

Effect of calcium hydroxide application time on dentin

Q Does application time of calcium hydroxide affect the physical and compositional aspect of dentin during root canal treatment?

A Currently calcium hydroxide is often used as an intra-canal medication during root canal treatment. It has a pH of approximately 12.5, and it has antimicrobial activity, tissue-dissolving ability, inhibits tooth resorption and induces repair by hard tissue formation. It has been promoted for intra-canal placement for various endodontic conditions, including apexification, apexogenesis, after trauma to prevent or resolve external resorption, and with routine root canal treatment in infected canals.^{1,2} Although the use of long-term calcium hydroxide dressing for apexification has declined with the use of mineral trioxide aggregate (MTA), calcium hydroxide is still the preferred short-term intra-canal medicament of choice, and it is sometimes placed in the root canal for weeks.

However, it has been suggested that long-term use of calcium hydroxide may have an adverse effect on physical property of dentin, making it more susceptible to root fracture. In many *in vitro* studies, it has been reported that use of calcium hydroxide dressing for 5 weeks or more, causes a decrease in root fracture resistance.³⁻⁵

The exact mechanism of such strength reduction is unknown, while it has been suggested that the alkaline pH of calcium hydroxide might either denature the organic matrix or breakdown the dentine inorganic matrix.⁶ Some authors^{5,7} suggested that the denaturing of organic matrix is better supported by the high pH, and the since the organic fibrils are encapsulated by the inorganic hydroxyapatite, it takes some time (e.g. 4 weeks in some studies) for calcium hydroxide to penetrate, causing the dentin to be more brittle and rendering it more susceptible to fracture.

Although it is difficult to conclude that such *in vitro* results directly reflect clinical situations, routine use of long-term calcium hydroxide dressing should be avoided if possible. Therefore, while calcium hydroxide is a very effective intra-canal medicament, it should be used with caution for periods longer than 1 month, especially in traumatized immature teeth with thin root walls, which are more prone to root fracture.

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References

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