VITAL CALCIUM HYDROXIDE PULPOTOMY

INTRODUCTION

In many instances, when the prognosis for direct pulp capping is doubtful, but when the prognosis for maintaining the vitality and function of the radicular pulp is good, the entire coronal pulp should be amputated, and a calcium hydroxide pulpal dressing should be applied to promote healing of the radicular pulp tissue and maintain the vitality of the tooth. This procedure is known as vital pulpotomy and is a practical option that can be performed in one visit on both primary and permanent teeth.

The condition of the odontoblastic membrane and the pulp tissue determines the treatment plan. The prognosis for vital pulpotomy should be considered good even if the odontoblastic membrane has been pathologically penetrated, provided that the disease process is contained within the confines of the coronal pulp tissue.

If after amputating the coronal pulp tissue, clotting occurs in the normal amount of time, there is an excellent chance that vital pulpotomy will be successful. If bleeding cannot be controlled, or if there is no bleeding whatsoever, root canal therapy is indicated.

Since pulpal degeneration begins in the coronal pulp tissue and progresses apically, early intervention improves the prognosis for this procedure.

Do not confuse vital calcium hydroxide pulpotomy with nonvital techniques that employ fixatives and escharotic agents. Fixatives, such as formocresol, are no longer acceptable and raise serious health concerns. [1,2,3,4,5]

Pulpotomy is also an important procedure for maintaining the vitality of young teeth with wide-open apices and incompletely formed roots so that apexification and/or apexogenesis can occur naturally.

Favorable Conditions for Vital Pulpotomy

1. *A normal radiographic appearance.*
2. *The absence of sensitivity to percussion.*
3. *Not more than a momentary response to thermal change.*
4. *Not more than a reasonable amount of hemorrhage at the exposure site which clots within normal time limits.*
5. *Not more than a small, bead-like serous or purulent exudate without odor.*

If a bead of pus exudes at the exposure site, it is essential to determine if the degenerative process is localized or has spread throughout the pulp. The final clinical verification is made when the roof of the pulp chamber is dissected off and the odontoblastic membrane is visually inspected. When the exposed membrane is healthy and intact, it almost always indicates that the degenerative process has not progressed into the radicular pulp tissue.

In the event the odontoblastic membrane has been mechanically compromised and cannot be clinically evaluated, the health of the radicular pulp tissue can be determined by amputating the coronal pulp tissue at the orifice of the canal(s). Normal clotting time indicates that the radicular pulp tissue is healthy and that the prognosis for pulpotomy is favorable.

If after amputation bleeding cannot be controlled, make a deeper incision into the radicular pulp tissue to determine if normal clotting will occur. It is particularly important to attempt this in incompletely formed teeth.

If bleeding cannot be controlled, or if after amputation there is no bleeding at all, root canal therapy is indicated.

Ultimately, for calcium hydroxide treatment to be successful in vital pulp therapy, the calcium hydroxide dressing must be placed in direct contact with healthy, non-inflamed pulp tissue.[6]

Contraindications for Vital Pulpotomy

1. *A carious exposure with sustained pain upon the application of heat or cold.*
2. *A throbbing toothache with marked sensitivity to percussion.*
3. *Tenderness to vestibular palpation.*
4. *Periapical radiographic changes related to the pulp.*
5. *Extensive restriction of the pulp chamber and root canals.*
6. *In primary teeth if more than two-thirds of the roots are resorbed.*
7. *If upon removal of the roof of the pulp chamber the pulp appears mushy or degenerated.*

Avoiding the Pitfalls of Pulpotomy

1. Prior to removing the overlying dentin to expose the odontoblastic membrane, thoroughly cleanse the cavity and be sure that all dentin particles are removed.
2. After lifting off the overlying dentin, again inspect the area and make sure all dentin particles are removed. If dentin particles get into the stroma of the pulp, it can lead to inflammation and/or internal resorption.[7]
3. When performing the amputation, be sure to slide the curette down the wall opposite the original site of exposure so that the contaminants at the exposure site are not forced into the radicular pulp tissue.
4. Amputation must be performed with a sharp curette to avoid tearing the tissue.
5. Amputate at the orifice of the root canal in posterior teeth, or below the cervical line of anterior teeth. Do not use a bur for this purpose.
6. Hemorrhage must be controlled with sterile cotton pellets under pressure. Never use escharotic agents.
7. If clotting does not occur in normal time, a deeper incision must be made or the pulp should be removed. Abnormal clotting is indicative of granulation or inflammatory tissue. To accelerate clotting in a healthy pulp, apply a cotton pellet that has been dampened with a local anesthetic containing epinephrine.
8. Be sure that the pulpal dressing is placed in direct contact with the pulp tissue and not in contact with an extra-coronal blood clot. Placing the dressing in contact with a blood clot may cause internal resorption.[8]
9. A hard base must be placed over the dressing to seal the dressing in place and provide support for the final restoration. Flowable materials are ideal for this purpose.
10. Vital pulpotomy is a one-visit procedure. Immediately place an interim or final restoration. Never place a temporary restoration such as ZOE or temporary stopping materials.
11. Do not reenter the tooth during the healing process. Wait at least three months if healing is uneventful.
12. A positive seal against bacterial invasion is mandatory for best results.