Operative Dentistry

Lecture (11) Dr. Raghad Noori

Cervical Lesions (Carious and non-carious)

Cervical lesions (or class V lesions) include those carious and non-carious defects found in the gingival third of facial and lingual tooth surfaces. Class V carious lesions are produced by bacterial plaque attaching to the surface of teeth and producing acids that cause demineralization. A class V lesion resulting from factors other than dental caries is known as a non-carious cervical lesion (NCCL).

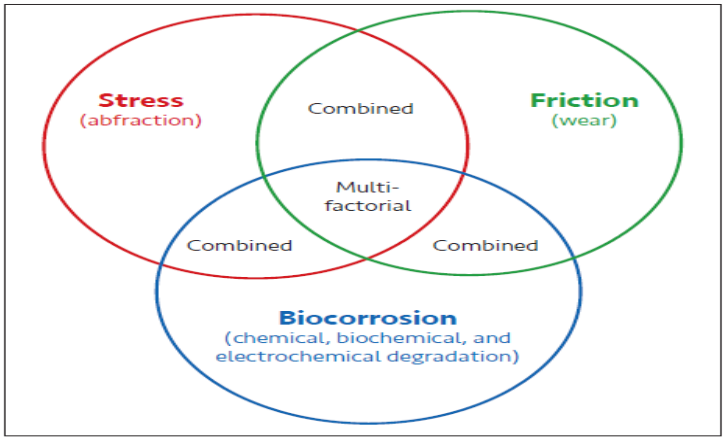
Caries lesion

Cervical lesions involving enamel structure (coronal to CEJ) can be easily detected visually (change in color). However, tooth color is not a good predictor of root caries damage. A root surface may be discolored and still have a hard sclerotic surface that would not warrant preparation and placement of a restoration unless the discoloration presented an acidic problem for the patient. In contrast, some root caries lesions will have the color of healthy tooth structure, but will be soft when tested with a dental instrument. Caries disclosing dyes may be inconsistent in identifying demineralized cementum/dentin on root surfaces. The best correlation to date for clinical detection of caries lesion on root surfaces is the softness of the surface has evaluated with a dental instrument.



Non-Carious Cervical Lesions

It is now generally accepted that NCCLs have a multifactorial etiology comprising stress, friction, and biocorrosion. The prevalence of NCCLs, regardless of form or etiology, varies from 5% to 85% in modern dentitions. These lesions are most commonly found in premolars and molars, and the prevalence and severity have been shown to increase with age.



Erosion:

loss of tooth structure due to chemical action. This can be prominent in patients with oral habits such as constant citrus ingestion, or chlorinated swimming pool water, or gastrointestinal problems that produce repeated exposure of teeth to gastric acids. In these cases, the oral lesions generally present a rounded-cupped out defects. In early stages, the acidic action produces a smooth and silk glazed enamel surface. In these situations, the lesions are located coronal to the CEJ and present an intact ring of enamel along the gingival margin. In intermediate stage, shallow flat concavities with rounded borders developed. In some situations, the enamel is totally removed, leading to exposure of dentin and a polished-looking surface. Clinically, rounding of the cusps, grooves, and incisal edges can occur. In more severe cases, when the continuing biocorrosive loss of dentin occurs, reactionary and reparative dentin forms, thus obliterating the dentinal tubules as a biologic response to compensate for the loss of tooth substance.



Box 5-2	Habits that accelerate dental chemical degradation and should be avoided[74]

- Frequent consumption of acidic drinks
- Swishing the drink before swallowing
- Consuming acidic drinks just before sleep, when the protective benefits of saliva are reduced
- Brushing teeth immediately following the acid challenge, which increases the wear of the enamel due to the abrasive action of the toothpaste on the still-softened tooth surface

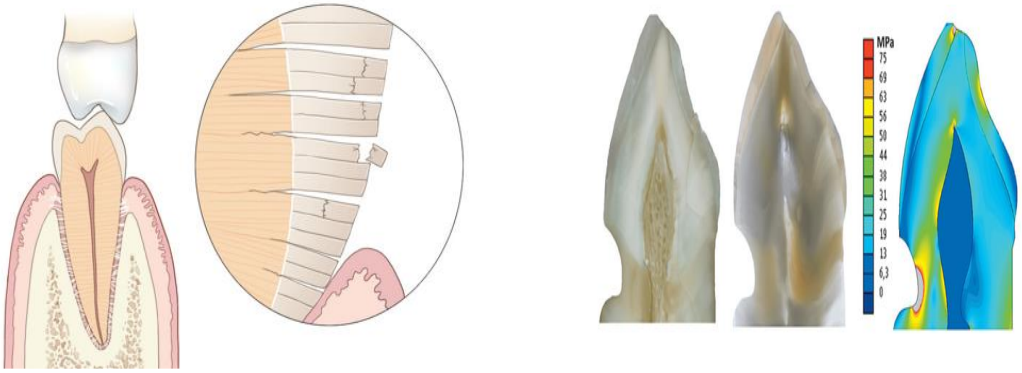
Abrasion:

loss of tooth structure by mechanical or frictional forces. These lesions are commonly caused by excessive tooth brushing; also, these defects may be produced by repeated and excessive forces by other materials and appliances such as dental floss, tooth picks or removable appliances. The lesions commonly caused by brushing appear as V-shaped notches in teeth. The main factors affecting the abrasion from tooth brushing are: 1. The particular brushing technique 2. Type of tooth brush 3. Abrasiveness of tooth paste 4. The duration and intensity of brushing.



Abfraction:

loss of tooth structure due to flexural forces. It is a theory proposed to explain the development of some V-shaped notches in teeth. The theory states that as teeth flex under occlusal load, stresses are transmitted to the cervical area causing cervical enamel rods to fracture and dislodge. This occurs in patients with heavy occlusal loads and clinical evidence of bruxism.



Access and Isolation

When cervical lesions occur supragingivally, access to the area is easy, but if the lesion progressed below the free gingival margin, isolation for complete caries removal, tooth preparation, restoration placement and finishing is difficult. If a restoration is placed without obtaining complete access to sound tooth structure on all margins, carious tooth structure may remain and the restoration may fail. Even in non-carious lesion, inability to gain sufficient access to the gingival margin may result in poor restoration-tooth interface, increased microleakage and premature loss of the restoration.

Class V lesions can be adequately treated using cotton rolls, retraction cord. If the lesion extends below gingival margin a rubber dam is useful. When a rubber dam fails to provide complete visualization and access to the entire lesion, a surgical approach must be used (gingivoplasty). It is advantageous to have periodontal surgical procedures accomplished before tooth restoration (at least 6 weeks) to allow gingival margin to heal to its stable position.





Treatment:

If active caries is present, treatment must be initiated to control the active disease and to prevent disease progression.

Non-carious cervical lesions should be treated

- To protect remaining tooth structure if the amount of tooth lost is extensive or progressing.

- If esthetic is compromised.
- To control or reduce sensitivity.
- To accommodate removable partial denture clasp design.

Non- carious lesions that are not extensive and are asymptomatic, these are preferable treated by prophylaxis which include:

Tooth Wear: Prophylaxis/therapy
– Good diagnosis → Causal therapy
– Prophylactic changes in possible causal factors
– Fluoride
– Documentation and follow-up

Once the decision to place a restoration is made, the dentist must select a restorative material and design the cavity preparation. For any class V restoration, the extent of restoration should be determined by the extent of the lesion. All demineralized tooth structure and unsupported enamel should be removed.

Restorative materials used in class V restoration:

1. Non esthetic materials:
    - Amalgam.
    - Gold foil (direct) not widely used.



2. Esthetic materials:
    - Resin composite (with dentin bonding system).
    - Resin composite with glass-ionomer base (sandwich technique).

    Glass ionomer is used to replace the missing dentin, reduce microleakage and increase retention, while a veneer of composite resin is placed to enhance esthetics and polishability and increase abrasion resistance of the restoration.
    - Flowable resin composite.
    - Glass ionomer.
    - Resin-modified glass ionomer.
    - Compomer.
    - Porcelain inlay (not widely used).



(a) Multiple adjacent Class 5 lesions in the maxillary left canine through the second molar. (b) The teeth were restored with conventional glass ionomer, which is opaque and relatively unesthetic.

❖ **Sandwich technique (laminated technique):** this technique is useful combining the advantages of both glass ionomer cement (GIC) and composite resin. It can be open or closed. Open technique in which the GIC at the gingival margin is exposed. Closed technique in which the GIC is completely covered by resin composite. This technique uses GIC as intermediate layer between dentin and resin composite.

- ✓ Some clinicians use the sandwich technique. Glass ionomer is used to replace the missing dentin, reduce leakage, improve the potential for tissue attachment for subgingival restorations, and potentially increase retention. A veneer of resin composite is placed to enhance esthetics, increase color stability, improve marginal performance, provide a smoother surface, and increase abrasion resistance

❖ Resin composite

The extent and depth of the lesion should determine the outline and depth of the preparation for resin composite, whether the lesion is carious or noncarious. For NCCLs, little or no preparation is required. Retention of a resin composite restoration is primarily due to the bond, so the bonding system must be used meticulously. Although roughening the surface of a noncarious lesion has been thought to enhance the bond by removing some sclerotic dentin.

For small restorations, the resin composite may be inserted and cured in one increment unless esthetic considerations call for layering to achieve appropriate shading. For restorations that are moderate to large in size, the first increment of resin composite should be placed from about the midpoint of the gingival floor to the incisal or occlusal cavosurface margin and light polymerized. The second increment can then fill the remainder of the preparation. Larger preparations may require more than two increments. Resin composite should be placed in increments no thicker than 2 mm to ensure adequate penetration of light for polymerization.

- ✓ If the margins of the restoration will be completely on enamel, the retention of bonded restorations should be predictably successful. Beveling of enamel margins is recommended when it would expose the ends of the enamel rods to provide better etch and bond and/or to improve esthetic blending of the resin composite with the tooth structure. Beveling the gingival margin that ends on cementum is not recommended.



Dentinal Sensitivity

Dentinal sensitivity, it is a problem often associated with gingival recession and non-carious cervical lesions. Sensitivity is caused by exposure of dentinal tubules that communicate between the pulp and the oral cavity. The degree of sensitivity is influenced by the number and size of the open tubules. Changes in the direction of fluid movement within open tubules are perceived as pain by mechanoreceptors near the pulp. Tactile, thermal or osmotic stimuli can induce changes in fluid flow and elicit a pain response.

Treatment

Dentinal hypersensitivity secondary to gingival recession is best treated surgically with root coverage procedures such as connective tissue grafts. Treatment or prevention of hypersensitivity is accomplished by the use of some method to occlude the open tubules by:

- Dentin adhesives provide short-term relief.
- Oxalate solutions used alone or in combination with electrophoresis is successful.
- Stannous fluorides have also been used with positive results.
- Potassium nitrate available in dentifrices or as a gel for application in the dental office is also reported to be an effective desensitizing agent. It is thought to act directly on nerve membranes to reduce sensory nerve activity rather than causing occlusion of the tubules.