

Deep Carious Lesion

One of the basic steps in a restorative procedure is the removal of carious dentin. Unfortunately this procedure is still empirical, resulting in a great deal of inconsistency.

Factors affecting caries progression on the P-D organ

Type of decay- acute decay is less defensive when compared to chronic decay

Duration of decay process- acute decay leads to massive destruction Chronic decay leads to repair

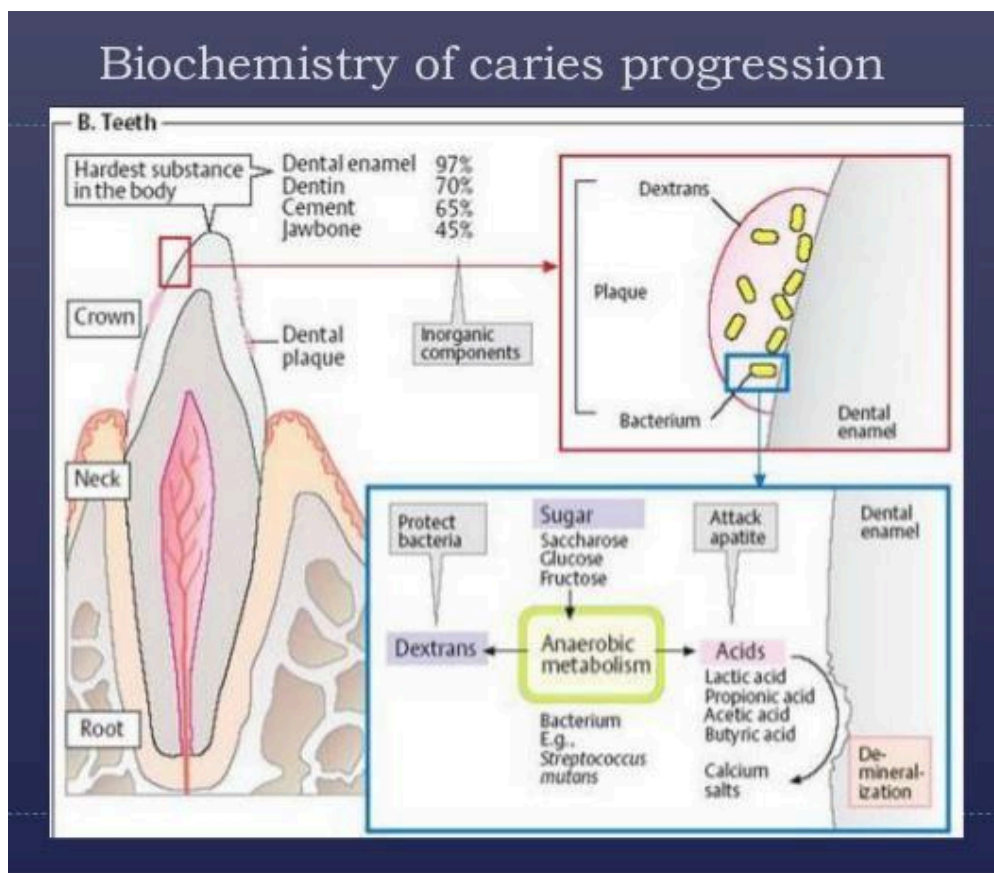
Depth of involvement- profound depth involvement of caries in chronic decay may have repair but acute decay will have pulpal destruction

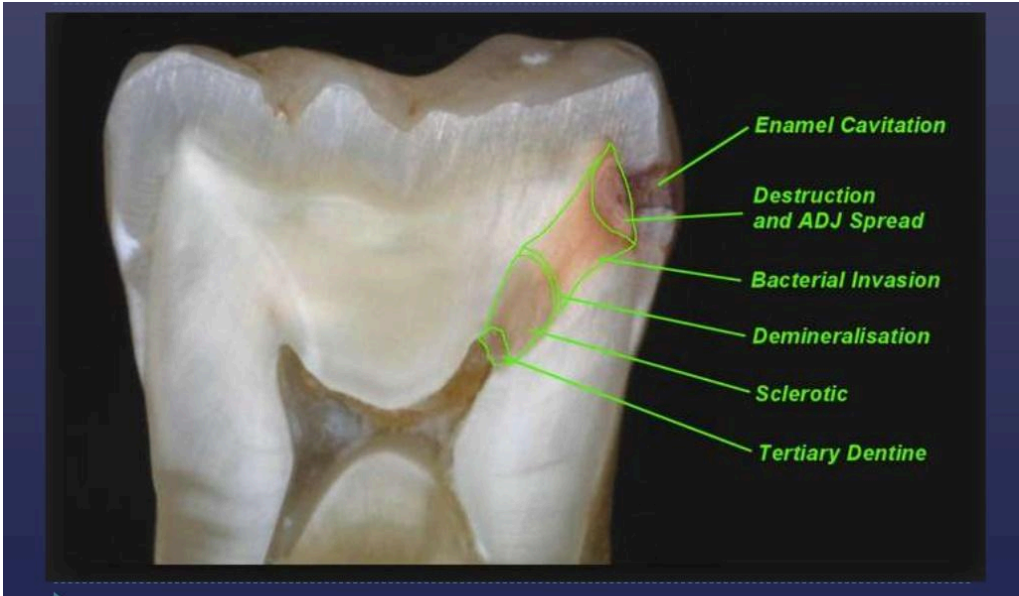
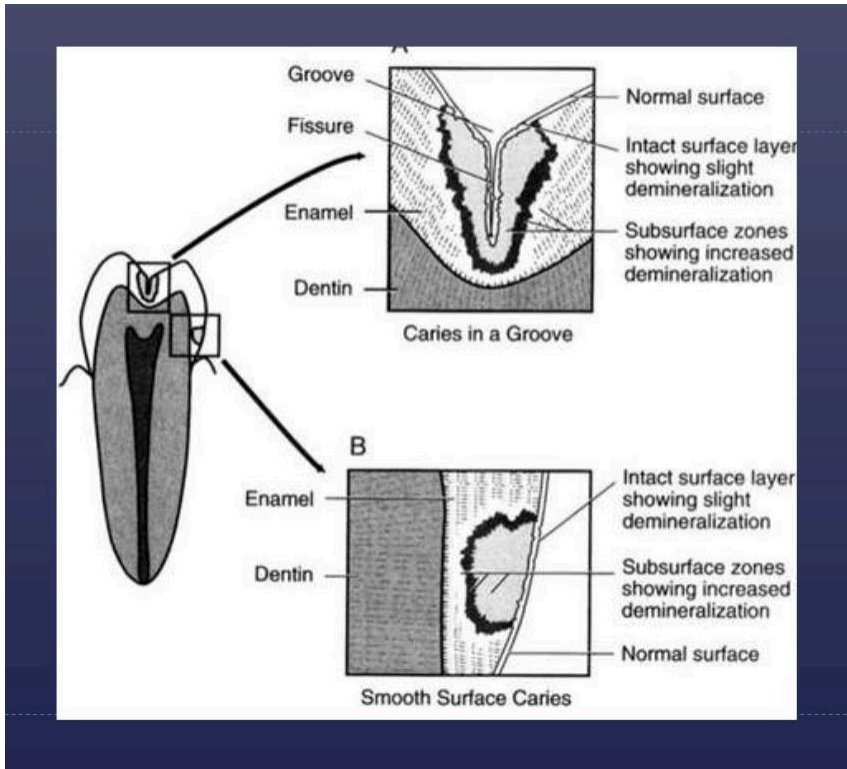
Number and pathogenicity of microorganisms

Tooth resistance depends on Thickness of dentin Permeability of dentin Solubility of dentin Fluoride and calcium of dentin Susceptibility of tooth

Individual factors Tooth age, vascularity of pulp, patients age

Pulp dentine complex reactions due to caries





The advancing front of the lesion was about 1 mm from the pulp

- no significant disturbance occurred pathological changes occur

The advancing front of the lesion once within 0.5 mm of the pulp

- pathological changes occur
- reactionary dentine itself was involved that 'pathosis of real consequence' will occur

when the lesion was within 0.25 mm–0.3 mm of the pulp

- when the lesion was within 0.25 mm–0.3 mm of the pulp

Effective depth is the area of minimum thickness of sound dentin separating the pulpal tissues from the carious lesion

- ▶ ED- 2MM a healthy reparative action occurs
- ▶ ED-0.8-2MM unhealthy reparative reaction occurs
- ▶ ED-0.3-0.8MM pulpal reaction occurs



Remaining dentin thickness:

- The studies have shown that 0.5 mm thickness of dentin reduces the effect of toxic substances on the pulp by 75%, 1.0 mm thickness of dentin reduces the effect of toxins by 90%, little if a pulpal reaction occurs when there is a remaining dentin thickness of 2mm or more.
- It helps us to make a decision concerning the use of bases and liners.

Diagnosis of deep carious lesion

- Pain
- Radiographs
- Pulp testing
- Direct pulpal exposure
- Percussion sensitivity
- Selective infiltration
- Dyes- 0.5% basic fuchsin in propylene glycol

Observe pulp exposure

- A pinpoint exposure having sound dentin at the periphery of an exposure with no haemorrhage- no pulpal inflammation/mild inflammation . Can be repaired
- A pinpoint exposure having sound dentin at the periphery of an exposure accompanied by a drop of blood that coagulates immediately – indicates healthy

repairable P-D organ An exposure having decayed/infected carious dentin at its periphery would indicate considerable inflammation

- An exposure with profuse haemorrhage indicates greater involvement

Direct and Indirect Pulp Capping

- The tooth must be vital and have no history of spontaneous pain
- The result of pulp testing should not linger
- A periapical X-ray should show no evidence of pathology
- Bacteria must be excluded from the site by permanent restoration

Direct pulp capping-Direct pulp caps should not be planned.

- Vital pulp (test the pulp)
- No spontaneous pain (ask the patient.)
- No lingering pain after pulp testing, or after hot/cold stimulus (test & ask.)
- No periapical lesion (take a radiograph)
- Restoration placed must have a good seal

Materials

- ☐ Calcium Hydroxide (CaOH) might stimulate reparative dentin in direct pulp caps. – - CaOH has an antibacterial effect. - CaOH eliminates most, if not all, of the bacteria
- ☐ MTA (mineral trioxide aggregate) has a high pH, is radiopaque, is somewhat antibacterial, has low microleakage, and has better compressive strength than CaOH
- ☐ Biodentin is a calcium silicate-based restorative cement, with better handling properties than MTA, better mechanical properties than MTA, and a shorter setting time than MTA.

What is the success rate of the pulp cap technique?

- Difficult to establish
- Prognosis of teeth that have received direct pulp caps as a result of trauma would appear good
- Loss of pulp vitality in these teeth poses a problem

- Significant amount of physiological secondary and reactionary dentine would have developed
- Complicates subsequent root canal treatment
- The root canal system may have become infected and prognosis for root treatment is less favourable
- Success of the direct pulp cap for various exposures is questionable??

INDIRECT PULP CAP

- When caries are thought to extend close to, or into the pulp, excavation of the pulpal caries can be stopped at stained but firm dentine.
- Calcium hydroxide lining is applied over the pulpal dentine prior to placement of the definitive restoration.
- This is classically referred to as the indirect pulp cap.

Capping agents:

- ✓ $Ca(OH)_2$
- ✓ *Zinc Oxide & Eugenol*

Why is an indirect pulp cap superior to a direct cap?

- ☐ Allows a remaining protective thickness of dentin
- ☐ Reparative dentin formation is enhanced
- ☐ Lowered chance of introducing bacteria into the pulp (which causes an inflammatory reaction)
- ☐ The difficulty with this technique is knowing how rapid the carious process has been, how much tertiary dentine has been formed and knowing exactly when to stop excavating to avoid pulp exposure.

Stepwise Excavation:

- Caries removal is accomplished over two visits. - The interval between visits can be anywhere from 3 weeks to 2 years.
- Only some of the soft dentin is removed at the first visit. The lesion is restored.
- At the second visit, the tooth is reopened, and soft caries can be removed.
- The tooth is now definitively restored.

- This technique is successful in avoiding a pulp exposure. - Symptoms are rare.
- Dentin often appears altered on re-entry.
- Bacterial numbers decrease.

WHY RE-ENTER??

- Cavities that were re-entered and the dentine in all} teeth were found to be darker in colour, harder and drier in consistency.
- By removing some of the carious biomass and} sealing the remaining caries from extrinsic substrate and oral bacteria, the caries left behind after the first excavation had become less active.
- It has also been suggested that by changing the} cavity environment from an active lesion into the condition of a more slowly progressing lesion, this will be accompanied by more regular tubular tertiary dentine formation
- Following sealing caries into the tooth carious dentin becomes dry, harder and darker in colour.
- As a result, there is shrinkage of the tissue leaving a} void beneath the restoration.
- The final excavation is done because it is more convenient to excavate the harder, darker caries than the soft yellow demineralized dentin

ADVANTAGES OF RE- ENTRY

- ☐ Get to evaluate tooth pulp
- ☐ see proof of remineralization
- ☐ Might remove dead tissue

DISADVANTAGES OF RE-ENTRY

- ☐ Second fee to patient anaesthesia again
- ☐ Further trauma to the tooth? second chance to hit pulp.



Figure 1. Large carious lesion in a tooth with minimal symptoms.



Figure 2. Partial caries excavation was carried out, leaving soft, wet, and discolored dentin.



Figure 3. Biodentine (Septodont) interim restoration.



Figure 4. Radiograph of the Biodentine restored tooth. Remaining caries is evident on the radiograph. Depending on the clinical symptoms, the dentist may choose to prepare this tooth, leaving some of the Biodentine as a base beneath the definitive restoration.

Few articles demonstrates that stepwise excavation is not always necessary.

The newer calcium silicate cements may be especially useful in achieving even greater success in few cases.

More clinical studies will be necessary before the dental profession generally accepts this concept.