds on enamel, then 10 seconds on dentin – for a total etch time of 15 seconds
  - Utilize 5<sup>th</sup> generation dentin bonding agent. Cure for 10 seconds
  - Apply thin layer of flowable composite-air disperse. Light cure for 10 seconds.
  - Syringe composite material
  - Polymerize with sufficient light energy
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## **Fiber-Reinforced Direct Composite Bridge Technique**

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NOTE: Traditional regular-bodied (RB) and flowable composites (FC) are utilized with the technique described here. Fiber system options include Ribbond, Connect and Construct. For illustration purposes, consider the replacement of tooth #7.

- Mark lingual contact points with articulating paper.
- Make tissue contacting portion of pontic or “button” with RB by taking a ball of composite and fitting it to the tissue ridge. Shape with brushes to near ideal and cure with a visible light source – either halogen or LED (> 850 mw/cm<sup>2</sup>). Polish only the surfaces toward the tissue and interproximal using rubber abrasive cups. Extend polish areas 1 mm over the labial and lingual. Set pontic aside for now.
- Reduce lingual enamel on each abutment tooth where fibers will be bonded in a cup-shaped prep  $\frac{3}{4}$ -1 mm deep (depending on occlusal space) using a round nosed 100 u diamond. Clean the interproximal surfaces of the teeth with a 40u diamond, carrying the finish line out to the facial line angles.
- When prepared properly, the area prepared lingually for bonding of fibers should extend from 1  $\frac{1}{2}$  mm from the incisal edge to a position near the gingiva (1-2mm) which will still leave a normal interproximal space.
- Determine the length of the fibers by measuring the span from one prepped abutment to the other, being sure to keep the fibers within the preps, but allowing for the fibers to “bow” into the pontic space so that they can become incorporated into the middle of the finished pontic. One can use the Miltex orthodontic divider or a piece of dental floss as a guide. Cut the fibers to length using a #15 scapel blade and set them aside.

- Take partially made pontic and roughen the proximal surfaces with a diamond, then cut a channel 1 ½-2mm high and ½ the thickness of the pontic in the lingual of the pontic with an inverted cone diamond. Replace the pontic on the gingival ridge to double-check that the channel is cut in line with the lingual preps on the abutment teeth. This is where the fibers will be placed. Coat the pontic channel and proximal sides with Composite Repair from All-Dental ProdX to improve surface adhesion prior to bonding the pontic into place.
- Clean all diamond cut surfaces with 5% sodium hypochlorite on a stiff disposable brush using a scrubbing action for 10 seconds. Rinse and dry.
- Etch enamel and dentin areas for 15 seconds with 30+% orthophosphoric acid. Rinse and dry. Treat any prep-exposed dentin areas with a 5<sup>th</sup> generation bonding agent according to the manufacturer's directions.
- Apply a small portion of FC to the proximals of the pontic and press to place. Light cure the proximals to "spot cure" the pontic securely.
- Flow a ribbon of FC into the lingual channel from abutment-pontic-abutment, but do not cure.
- Take the pre-cut fiber piece and saturate the fibers with FC by rolling the fibers and FC between your finger and thumb. Place the saturated fibers into the lingual channel and press the fibers into the FC until all the fibers "disappear" within the channel. Light cure for 20 seconds from both the lingual and facial aspects
- Syringe matching or final shade(s) of RB to labial, lingual and incisal areas of the pontic to create the final shape of the tooth pontic. Finish shaping prior to curing with brushes and instruments of choice.
- Cure with two lights – one for the lingual and one from the labial – for 40 seconds. Shape with 40u diamonds and adjust occlusion as needed. Polish with abrasive cups and points to a high luster.

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The handout materials are merely just an outline and may serve as a quick reference for you. Please feel free to contact me with any questions or requests for further information about any or all of the topics presented today including a more detailed handout. I may be reached in any of the following ways:

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