

OPERATIVE (2019-2020)

lec.4

L. ayad mahmood

Treatment of deep-seated caries and pulp exposure[1]

Deep-seated caries: When the dentist is faced with the deep carious lesion and the tooth has normal pulp, all the caries is removed and a protective base such as calcium hydroxide or glass-ionomer cement is placed between the permanent restoration and the dentin to minimize postoperative sensitivity and promote pulp tissue healing.

Pulp exposure: Pulp exposure may occur:

- 1- Accidentally during cavity preparation (mechanical or traumatic exposure).
- 2- As a consequence of deep carious dentin (pathological exposure).

Pulp capping

Indications: A small mechanical pulp exposure and the surrounding dentin is clean and no history of spontaneous pain or inflammation.

Pulp capping agents

1- Calcium hydroxide (dycal): It is an acceptable medicament in dentistry used for pulp protection. It has an antibacterial action because of its high pH (9.2) which causes sterilization of carious dentin also; it stimulates the formation of reparative dentin and pulp coverage.

The use of any calcium hydroxide should be kept to a minimum because it dissolves over time, resulting in an unsupported restoration.

After any pulpal exposure, the preparation should be disinfected with Concepsis (Ultradent) and then dried. Alternatively, 2.625% sodium hypochlorite can be applied and then rinsed off with water. (Sodium hypochlorite also helps create hemostasis.) An adequate amount of calcium hydroxide to cover the exposure should be applied, and then a small amount of light-polymerized resin-modified glass ionomer should be used to cover the calcium hydroxide, creating a bacterial barrier.

2- Mineral trioxide aggregate (MTA)[2]: A recent material that is used for many applications like the treatment of root perforation, apexification, pulp capping and root end filling. It has the following properties:

- a- Biocompatibility and no mutagenic potential.
- b- Great sealing ability.
- c- Antibacterial activity.
- d- Low cytotoxicity.
- e- Stimulation of mineralized tissue formation.

-However, MTA is expensive

3-Theracal LC pulp capping material and liner:[3]

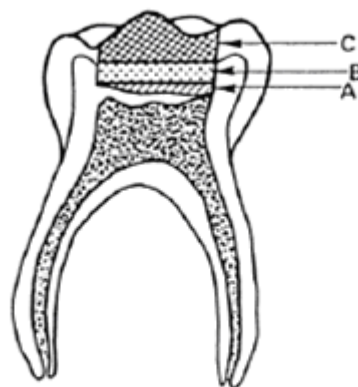
Theracal LC is dentistry's first light-cured flowable resin containing the "apatite stimulating" calcium silicates. It is the first of a new proactive class of internal flowable to serve in protecting and revitalizing pulp tissue and will be described by the profession as a RMCS, or Resin Modified Calcium Silicate.

The significant calcium release:

- provides reparative ions,
- creates a sustaining alkaline environment required to promote wound healing,
- provides immediate bond and sealing properties, and
- stimulates hydroxyl-apatite and secondary dentin formation within affected tissues.

I- Direct pulp capping: It is one appointment procedure which includes the following steps:

- 1- The field must be isolated with a rubber dam to minimize bacterial contamination of the treatment site.
- 2- Soft carious dentin is excavated by sharp explorer.
- 3- We should be careful not to force carious dentin into the pulp chamber.
- 4- A cleansing agent is used as sterile water or saline solution and no air should be used.
- 5- After cleansing the area, the cavity is dried by a cotton pellet and calcium hydroxide is placed.
- 6- If bleeding at the exposure site is arrested and the area is dry, calcium hydroxide is used. If bleeding continues, calcium hydroxide powder is used instead and a sharp excavator is used to remove the excess material from the periphery.
- 7- Glass-ionomer cement is placed over calcium hydroxide to protect the base and to enhance seal, and then ZOE cement is placed.



Direct pulp-capping technique. A, Capping material covers pulp exposure and the floor of the cavity. B, Protective base of zinc oxide-eugenol cement. C, Amalgam restoration.

- For a direct pulp cap to be successful a number of factors have to be met and these are

History	Preoperative assessment	Clinical findings.
No recurring or spontaneous pain. No swelling.	Normal vitality tests. Not tender to percussion. No radiographic evidence of periradicular pathology. Young patient. Radiographically obvious pulp chamber and root canal.	Pink pulp Bleed if touched but not excessively.

II- Indirect pulp capping: It is a two-appointment procedure which is preferred by many clinicians and it is more conservative and more likely to yield favorable results than direct pulp capping.

The following procedures are applied:

- 1- The field must be isolated with a rubber dam to minimize bacterial contamination of the treatment site.
- 2- All peripheral carious dentin is removed with large round bur or spoon excavator.
- 3- The deep soft carious dentin adjacent to the pulp is left without removal.
- 8- Calcium hydroxide is placed over the area and Glass-ionomer cement is placed over calcium hydroxide to protect the base and to enhance seal, and then ZOE cement is placed.

Signs of clinical success of direct or indirect pulp capping

After 4-6 weeks or more the cement is removed and the internal surface of the cavity inspected for remineralization and hard dentin formation. Dentin at the suspected site should be hard with no bleeding. Also, the tooth should be asymptomatic and no history of spontaneous pain.

III-Pulpotomy: It is a conservative therapy performed to remove the inflamed coronal portion of the pulp and preserve the vitality of the remaining radicular pulp.

Indications: a Permanent tooth with incomplete root formation and no history of pain and clinically no abscess, extreme mobility, large carious lesion or mechanical/traumatic exposure. Radiographically, a normal bone structure with no internal or external root resorption and it is a short-term preservation of permanent teeth.

Agents used in Pulpotomy:

- 1- Calcium hydroxide is most widely used.
- 2- Formocresl.
- 3- Glutaraldehyde.

The following procedures are applied:

1- The field must be isolated with a rubber dam to minimize bacterial contamination of the treatment site.

2- Amputation of the pulp and surrounding dentin at a depth of 2mm beyond the exposure and the cutting intermittently and with light pressure.

3- Establish hemostasis and cover the pulp with calcium hydroxide and restore the tooth.

Signs of clinical success of Pulpotomy:

1- No clinical signs and symptoms

2- No radiographic pathology.

3- Continued development of immature roots.

4- Sensitivity to electrical stimulation.

References

1. Ritter, A.V., *Sturdevant's art & science of operative dentistry-e-book*. 2017: Elsevier Health Sciences.
2. Tawil, P.Z., D.J. Duggan, and J.C. Galicia, *MTA: a clinical review*. Compendium of continuing education in dentistry (Jamesburg, NJ: 1995), 2015. **36**(4): p. 247.
3. Arandi, N.Z. and T. Rabi, *TheraCal LC: from biochemical and bioactive properties to clinical applications*. International journal of dentistry, 2018. **2018**.