Tomorrow tonight - Controversies In Dentistry
Complete caries removal vs Selective caries removal.

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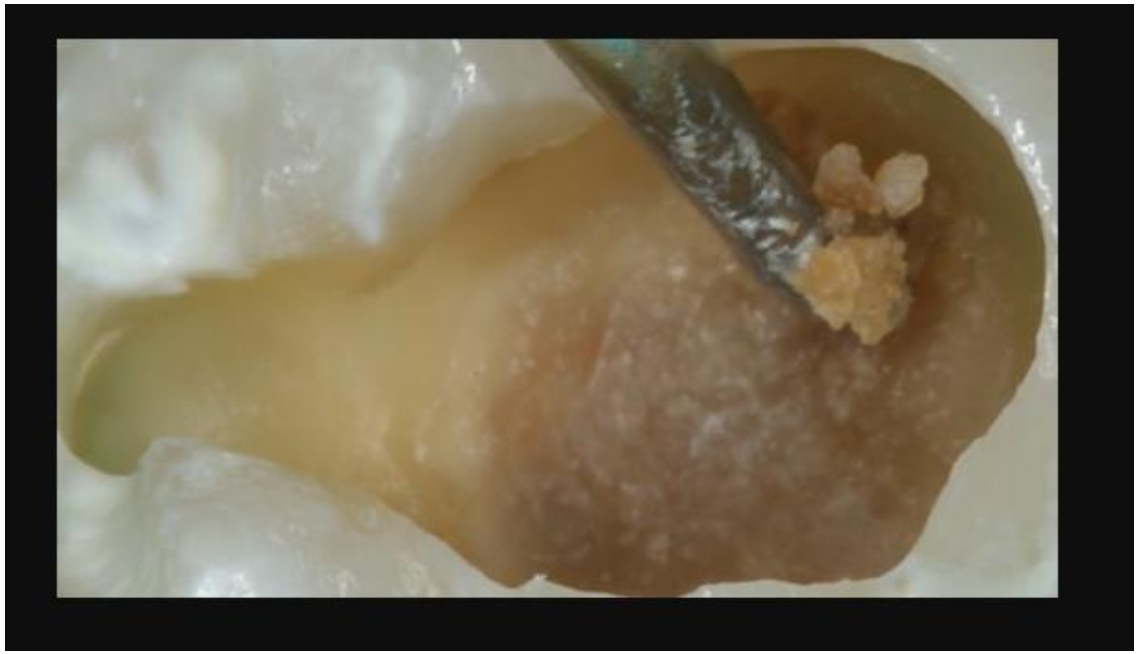
Josh 14 years old

Caries removal

- Complete caries removal / nonselective caries removal to hard dentine
- Selective caries removal / partial, incomplete, minimally invasive, ultraconservative caries removal
- Stepwise excavation

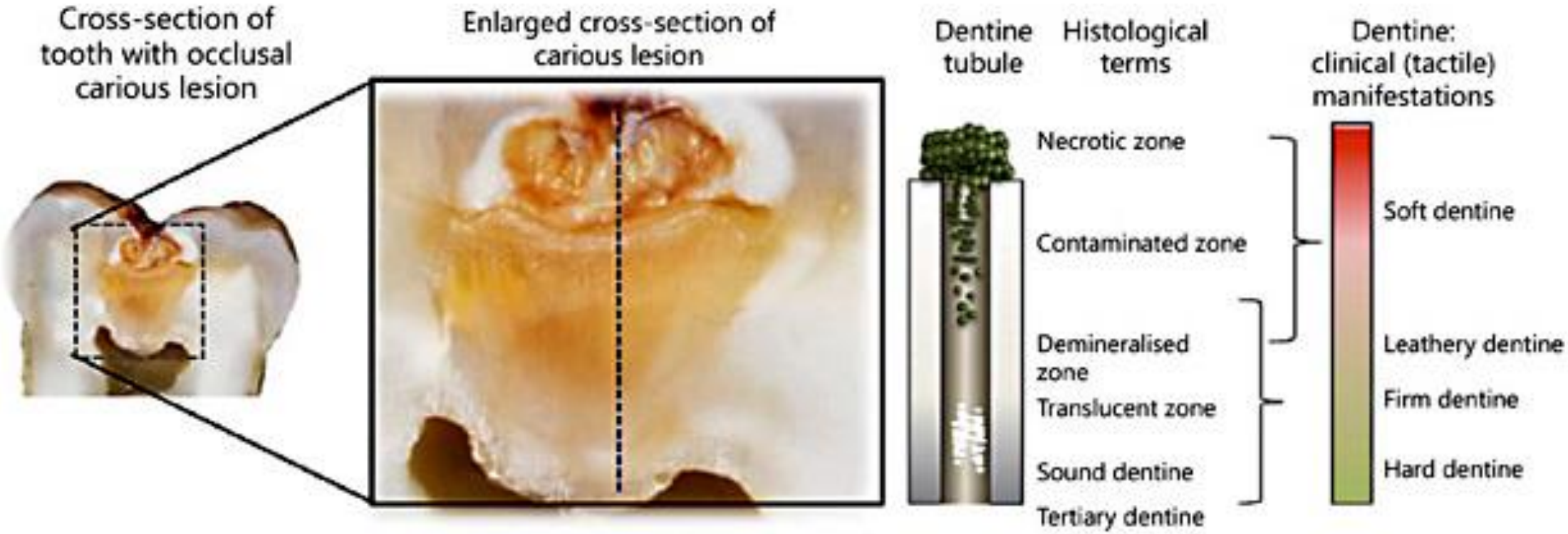


Inner “affected” dentine

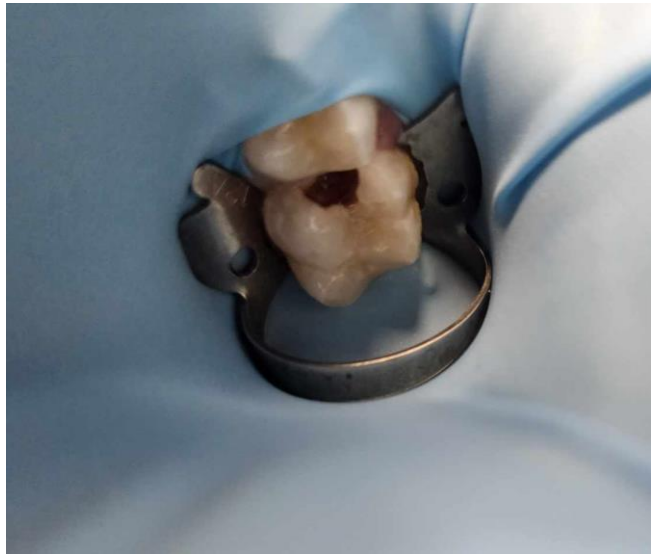
- Few bacteria
- Re-mineralisable
- Vital
- Sensitive
- Useful

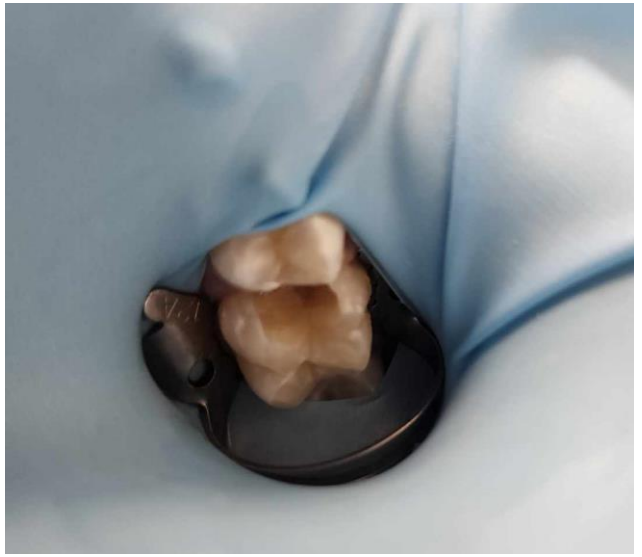
Outer “infected” dentine

- Bacterial invasion
- Un-remineralisable
- Dead
- Without sensation
- Not useful


Cross-section of tooth with occlusal carious lesion
Enlarged cross-section of carious lesion
Dentine tubule
Histological terms
Dentine: clinical (tactile) manifestations
Necrotic zone
Contaminated zone
Demineralised zone
Translucent zone
Sound dentine
Tertiary dentine
Soft dentine
Leathery dentine
Firm dentine
Hard dentine

Old concept

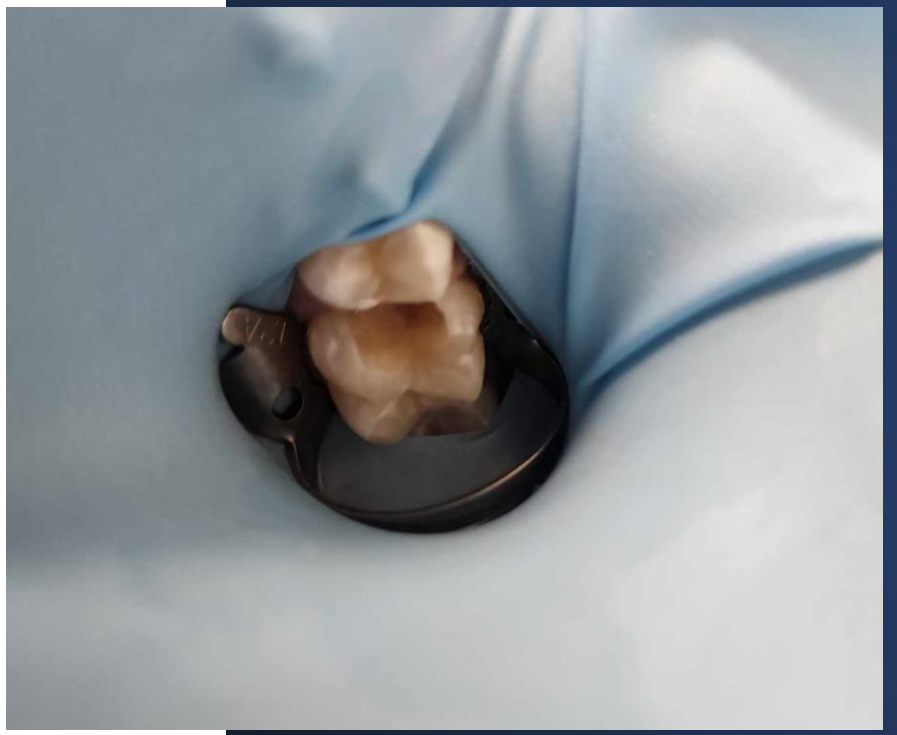




- a lesion with a cavity should receive a restoration after removing all the carious dentin
- Otherwise, the tooth would be at continuous risk of lesion progression and would have an unfavorable prognosis

Non-selective caries removal

- Carious tissue removal is performed until all demineralized dentin is removed to reach hard dentin in the pulpal/axial walls and cavity periphery. This is no longer recommended, being considered over treatment.
- Not indicated now



New Concepts

Research

How clean a cavity should be before the placement of a restoration?

- The understanding that it was impossible to completely remove bacteria from the dentin before a restoration gave rise to a series of studies evaluating the effects of sealing contaminated dentin.
- These studies have focused on different outcomes, as such microbiological counts, clinical characteristics, laboratory analysis, and radiographic findings.

Selective caries removal to firm dentine

- The excavation is performed until a firm dentin is reached (physically resistant to hand excavation) in the pulpal/axial walls of the cavity. The periphery of the cavity should be excavated to hard dentin (similar to sound dentin)
- Indicated for caries lesions in which the risk of pulp exposure is negligible.

Selective caries removal to firm dentine

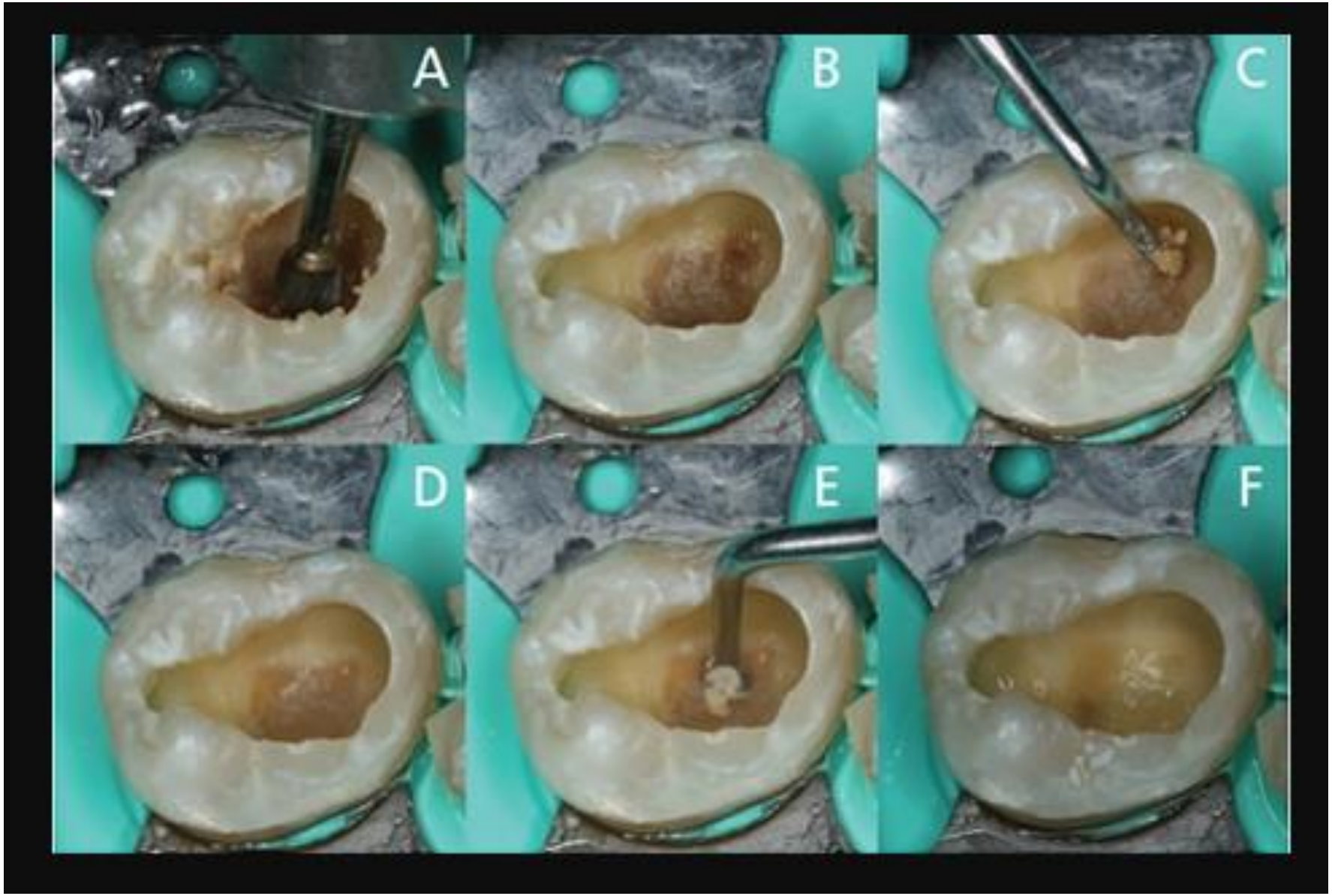


Image courtesy: Clinical treatment of deep caries. Decisions in Dentistry. February 2019;5(2):10—12,14.

Selective caries removal to soft dentine

Selective caries removal to soft dentin.

- Carious tissue removal is performed until soft dentin is reached in the pulpal/axial walls of the cavity. The periphery of the cavity should be excavated to hard dentin.
- Indicated for deep caries lesions, defined as those radiographically involving the inner pulpal third or quarter of dentin or with clinically assessed risk of pulpal exposure.

Selective caries removal to soft dentin.

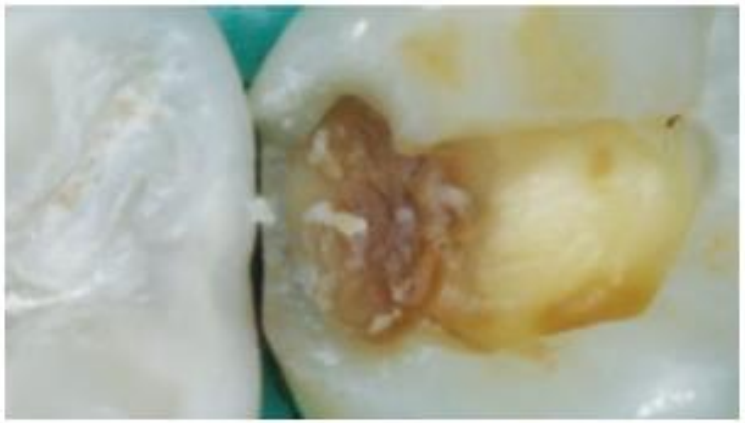


FIGURE 5. *Soft infected dentin remaining at the dentin-enamel junction.*

FIGURE 6. *Infected and affected dentin removed at the dentin-enamel junction with a round bur.*

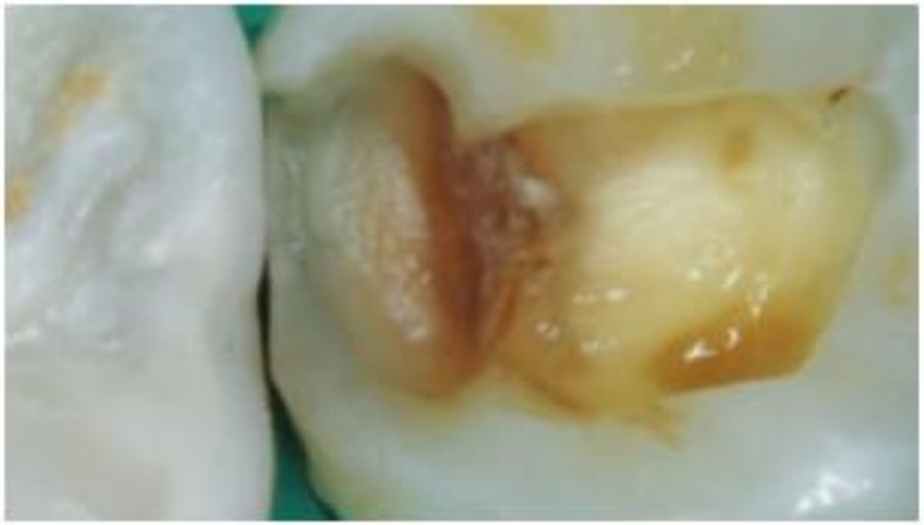


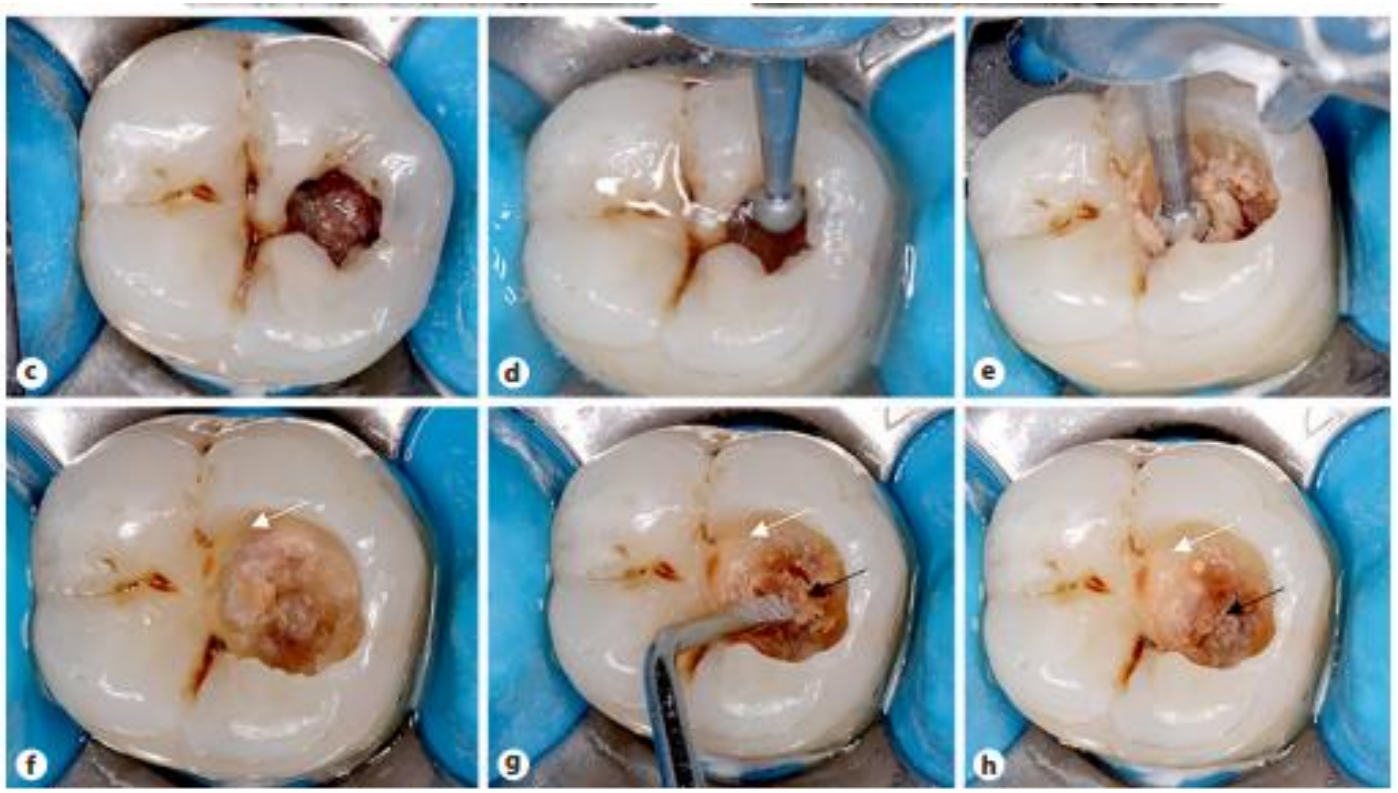
FIGURE 7. *Peripheral sound dentin achieved, with some unsupported enamel at the margins.*

Image courtesy: Clinical treatment of deep caries. Decisions in Dentistry. February 2019;5(2):10—12,14.

Selective caries removal to soft dentine.

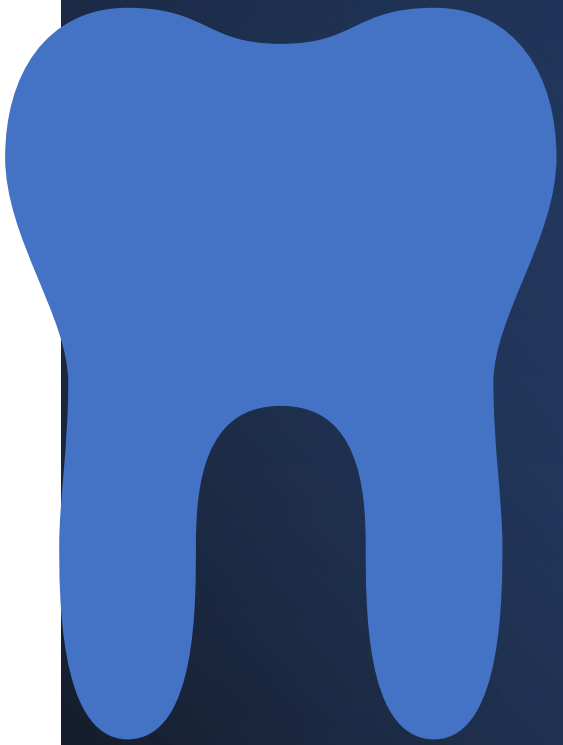
White arrows indicate firm dentin and black arrows soft dentin.

Images courtesy of MSc Rafael Schultz de Azambuja.



Stepwise excavation

- This two-step procedure is a combination of the three previous techniques. At the first visit, selective caries removal to soft dentine is performed in the pulpal/axial walls, the periphery of the cavity is excavated to hard dentin, and a temporary restoration is placed. After a given time interval, the cavity is reopened for selective caries removal to firm dentine in the pulpal/axial walls and placement of the final restoration



Strategies for dentine caries removal

The two main principles for dentin removal are

(1) preservation of dental tissues and

(2) maintenance of pulpal health.

- **The depth of the lesion is a determining factor of the limit of excavation before the placement of a restoration**

Research

- A study concluded that selective removal to soft dentine had a high success rate (100%) compared to selective removal to firm dentine (93%) to treat deep carious lesions in permanent teeth after 2 years of follow-up.
- Age, gender, tooth, cavity type, radiographic depth, ICDAS scores, carious tissue characteristics, and preoperative sensitivity were not correlated with treatment success.
- The high success rates in this study may also be attributed to good coronal sealing. No restoration failure, such as fracture, secondary caries, or marginal gap that may promote detrimental effects of bacteria in the remaining caries tissue, was observed.

(Selective removal to soft dentine or selective removal to firm dentine for deep caries lesions in permanent posterior teeth: a randomized controlled clinical trial up to 2 years Clinical Oral Investigations (2023) 27:2125–2137)

Guidelines

- Preserve nondemineralized and remineralizable tissue
- Achieve an adequate seal by placing the peripheral restoration onto sound dentine and/or enamel, thus controlling the lesion and inactivating remaining bacteria
- Avoid discomfort/pain and dental anxiety, as both significantly influence treatment/care planning and outcomes (methods that are less likely to lead to dental anxiety are preferable)
- Maintain pulpal health by preserving residual dentine (avoiding unnecessary pulpal irritation/insult) and preventing pulp exposure (i.e., leave soft dentine in proximity to the pulp if required)

Recommendations

- Sealing and/or selective caries removal to firm dentin is recommended for the management of shallow and moderate lesions
- As the maintenance of pulp vitality is crucial in the management of deep caries lesions, the selective caries removal to soft dentin is indicated in these cases.
- As there is no reason to reopen the cavity to excavate further, the selective caries removal to soft dentin in a single session is recommended, which will avoid the disadvantages of the stepwise excavation technique related to the need for a second visit.
- Cavity disinfection procedures currently have no evidence of patient benefit to support their use (weak recommendation).
- Placement of cavity-lining materials are not necessary to control the sealed lesion but might be beneficial in impeding monomer penetration and avoidance of fracture of the remaining dentine when resin composite is the restorative material (weak recommendation).

Recommendations

- The choice of materials for restoring cavities should be guided by the location and extent of the lesion, the caries risk, the carious lesion activity, and the specific patient conditions and setting. There is no definitive evidence to support particular materials as more suitable than others for restoring teeth after selective carious tissue removal to soft or firm dentine (weak recommendation).
- Retreatment of restorations should aim to repair by resealing, refurbishing, or repolishing where possible, and replacement should be a last resort (strong recommendation).

(Managing Carious Lesions. Advances in Dental Research 2016 28:2, 58-67)

Thank you!