

AGD 2016 BOSTON

REVOLUTIONARY CHANGES IN DENTISTRY



Update on Managing Non-carious Cervical Lesions



AGD Dental Pearls from the Masters and Fellows
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I declare that neither I nor any member of my family have a financial arrangement with any corporate organization offering financial support or grant monies in regards to my continuing dental education presentation at this AGD 2016 Boston Meeting.

Five Pearls to Learn Today...

- What causes NCCL formation, and is 'abfraction lesion' still the right term to use?
- What are the criteria for initiating restorative treatment?
- What is the best technique to isolate the lesion for restoration?
- What restorative materials and techniques have the best clinical success?
- What are some combined restorative/periodontal treatment choices?

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Clinical Presentation of NCCLs



Evaluate size, shape, depth,
location, patterns, symptoms.
Then etiology!





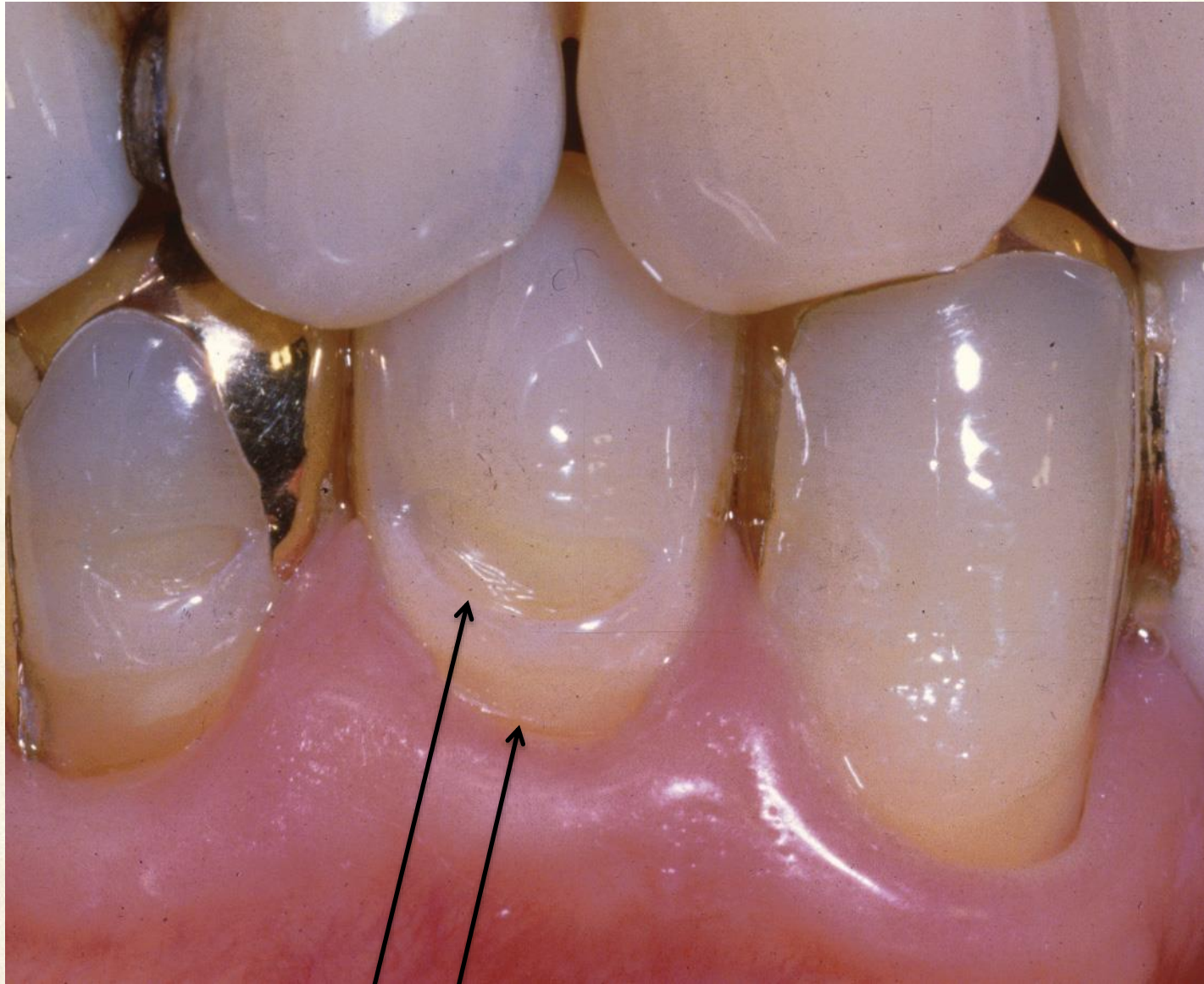
Note that gingival marginal tissues adjacent to NCCLs are usually firm and healthy.



NCCLs are more uncommon on lingual surfaces due to FIVE times more protective saliva exposure than on facial surfaces.



Multiple saucer-shaped NCCLs also associated with gingival recession.



Two lesions, pre- and post-periodontal surgery.



NCCLs involving previously placed restorations.

Important NCCL Factoids

- Most predominant teeth for NCCL formation:
 - Maxillary and mandibular canines, 1st and 2nd premolars
 - Mandibular teeth more frequently than maxillary
- NCCL frequency and depth increases with age.
- Numerous etiological factors have been observed!
 - Higher prevalence amongst bruxers.
 - Increased brushing frequency (BID) and horizontal technique.
 - Dentifrice amount and abrasiveness.
 - Saliva, diet, and gastrointestinal disorders.
- NCCLs do not contribute to gingival inflammation.

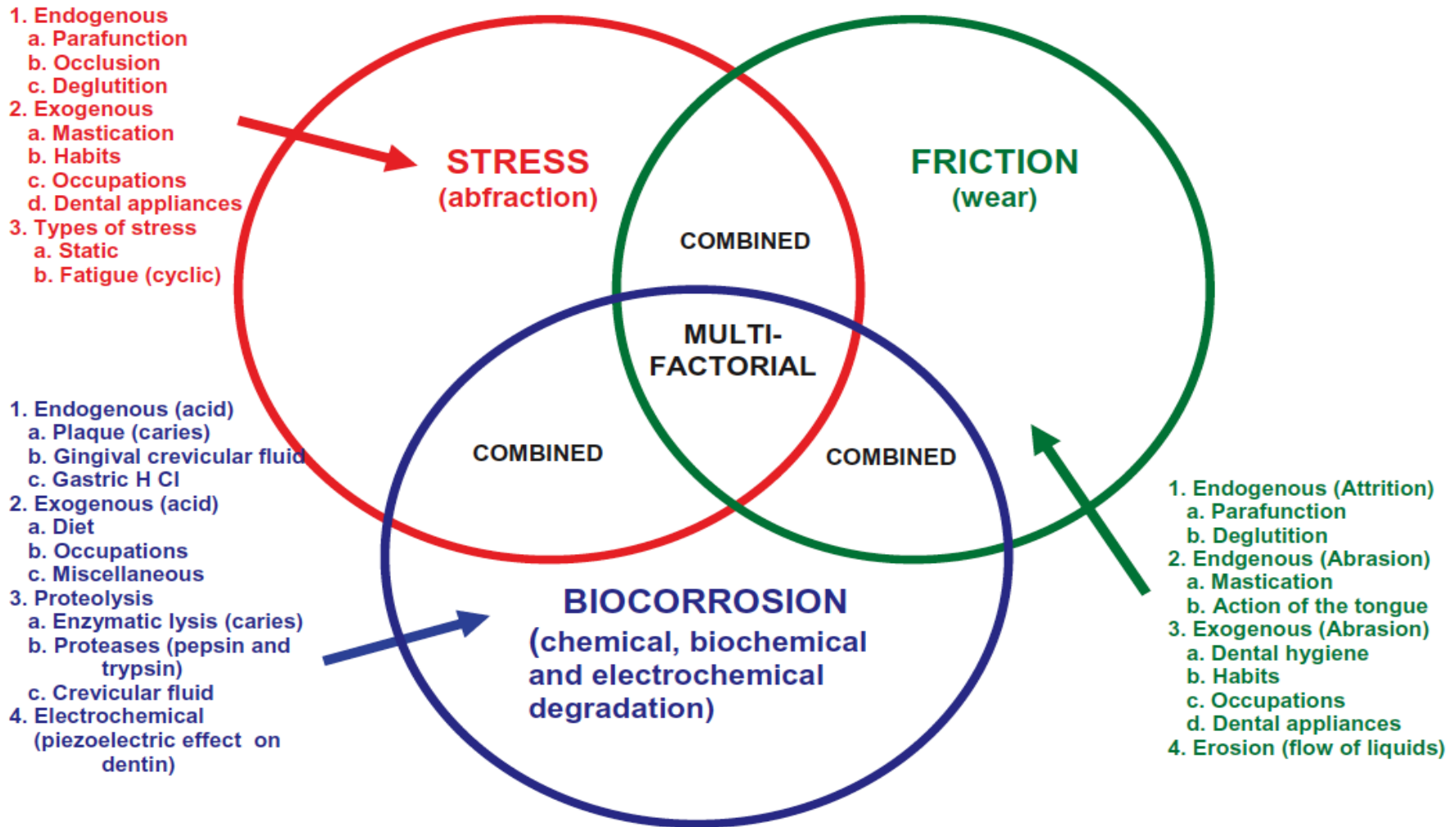
What are Etiological Factors Involved in NCCL Formation?

- **Abfraction**- effects from tooth flexure?
- **Abrasion**- effects from toothbrush/dentifrice?
- **Erosion**- effects from acid?
- **Combinations?**

Today, the three big spheres of influence are:

- **Stress**
- **Friction**
- **Biocorrosion**

Schema of Pathodynamic Mechanisms of Tooth Surface Lesions

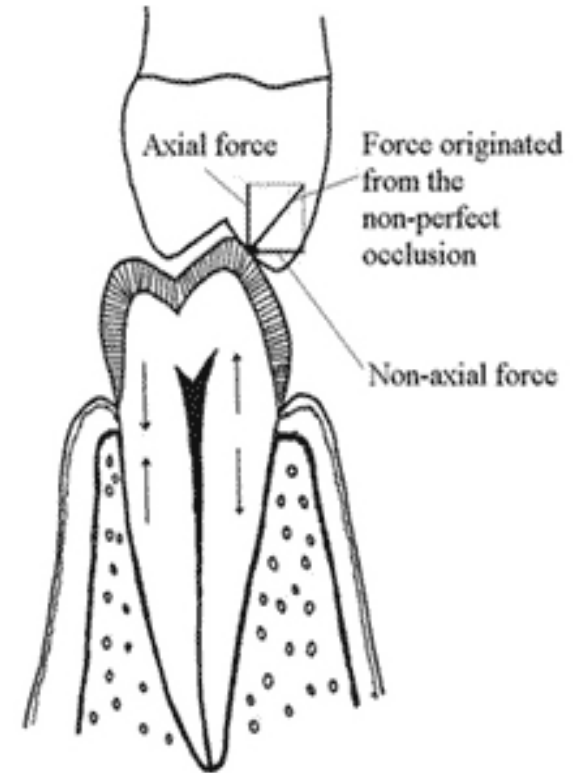
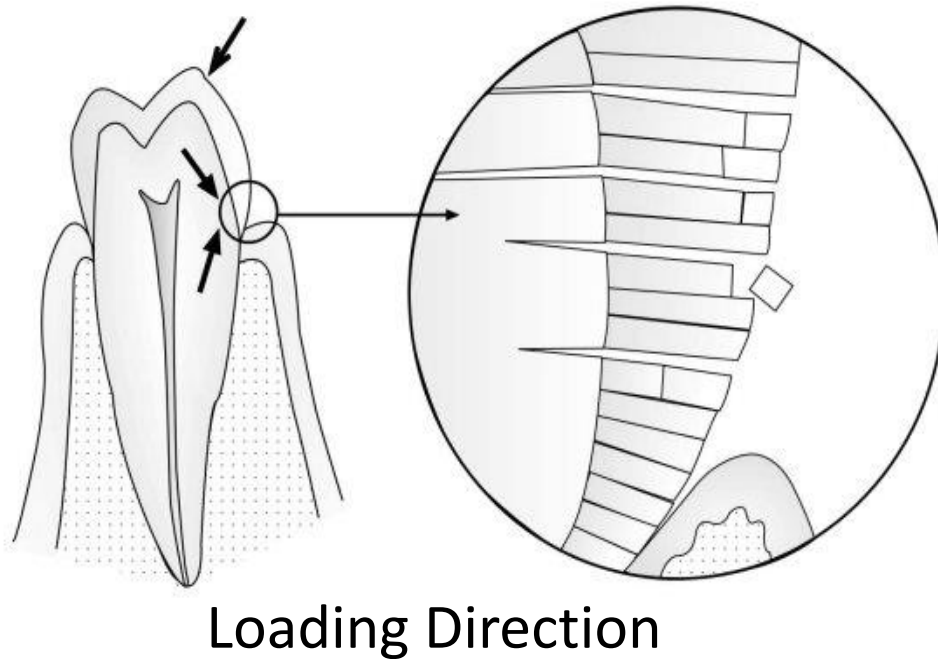


Grippo et al, *Journal of Esthetic and Restorative Dentistry*, 2012

Stress (Abfraction)

- ‘Catch-all’ term that has been used to combine all NCCLs together, and does not consider the multifactorial etiologies:
 - Coined by Grippo in 1991 and amended in 2004 and 2012.
- Represents the microfracture of tooth structure in areas of stress concentration from occlusal loading forces.
- Stresses dependent on magnitude, direction, frequency, site of application, duration of force, orientation to axis of tooth, stability of tooth.

Occlusal and Eccentric Loading



A theory that eccentric (flexing) and axial (barreling) from occlusal forces can contribute to NCCL formation.

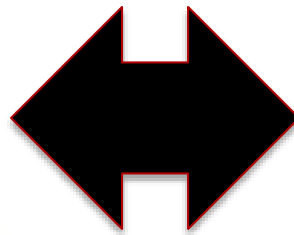
Lee & Eakle, J Prosthet Dent, 1984

Association of Occlusal Loading with NCCL Formation

- ▣ What we see:
 - Patients in group function (GF) with higher incidence of NCCLs versus canine disclusion (CD).
 - NCCLs found to coexist with wear facets, altered tooth position, and parafunctional habits
- Still, there is continued controversy in the exact role of occlusal stress as THE FACTOR in initiation and advancement of NCCLs.

Pecie et al, *Am J Dent*, Feb, 2011

Toothbrush and Toothpaste Abrasion



Friction (Abrasion)

- Frequent, forceful, faulty, vigorous brushing can cause tooth wear and gingival recession by:
 - Filament stiffness or design.
 - Dominant hand dexterity.
 - Abrasive dentifrices.
- Cross-brushing techniques create V-shaped grooves.
- Vertical-brushing produces U-shaped notches.
- Higher frequency and longer duration creates defects regardless of left- or right- handedness.

Ozgoz et al, *Journal of Dental Sciences*, 2010



Cervical lesions with dentinal involvement caused by lemon sucking. Is this erosion?

Photo courtesy of Dr. Peggy Alexander

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Biocorrosion

- Better term now is 'biocorrosion', since the term 'erosion' doesn't recognize the proteolysis and piezoelectric effects of the collagen in dentin.
- Proteolytic enzymes like pepsin and trypsin can degrade the demineralized dentinal organic matrix.
- Combination of using a dentifrice after drinking an acidic liquid (mouth rinse) creates biocorrosion at the microstructural level, which then is abraded by toothbrush/dentifrice.
 - Do not brush immediately after a meal
 - Consider dietary counseling
- Remember that saliva plays a major protective role!

Bottom Line...

NCCL formation is multifactorial!



Stress and biocorrosion contribute to progression of NCCLs, and become caries lesions in this case.

Grippe et al, *JADA*, Aug 2004

Treatment of NCCLs should include identifying and minimizing or eliminating suspected etiological factors first!

- If **toothbrushing** is involved:
 - Reduction in toothpaste use and amount.
 - Change in brushing habits.
 - Avoidance of brushing after an acid challenge.
- If **diet** is involved:
 - Reduction in frequency of oral acid challenges.
- If **occlusion** is involved:
 - Occlusal adjustments may include altering inclined cusp inclines, reducing heavy contacts, and removing premature contacts.

Treatment Strategies for NCCLs

- Coronal structure only
- Treated with restorative therapy



- Coronal and radicular structure
- Treated with combination restorative/ perio therapy

- Radicular structure only
- Treated with perio therapy



Restorative Treatment

- Though a very common clinical procedure, NCCLs also represent one of least durable restoration treatments, with concomitant problems of:
 - Loss of retention
 - Marginal excess (flash)
 - Secondary caries lesion formation
 - Discoloration
 - Decreased longevity
- Is “wait and see” philosophy OK?
 - Can be substantiated with slow progression of lesion, high capacity of self-defense with sclerotic dentin production, lack of evidence for tooth weakening, lack of dentinal sensitivity, and esthetic concerns.

Basic Guidelines for Restorative Intervention

- Esthetic desires of patient.
- Intractable dentin hypersensitivity.
- Depth >1mm as etiologies continue.
- Potential pulp exposure.
- Proximity of NCCL to RPD clasp location.
- Structural integrity of tooth threatened.

Lucci et al, *Oper Dent*, 2009

Isolation

- Challenges with:
 - Moisture control (gingival fluid and blood contamination)
 - Access to subgingival margins.
 - Absence of peripheral enamel walls
 - Dentin characteristics (deep dentin, sclerotic dentin).
- Options:
 - Rubber dam (elastic profanity)
 - Retraction cord isolation
 - Isolite

Ultimate Elastic Profanity (RD)



Retraction Cord Placement

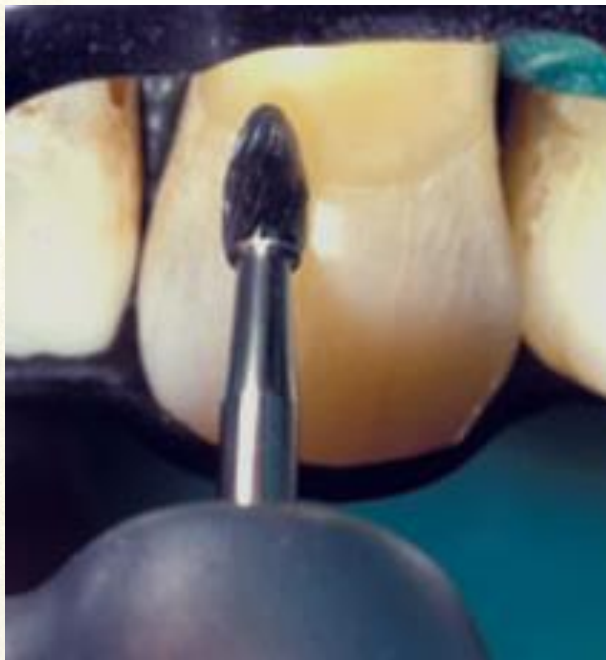
- Use only if tissue is healthy and lesion no more than slightly subgingival.
- Use Ultrapack #00 or #000.
- Don't impregnate with HEMODENT!
 - Bond strength will be compromised!
- **Shown to be as effective in isolation as rubber dam placement.**



Photos courtesy of Dr. James Summitt.

Preparation Considerations

- Beveling the enamel margin:
 - Has been recommended for better bond to enamel.
 - Has been found not to improve bond strength.
 - Placement of retentive features (grooves) in prep may create 'mud flap' phenomenon. Not good.



Restorative Options

- Options to consider:
 - Resin composite (RC) and dentin bonding agent (DBA)
 - Resin-modified glass ionomer cement (RMGIC)
 - RMGIC/RC as a 'sandwich' restoration
- Confusion exists on whether microfilled resins are more retentive than macrofilled resins due to their Modulus of Elasticity (MOE) compared to tooth in flexure.

EBD Support for Best Restorative Material for NCCLs

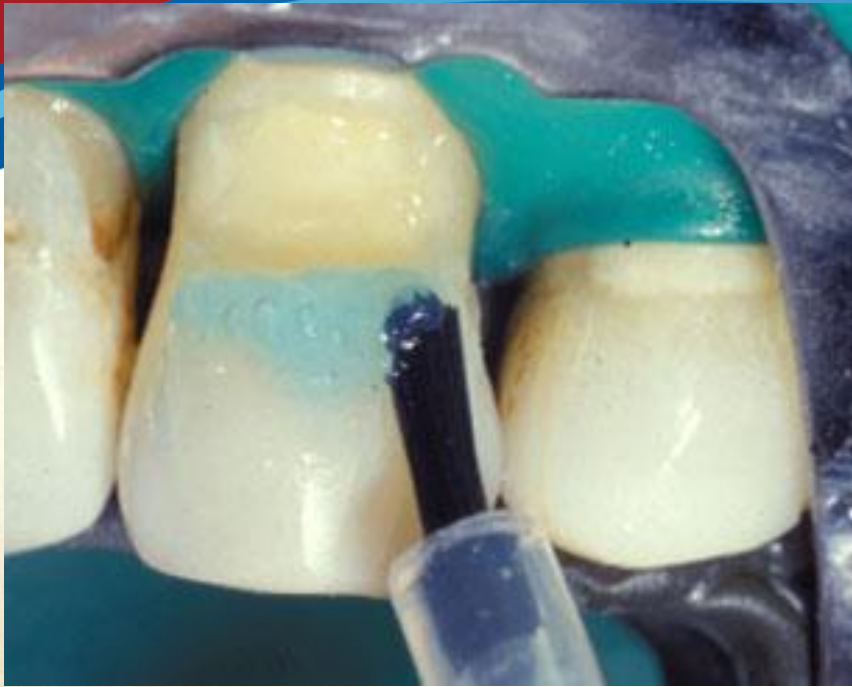
- Literature-based review over past 10 years on 85 articles about NCCLs using USPHS rating system.
- Questions to answer:
 - Is the clinical performance of resin composite (RC) better than resin modified glass ionomer (RMGIC)?
 - Which resin composite is best to use?
 - Which dentin bonding agent system is best to use?

Their Findings Based on Literature

- Though RMGIC have been treatment of choice in past:
 - Use of RC now shows best performance.
 - No difference between hybrid and microfill.
 - Flowable RC only for small, non-sculpted preps.
 - No particular indication for ormocers, compomers, and giomers.
- Choice of adhesive system has important role in performance:
 - 3-step etch & rinse and 2-step self-etch have the best retention record.
 - Regardless, always apply DBA carefully and according to manufacturer instructions!

Should I Prepare the Dentinal Surface for Bonding? What Studies Reveal!

- With sound dentin:
 - No benefit from roughening dentin.
 - With etch and rinse (ER) and strong self-etch (SE) DBAs, no additional benefit from roughening.
 - With mild SE and ultra-mild 1-step SE, diamond bur roughening can help.
- With sclerotic dentin:
 - No predictable retention improvement by modifying the surface preparation.
 - No difference between using ER and SE DBAs.
- The condition of the **peripheral dentin** is paramount to a predictable seal.



Insertion Techniques

- Challenges with enamel and dentin margins.
- To minimize polymerization shrinkage and improve marginal adaptation, incremental placement is recommended:
 - Gingival margin first (when no enamel there) to reduce gingival margin gap when bonding to enamel margin.
 - Incremental placement with last one on enamel margin.
- Sculpting prior to polymerization can reduce stresses from finishing and polishing.

Incremental Placement



Placement starts gingivally!



Ends incisally!

Finishing and Polishing

- Use of 12-B blade for gingival trimming.
 - Avoid rotary instruments on cementum.
- ET (Esthetic Trimming) burs for axial and proximal contours.
- Sequential polishing disks.
- Surface sealant.



What options are available
when NCCIs involve the root
surface???

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Gingival Coverage of NCCLs

- **Soft tissue grafting procedures:**
 - Pedicle graft
 -  – Connective tissue graft (subepithelial or with epithelium)
 - Double-papilla procedure
 - Visor procedure (semilunar flap procedure)
 - Combinations

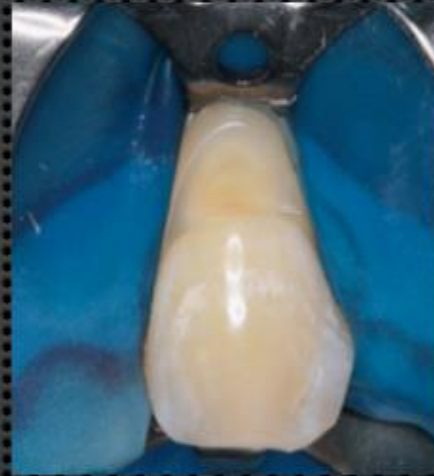
Why Consider Combined Periodontal and Restorative Intervention?

- Gingival recession is often associated with NCCLs.
- Soft tissue root coverage can improve esthetics, decrease root sensitivity, and prevent further recession.
- Ability to recreate the anatomic position of the CEJ which may have been lost during NCCL formation, and the restored CEJ can be in harmony with adjacent teeth.
- Estimation of maximum root coverage (MRC) allows for prediction of CTG, with or without restoration, to provide proper root coverage.

- RCT with 6mo follow-up

- CTG (N=20)
- CTG + R (N=20)

Glass ionomer overlaid by CTG
reduced sensitivity.
Downside was color changes.



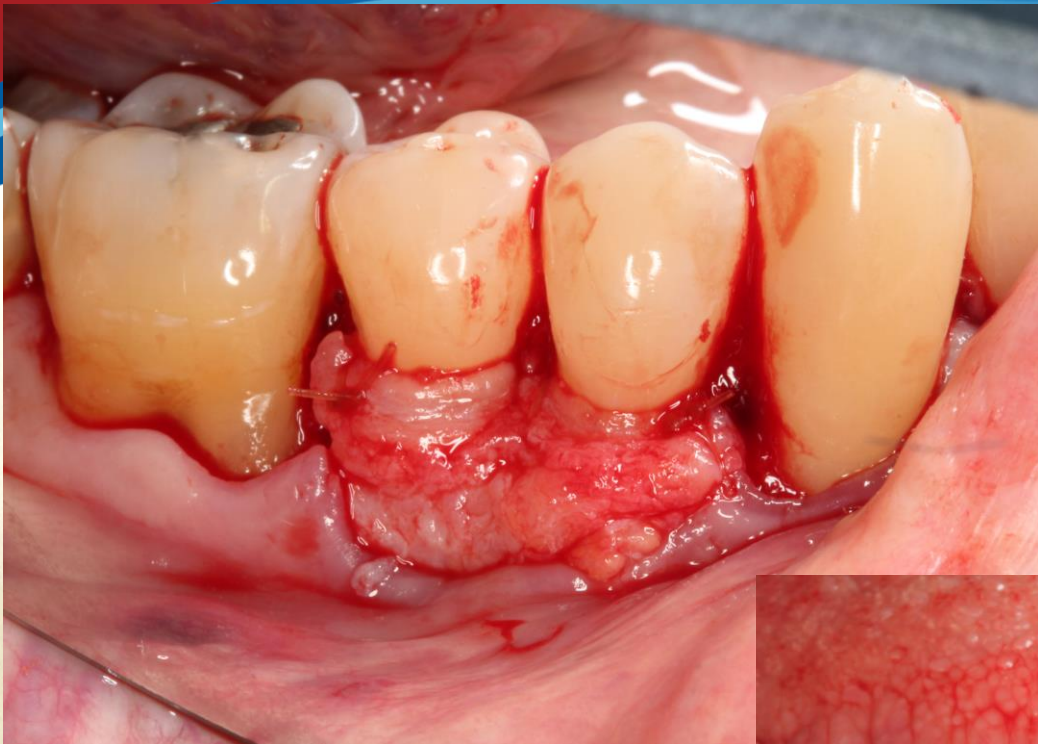


NCCL/gingival recession as combined management with restoration of #28-29 NCCL and CT graft.

(Courtesy of Dr. Natalie Frost, former UTHSCSA Perio Resident)



Restorative CEJs established pre-op.



CT graft placed
and flap sutured.



Up to three years post-op.

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Five Questions...Five Pearls!

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Lone Star Central!

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