Restorative Dentistry and it’s related to Pulp health

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Pulp

- Is a **viscous connective tissue** of collagen fibers and **ground substance** supporting the vital cellular, **vascular**, and **nerve** structures of the tooth.

- The pulp contain **blood vessels** and nerves that entre through the **apical foramen**.
The commonly used operative procedures endanger the pulp more than the disease process. Pulp inflammation for which the dentist’s own procedures are responsible may well be designated as (Dentistogenic Pulpitis); that means dentist induced pulpitis.
1. Effect of Local Anesthetic on the pulp
2. Effect during Cutting Procedures.
3. Effect during Lining procedures.
4. Effect during Filling procedures.
5. Effect after restoration (Accumulative Effect)
1- Effect of Local Anesthetic on the pulp

- Vasoconstrictors of LA potentiate and prolong anesthetic effect by reducing blood flow in the area.
- Reduction in blood flow during a restorative procedure could lead to an increase in the concentration of irritants accumulating within the pulp.
2- Effect during Cutting Procedures.

- Pulp trauma results when the pulp is closely approached or the dentine is extensively removed in all type of preparation in the teeth, for amalgam, composite, inlay, crown and bridge preparation.

- Over cutting cavity preparation whether or not the pulp exposure is one of the greatest damage to the pulp.

- A full crown preparation damages every single coronal odontoblast.

- So the depth of cavity affects the pulp as well as the width of cavity also of the same importance.
The immediate reaction of the pulp when cutting dentine is the disturbance of the odontoblasts cells beneath the cut tubules of the cavity, also the stripping of the odontoblast layer from predentine this will be followed by the establishment of acute inflammatory reaction.

Usually, it will resolve into a repair process with subsequent reparative dentine formation.

This will depend on many factors:

1. **The depth of the cavity** the deeper cavity the more damage to the pulp.
2. **Speed of rotation** depend on whether there is water cooling or not, the more speed the more damage unless water cooling is effective. The speed between 3000 rpm to 30000rpm are more damaging to the pulp if used without cooling
3. **Frictional heat** the production of heat within the pulp is the most sever stress that restorative procedures impart on the pulp. A mount of heat produced depends on 1 speed of rotation, 2 size and shape of the cutting instrument, 3 length of time in contact with dentin, 4 amount of pressure exerted on hand piece and 5 if water-air spray is used. A water coolant is more efficient in lowering the temperature than an air coolant.
For the water to be effective it must have sufficient pressure to penetrate the area of turbulence and should be delivered directly at the point of contact between the bur and tooth.

- Temp raised 10 degrees above surrounded temp; cell death occurs.
- **Blushing** of teeth during or after cavity or crown preparation is attributed to frictional heat.
- **Pink or purple** color due to vascular stasis of sub odontoblastic capillary plexus blood flow which ruptures and release RBC’s.

4. **Rebound response due to vibration** increase in speed of rotation not only increase in vibration which affect the pulp, these vibration movement affect odontoblast cells and may cause displacement of these cells on the other side of the pulp.

5. **Extensiveness of preparation** the pulp damage is roughly proportional to the amount of tooth structure removed.

6. **The use of pins** the insertion of pins introducing the hazards of dental fractures or unnoticed pulp exposure or perforation through periodontal ligaments, also the cementation of pins with an irritant material cause more damage in the pulp.
6. **Nature of cutting instrument and hand instruments** produce pressure upon manipulation during cavity preparation or crown preparation or cavity filling.

7. **Drying of dentine** drying of cut dentin with a jet of air produces a rapid outward movement of fluid through the dentinal tubules. Not only does this stimulate sensory nerve fibers (pain), this fluid movement may “draw” odontoblasts up into the tubules resulting in cell death.
3-Effect during Lining procedures

- Materials in general used in dentistry, various filling materials produce some irritation as chemical toxicity, acidity, absorption of water during setting. In deep cavities non irritant lining materials should be used such as Ca(OH)$_2$ or ZOE.
4-Effect during Filling procedures.

A. Correct placement of band retainer and wedge.

B. Correct insertion of the materials to avoid micro leakage and the development of secondary caries.

C. Correct carving of the material to produce the missing part of the tooth and to prevent high spot.

D. Polishing of the restoration should be done and avoid heat generation. Polishing of teeth with rubber cup and polishing of amalgam with pumice will produce heat if exceeds speed and time, so water should be directed to the tooth to prevent damage due to heat.

E. When irritant filling materials is used such as composite a good lining to be placed.
5- Effect after restoration (Accumulative Effect)

- It should be realized that the pulp get damage, when involved with caries and also during the operative procedures, and may get further damage in the pulp after restoration which could be irreversible and it will progress to involve the whole pulp.

- This could give rise to painful symptoms or may proceed without causing any problem to the patient.
Irradiation irritants to pulp
• The pulp of human teeth are affected in patient who are exposed to deep radiation therapy for malignant growth in oral cavity and neck region.

1. In time the odontoblasts and other pulp cells become necrotic.
2. The salivary glands affected resulting in decreasing of salivary flow.

• Radiation causes pulp involvement which should be endodontically treated, extraction of teeth may cause radionecrosis of involved bone.
• Radium is found in human dental tissue for many years after medical occupational exposed.
Clinically important features of the dental pulp
1. With age the pulp become less cellular. The number of cells in the dental pulp decreases as cell death occurs with age.

2. The volume of the pulp chamber with continued deposition of dentine. In older teeth, the pulp chamber decreases in size, in some cases the pulp chamber can be obliterated.

3. An increase in calcification in the pulp occurs with age.

4. With advancing age, the pulp become more fibrous and may contain pulp stones which may be concentric attached to the pulp cavity wall or free in the mass of pulp tissue.
Thank you
Have a nice day