Operative Dentistry

Lecture (2)

Dr. Raghad Noori

Patient Evaluation, Diagnosis and Treatment Planning (Part II)

D. Evaluation of existing restorations

The following criteria are used to evaluate existing restoration:

1. **Structural integrity:** this evaluation involves determining whether it is intact or whether portions of the restoration are partially or completely fractured or missing. The presence of fracture line indicates replacement of the restoration.

2. **Marginal opening:** for amalgam restorations the existence of marginal ditching does not indicate the replacement of the restoration; because the margins of amalgam restorations become relatively well sealed from the accumulation of corrosion products, unless signs of recurrent caries are present.

For composite restoration, the marginal gap should be considered for repair or replacement of the restoration. The presence of marginal gap is less critical for restorations with anticariogenic properties, e.g. glass ionomer (GI) cement. As studies have shown that tooth structure adjacent to GI cement restorations is less susceptible to caries; replacement of the restoration indicated when tooth structure adjacent to the marginal gap becomes carious or by marginal staining that is esthetically unacceptable especially in anterior teeth.



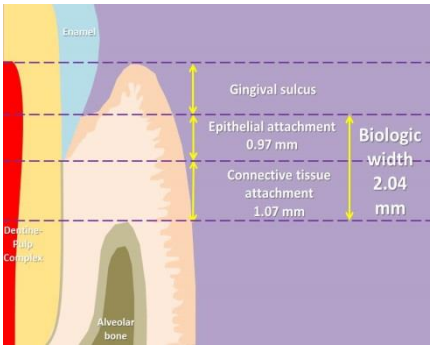
3. **Recurrent Caries lesions:** the dentist must use a combination of visual, tactile and radiographic examinations to detect the presence of caries lesion. A radiolucent area surrounding a radiopaque restoration or the presence of soft tooth structure generally indicates caries and must be repaired or replaced.

4. **Restoration-related periodontal health**: examination of restorations must include an assessment of the effect that existing restoration have on the health of the adjacent periodontuim. Problems commonly encountered in this area are:

a. Surface roughness.

b. Interproximal overhangs.
c. Impingement on the zone of attachment (called the biologic width)

☒ Biologic width: is the area approximately 2mm in the apicocoronal dimension, occupied by the junctional epithelium and the connective tissue attachment.



All three of these phenomena can cause inflammation within the periodontium even in the absence of impingement on biologic width. Open or rough subgingival margins can harbor bacterial plaque to generate an inflammatory response. Gingival inflammation around crown may also due to an allergic reaction to material in the crown.

5. **Occlusal and interproximal contacts**: all interproximal contact should be assessed with thin dental floss by the dentist. Contacts should allow the smooth passage of floss. Contacts that are open or excessively light should be evaluated to determine whether pathosis, food impaction or annoyance to the patient has resulted.
In occlusal contacts of all restorations should be evaluated to determine whether they are serving their masticatory function without creating a symptomatic or pathogenic occlusion. Restorations whose occlusal contacts are creating primary occlusal trauma should be altered or replaced to resolve the problem. Restorations that are in significant infra-occlusal may permit the super eruption of opposing teeth and should be considered for replacement.

6. **Esthetics:** some of the more common esthetic problems found in the existing restoration are:
a. Display of metal.
b. Discoloration or poor shade match in tooth colored restoration.
c. Poor contour in tooth-colored restoration.
d. Poor periodontal tissue response in anterior restoration.

E. Evaluation of Occlusion and Occlusal Wear

The occlusion can have significant effects on the restorative treatment plan. The following factors should be evaluated during occlusal examination:

1. Occlusal interferences between the occlusion of centric relation and that of maximum intercuspation.
2. The number and position of occlusal contacts as well as the stress placed on the occlusal contacts.
3. The amount and pattern of attrition of teeth and restorations resulting from occlusal function.
4. The interarch space available for placement of needed restoration.

The number and position of occlusal contacts strongly influence the selection of restorative materials as well as the design of the preparation
and restoration.

Wear (mechanical and chemical): is a progressive phenomenon characterized by the loss of anatomical tooth form. Mechanical wear can be either *attrition* (tooth against tooth) or *abrasion* (other than tooth against tooth). Chemical wear is termed *erosion*.

☒ **Attrition:** excessive occlusal wear caused by occlusal parafunction (bruxism). In these instances, facets on opposing teeth match well. Prevention is accomplished with use an occlusal resin appliance (night guard, bite plane), and education of the patients.





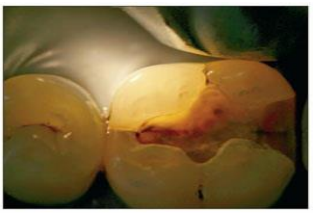
☒ **Abrasion** is abnormal tooth surface loss resulting from direct frictional forces between the teeth and external objects, or from frictional forces between contacting teeth in the presence of an abrasive medium. Such wear is caused by improper brushing techniques or other habits such as chewing on hard objects such as pens or pencils. Toothbrush abrasion is the most common example and is usually seen as a sharp wedge shaped notch in the gingival portion of the facial aspects of the teeth.

☒ **Chemical erosion** is the loss of surface tooth structure by chemical action in the continued presence of demineralizing agents (acids), can result from some habits such as sucking lemons or from the introduction of gastric acid into the oral cavity, erosive lesions have a smooth, glassy appearance.

F. Evaluation of tooth integrity and fractures

Cracked-tooth syndrome: is a fairly common result of incomplete tooth fracture. Patients suffering cracked tooth syndrome often experience cold sensitivity and sharp pains of short duration while chewing. The cusps most commonly fractured are the nonfunctional cusps. Often patients with multiple cracked teeth have parafunctional habits or malocclusions. Cracked-tooth syndrome is an age-related phenomenon, the greatest occurrence is found among patients between 33-50 years of age.

This syndrome is often difficult to diagnose. The patient is unable to identify the offending tooth and evaluation tools such as radiograph, visual examination, percussion and pulp tests are typically non diagnostic.



The two most useful tests are:

- **Transillumination:** when a tooth with a crack is transilluminated from either the facial or lingual direction, light transmission is interrupted at the point of the crack. This results in the portion of the tooth on the side away from the light appearing quite dark.
- **Biting test**: it is the most definitive means of localizing the crack, by having the patient bite a wooden stick, rubber wheel; the dentist will be able to reproduce the patient's symptom and identify the fractured tooth.

In treatment of incomplete tooth fracture, the tooth sections are splinted together with a cuspal coverage restoration. This may include the use of an amalgam restoration, a crown or indirectly fabricated onlay or resin composite.

G. Esthetic Evaluation

In addition to an esthetic evaluation of existing restorations, an assessment of the esthetics of the entire dentition should be completed. Commonly encountered esthetic problems that are related to restorative dentistry include:

1. Stained or discolored anterior teeth.
2. Unaesthetic contours in anterior teeth (length, width, incisal edge shape or axial contour).

3. Unaesthetic position or spacing of anterior teeth.
4. Carious lesions and unaesthetic restoration.
5. Unaesthetic color and/or contour of tissue adjacent to anterior restorations, this includes: excessive gingival display occasionally referred to as the (gummy smile).

The restorative treatment of esthetic problems may range from conservative therapy such as micro abrasion or bleaching to more invasive care such as the placement of resin veneers, ceramic veneers, or complete coverage crowns. Additionally periodontal, endodontic or orthodontic procedures may be helpful depending on the nature of the problem.

2. EVALUATION OF THE PERIODONTIUM

From a restorative dentistry perspective, the periodontium must be evaluated for two reasons:

- ✓ To determine the effect that the periodontal health of the teeth will have *on the restorative dentistry treatment plan*.
- ✓ To determine the effect that planned and existing restorations will have *on the health of the periodontium*.

Evaluation of periodontium consists of a clinical assessment of attachment levels, bony support, tooth mobility, qualitative assessment of tissue health, and radiographic evaluation of supporting bone.

The most consistent clinical indicator of inflammation is bleeding on probing. Any bleeding by gentle probing should be noted.

The qualitative assessment of periodontal tissue health includes tissue color, texture, contours, edema and sulcular exudates are noted. The presence of specific local factors such as plaque, calculus and their relationship to tissue inflammation should be noted.

During examination of periodontium, the dentist must estimate the location of margins for future restorations and their potential to impinging on the biologic width.

3. EVALUATION OF RADIOGRAPH

The radiographic examination is an essential component of the comprehensive evaluation. Clinical situations for which radiograph may be indicated includes:

- Pervious periodontal or root canal therapy.
- History of pain or trauma.
- Large or deep restorations.

- Deep carious cavity.
- Swelling and mobility of teeth, fistula or sinus tract infection.
- Abutment teeth for fixed or removable partial prosthesis.
- Unusual tooth morphology or color.
- Missing teeth with unknown reason.

In evaluating radiographic findings for restorative purposes, the dentist should note open interproximal contacts, marginal openings, overhanging restoration, periapical radiolucencies within the bone of the tooth.

The dentist must interpret abnormal radiographic finding with caution. For example when the clinician evaluates radiolucencies that appear to represent carious tooth structure but may in fact represent nonpathologic processes as in a radiographic phenomenon known as (burnout) which is a radiolucency not cause by caries, it occurs when x-ray beam traverses a portion of the tooth with less thickness than surrounding areas most commonly seen in cervical area of the tooth. So the dentist must be careful not to mistakenly diagnose as demineralized tooth structure. Also the dentist must be cautious in diagnosing caries beneath existing restorations because certain radiolucent dental materials have a radiographic appearance similar to that of carious tooth structure.

4. EVALUATION OF DIAGNOSTIC CASTS

The dentist can gain valuable information through an evaluation of diagnostic casts. The dentist can see areas that are visually inaccessible during the clinical examination. Facets and marginal openings that may be difficult to see intraorally are readily visible on the diagnostic casts. Also cases involving multiple missing teeth need the evaluation of casts mounted on a semi-adjustable articulator. This enable dentist to assess the occlusal relationship and to plan restorative treatment.

❖ Treatment Plan

Having completed a comprehensive examination, the dentist lists the problem related to restorative dentistry. Planning the restoration of individual teeth requires the consideration of four factors:

1. The amount and form of remaining tooth structure.
2. The functional need of each tooth.
3. The esthetic needs of each tooth.
4. The final objective of the overall treatment plan.

❖ Treatment Sequence

When the completed treatment has been visualized and the design of the restorations required has been established the final step in establishing the restorative dentistry treatment plan is sequencing the treatment.

Restorative treatment aimed at the control of active disease generally consists of direct restorative procedures using amalgam, resin composite or glass ionomer material. The sequence of treatment within the disease-control phase is dictated by three considerations:

1. Severity of the disease process (i.e. the most symptomatic tooth, the tooth with the deepest lesion, or the most debilitated tooth is restored).
2. Esthetic needs.
3. Effective use of time.

At each appointment, treatment is rendered in the area in most acute need of restorative treatment. When possible the restorations should be completed quadrant by quadrant to optimize the use of time.

❖ The Dental Record

Accurate and descriptive record keeping is essential to quality dental care. The dental chart should include findings from the history and examination, the problem list, the treatment plan, and a description of the treatment accomplished.

- Dental records should include the following information:
  - Charting of examination findings, including existing restorations and dental relationships (eg, diastemata, dentoalveolar extrusion, tilted teeth), existing periodontal and endodontic conditions, occlusal relationships, and caries lesions and defective restorations
  - Medical history and consultations
  - Problem list
  - Treatment plan
  - Description of treatment provided
  - Follow-up assessment