



APEXIFICATION AND APEXOGENESIS

INTRODUCTION

Root canal therapy for teeth with incompletely formed roots and necrotic pulps poses difficult problems for the clinician. The success of root canal therapy depends on obtaining a positive apical seal, therefore, it is important to induce apical closure whenever possible.

Calcium hydroxide has been shown to promote apexification in nonvital teeth and is the recommended agent for this purpose. It is believed that calcium hydroxide stimulates the undifferentiated mesenchymal cells to differentiate into cementoblasts, which initiates cementogenesis of the apex.

There are also cases of apexogenesis in which the root continues to develop even after an apical calcific barrier has formed. Apexogenesis is possible when there is no disturbance of either the dental follicle, Hertwig's sheath or the dental papilla; therefore, special care must be taken to avoid causing any damage to the tissues beyond the apex.

EARLY USES OF PULPDENT PASTE FOR APEXIFICATION



Figure APEX1
Shows incompletely formed maxillary left central incisor (#9).

In 1965, I saw an 8-year-old child who had a nonvital pulp due to trauma and a wide-open apex (*APEX 1*). After preparing the canal, I decided to place calcium hydroxide in the tooth to see what would happen, so I filled the canal with Pulpdent Paste.

The child was seen regularly, and a radiograph taken after eight months shows blunted closure of the apex with a calcific barrier (*APEX 2*). I proceeded to fill the canal with Pulpdent Root Canal Sealer using the Pressure Syringe. *Figure APEX 3* is a radiograph taken two years later. Note the blunted calcific barrier and the normal development of the adjacent lateral.



Figure APEX2
Shows apexification eight months following treatment with Pulpdent Paste. Note eruption of the lateral incisor.

This was the first case where I used calcium hydroxide to stimulate hard tissue formation at the apex.



Figure APEX3
Two-year follow-up radiograph shows obturation of #9 with Pulpdent Root Canal Sealer. Note fully erupted lateral incisor.

Shortly after that, I used the same procedure on another case. The canal was prepared, Pulpdent Paste was placed in the canal, and apexification occurred in nine months (*APEX4 & APEX5*).



Figure APEX4
Shows apical closure of a traumatized tooth nine months following treatment with Pulpdent Paste.



Figure APEX5
Shows the same tooth obturated with Pulpdent Root Canal Sealer using the Pressure Syringe Technique.

The following is a third case from the same period. Again, apexification occurred following treatment with Pulpdent Paste (*APEX6 & APEX7*). Over the years, many investigators have corroborated these findings.



Figure APEX6
Shows closure of the apex of a traumatized tooth six months following treatment with Pulpdent Paste.



Figure APEX7
Shows the same tooth obturated with Pulpdent Root Canal Sealer using the Pressure Syringe technique.