

fundamentals of adhesion

TOOTH SURFACE LESIONS: PREVENTION AND TREATMENT—PART II

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The operative requirements for the restoration of carious and noncarious tooth surface lesions have been the creation of gingival health through developing proper anatomical contours, marginal integrity, and surface texture. In the past, restorative therapy of the lesion was limited to artificial replacement of the tooth structure by operative procedures. The restorative material selection and operative techniques were designed to follow the concept of “form and function.”

Today, an expanded philosophy has developed with an improved scientific knowledge of these lesions and the addition of a third element, aesthetics, to the restorative equation. This new philosophy requires an interdisciplinary approach for reconstruction of the dentogingival complex. The new parameters of restorative therapy require a “true aesthetic consideration” for the treatment of tooth surface lesions, which may require periodontal and/or operative dental procedures to restore harmony and aesthetic balance.

Management and Prevention

The management of surface lesions begins with diagnosing the etiology and prevention. The modern management and prevention of surface lesions should aim to prevent initial restorative therapy, preserve hard and soft tissue structures, and increase the longevity of the restorative therapy.¹ Controlling and preventing the advancement of hard-tissue destruction begins with dietary instructions, fluoride therapy, brushing with desensitizing

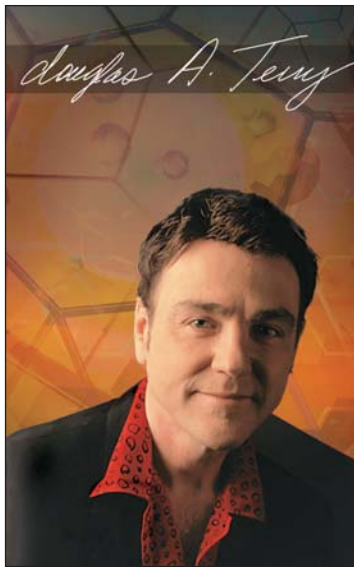
dentrifices, and improved oral habits. Management of these lesions may include remineralization through the in-office application of fluorides, calcium, and potassium phosphate. Desensitization of these hard surface lesions can be achieved through the professional application of potassium oxalate or other tubule-occluding agents, iontophoresis, or application of dentin adhesives. Other management methods include occlusal evaluation and equilibration with occlusal guard fabrication, coronoplasty, or orthodontic treatment.^{2,4}

Defining Restorative Therapy

Reconstruction of these cervical lesions may require an interdisciplinary diagnosis and treatment planning. Treatment may involve periodontal surgery, orthodontic measures, and operative procedures. Periodontal procedures include free autogenous mucosal grafts, subepithelial connective tissue grafts, coronally advanced flap technique, guided tissue regeneration, and enamel matrix derivative grafts.⁵ Operative methods can involve the use of glass ionomers,

compomers, composite resins, or various laboratory-fabricated restorations.⁴ Orthodontic therapy can involve intrusion, uprighting, space closure, and restoration of occlusion.⁶

After the diagnostic and preventive phase, the concern focuses on the direction of the restorative treatment. Treatment depends on the location and the size of the lesion,⁴ its relationship to the cemento-enamel junction (CEJ), and the amount of gingival recession. In 1985,



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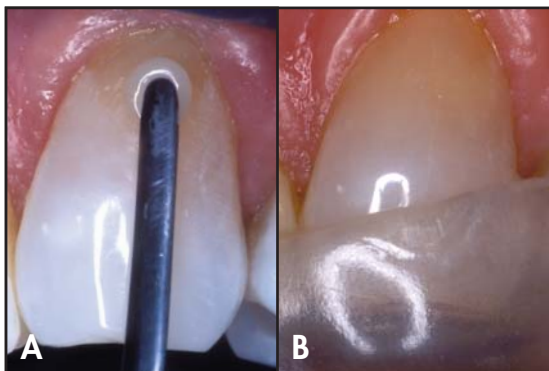


Figure 1A. Operative restorative treatment should be considered utilizing a hybrid composite resin when the lesion is coronal to the CEJ. **1B.** Controlling and preventing the advancement of hard-tissue destruction was accomplished with an occlusal guard.

in order to identify and categorize gingival recession in relationship to the amount of root coverage anticipated, Miller described four categories for recession-type defects (Table 1).⁷ A periodontal approach should be considered when there is root exposure, when the lesion is apical to the CEJ, and when it is possible to remove the caries or existing restoration and achieve a relatively flat root surface without endangering the pulp. The carious lesion or recurrent decay on an existing restoration coronal to the CEJ should be removed and restored before surgical treatment. Restorations below the CEJ should be removed prior to surgery because the presence of restorative materials on the root surface precludes the ability to perform root coverage procedures.⁸ In addition, an operative-only approach should be considered if the lesion is coronal to the CEJ in the absence of gingival recession (Figure 1).

Surgical Treatment of Recession-Type Lesions

Periodontal surgical procedures should be part of the clinician's technique for restoring the dentogingival complex. Traditionally, restorative therapy of teeth with gingival recession and carious or noncarious lesions has been achieved through operative procedures with little attention to aesthetics. In contrast, the perio-aesthetic approach considers the harmonious integration and inter-relationship of the hard and soft tissue (Figure 2), and there are numerous mucogingival procedures available



Figure 2A. Maxillary right canine with a Class I gingival recession-type defect. **2B.** One-year postoperative view demonstrates complete root coverage and a harmonious dentogingival complex without the use of restorative materials.

for the treatment of gingival recession-type lesions (eg, free gingival autografts, subepithelial connective tissue grafts, coronally positioned flaps).⁵ These soft-tissue grafts are indicated for the restoration of cervical radicular lesions and for previously restored Class V restorations associated with gingival recession.

Operative Treatment of Tooth Surface Cervical Lesions

Many restorative alternatives, such as direct resins and indirect inlays, exist for the replacement of tooth structure lesions.^{2,9} The initial consideration for the selection of a direct restorative material is to determine the type of cervical lesion and whether it is carious or noncarious. The choice of restorative materials for the carious lesion could require a fluoride-releasing material (ie, modified glass ionomers or compomers). When fluoride is not a consideration, however, composite resin provides an optimal aesthetic result for the carious and noncarious cervical lesion, because of the acid-etch technique and the chemical attachment to tooth structure through dental bonding systems.⁴ Hybrids, microfills, and flowable composites are among the options for use in cervical lesions. Investigations from Heymann et al on occlusal factors that influence the retention of restorations and the tooth flexure theory indicate that forces are transmitted through the cusp and concentrated in the cervical region of the tooth.¹⁰ Such data influences the type of restorative

Table

| <i>Miller's Classification of Recession-Type Defects⁷</i> | |
|--|---|
| Class I | Marginal recession that does not extend to the mucogingival junction. Complete root coverage can be achieved. |
| Class II | Marginal recession that extends to or beyond the mucogingival junction, with no periodontal attachment loss (ie, bone or soft tissue) in the interdental area. Complete root coverage can be achieved. |
| Class III | Marginal recession that extends to, or beyond, the mucogingival junction, with periodontal attachment loss in the interdental area or malpositioning of the teeth. Only partial root coverage can be achieved to the height of the contour of the interproximal tissue. |
| Class IV | Marginal recession that extends to or beyond the mucogingival junction, with severe bone or soft-tissue loss in the interdental area and/or severe malpositioning of the teeth. Root coverage is unpredictable and requires adjunctive (ie, orthodontic) treatment. |

material that is selected for cervical lesions. Composite resins with a low modulus of elasticity will absorb this transferred energy from the occlusal surface, preventing transmission to the dentin-restorative interface. These low modulus resins have a lower level of filler loading, and there is a difference in the values between filler particles and the resin matrix.⁶ The microfill and flowable composite resins have a lower modulus of elasticity than hybrid or conventional composite resin.⁴ Additionally, dentin bonding systems provide an elastic intermediate layer between the restorative material and the cavosurface, to absorb this flexural deformation of the tooth.

A successful operative procedure with the utilization of composite resins for lesions relies on the type of selected material, cavity design, isolation, and occlusion. Fundamental principles of this process require maintaining sound tooth structure, achieving a sterile, gap-free hybrid layer, and eliminating microleakage.¹¹

Conclusion

Changes in the understanding of the etiology of cervical lesions have attributed to the methods in which they are treated. The adoption of a modern philosophy of "medical management" has rendered diagnosis, prevention, and treatment planning essential components of comprehensive treatment. Thus, contemporary restorative concepts have evolved to redefine restorative treatment to include surgical and operative procedures in the

treatment of these tooth surface lesions. Therefore, restorative therapy becomes a process of all disciplines instead of a term used for the definitive prosthetic and/or operative therapy.

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