

ORIGINAL ARTICLE

Effectiveness of Calcium Hydroxide (CaOH) as agent for Direct Pulp Capping in the Mandibular Molars

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ABSTRACT

Background: Direct Pulp Capping technique has been in use as a treatment therapy to sustain a vital pulp. The substitute procedure to the endodontic therapy or extraction is precise & successful pulp capping. Calcium hydroxide (CaOH) is considered as gold standard agent for pulp capping because of antibacterial characteristics & ability to form dentinal bridge. Calcium hydroxide has also shown great results on peri-apical healing process.

Aim: To evaluate success rate of direct pulp capping when CaOH is used as a direct pulp capping agent

Setting: Multan Dental College Multan

Methodology: Sample size 60 cases. Patients of 15-40 years age group were selected with the exposure of the vital pulp by caries or Trauma in permanent lower molars clinically. Those cases with pinpoint (precise) exposure of pulp were selected. Flow of blood from site of exposure should be ceased inside two to three minutes after the applying the soaking cotton pallet with the saline.

Results: 25 were woman (41.67%) and 35 were men (58.33%). Overall percentage of success is 80% which means that 48 patients had showed effectiveness, while twelve patients had shown failure of pulp capping

Conclusion: We conclude that Calcium hydroxide is a choice for the direct pulpal capping. When a site of exposure is sealed/ wrapped by means of calcium hydroxide, the odds of the failure may decrease, and prognosis might be good.

Keywords: Calcium hydroxide, Direct Pulp Capping, Postoperative X-ray, follow-up

INTRODUCTION

One of imperative aims of all endodontists is the reservation of vitality of the pulp. Pulp could be accidentally or traumatically uncovered during the formation of cavity. Biocompatible material can be used to cover the exposed pulp. Procedure of positioning of material or the medicament against a pulp exposure (direct) during excavation of the caries is termed as direct pulp capping. This technique has been in use as a treatment therapy to sustain a vital pulp¹. This technique helps in creation of dentinal bridge that provides pulpal safety². RCT & tooth extraction can be avoided, if direct pulp capping discloses better amount of success³.

Amount of success with the direct pulp capping technique may differs & is dependent on the technique as well as materials used. In the humans, success amounts oscillate from 30 to 85% in few retrospective studies^{4,5}.

Calcium hydroxide (CaOH) is considered as gold standard agent for pulp capping. Antibacterial characteristics of CaOH can lessen the contamination of the pulp from microbacteria's. Reduced perforation of the bacteria can increase the survival of tissues of the pulp. Dentin matrix, counting BMP (Bone-Morphogenetic Protein) as well as TGF-β1 (Transforming Growth Factor-Beta One) can repair/restore the tissues of pulp, thus forming dentinal bridge. These growth factors are stimulated by Calcium

hydroxide. Nonetheless evidence is not understandable about this process of repair. In addition to this, calcium hydroxide also has few drawbacks like high solubility, calcification of the pulp chamber, degradation with time, & tunnel formation. Tunnel defects within dentin bridges might give an alleyway to entrance of microorganisms^{6,7,8}. Calcium hydroxide and water is formed by MTA as well on setting. By product calcium hydroxide provides biocompatibility and pulpal repair property to MTA. MTA (Mineral trioxide aggregate) is also a fresh advancement in science of the dental materials that is also in use as direct agent for pulp capping⁹⁻¹¹.

Histologically MTA develop thicker/denser dentinal bridge than that of CaOH. Clinical successful outcome is not certainly linked with thickness of the bridge. Clinical success ought to measure via vitality test of pulp as well as absenteeism of indications of pulpal pain¹². Previous publications are evident that MTA is also a better material for direct pulp capping^{13,14}.

The objective of study was to evaluate success rate of direct pulp capping when CaOH is used as a direct pulp capping agent.

MATERIAL & METHODS:

Patients were in the Operative Dentistry department, MMDC Multan. Sample size 60 cases. Patients of 15-40 years age group were selected with the exposure of the vital pulp by caries or Trauma in permanent lower molars clinically. Those cases with pinpoint (precise) exposure of

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pulp were selected. Flow of blood from site of exposure should be ceased inside two to three minutes after the applying the soaking cotton pallet with the saline. In order to isolate a tooth prior to the procedure, a rubber dam ought to be used.

Bleeding was controllable at the site of exposure in two to ten minutes having no observable caries round the site of exposure clinically. Patients presenting history of irreversible pulpitis, apical/furcal radiolucency radiographically, internal resorption, & existence of sinus tract / the external fistula on clinical checkup were excluded. Well-versed consent was gained from the patients. Anesthesia was injected to teeth and rubber dam was used for isolation. Tungsten carbide bur was used for the removal of caries.

After controlling the bleeding in two to ten minutes, CaOH was placed in creamy consistency on site of exposure. After it's hardening, GIC was placed on CaOH as per a lining agent. When GIC was set, the hole was jam-packed with an amalgam.

Base line radiograph was recorded instantly afterwards procedure so as to compare it with that radiographs recorded on the follow-up visit.

On follow-up after 3 months objective & subjective assessment/determination of pain was checked on the basis of past history & clinical inspection which comprised of percussion in the vertical as well as horizontal directions. Subjective pain "is the one which patient felt post operatively till follow up". Pain while percussing the tooth was indicative of the objective pain. Thermal tests were done to assess the vitality. Nonappearance of symptoms as well as signs of irretrievable inflammation of the pulp was the indication of successful treatment. Third month 's radiograph was used to assess the tooth's periapical radiolucency.

Material for straight pulp capping was well-thought-out as fruitful if the patient was pain free objectively & subjectively on percussion & history respectively and the tooth was vivacious by thermal test having no periapical radiolucency. All the information/data will be kept & recorded in predesigned Performa. All this procedure was completed by single individual. The variables were gender of the patient, age, & effectiveness. The quantitative data that was age will be presented as mean with standard deviation. Qualitative variables include gender, & outcome variable effectiveness includes response to hot and cold stimulus, pain, periapical radiolucency & periodontal rank of tooth.

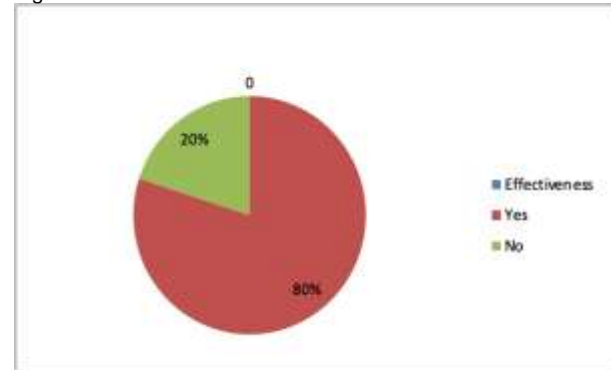
RESULTS

Sixty teeth were treated in the 60 patients. 25 were woman (41.67%) and 35 were men (58.33%). Age of the patients was ranged b/w 15-40 years (table 1). Overall percentage of success is 80% which means that forty-eight patients had showed effectiveness, while twelve patients had shown failure of their pulp capping (Figure 1).

Table 1: Gender distribution

Gender	n
Female	25
Male	35
Total	60

Fig. 1: Effectiveness of MTA



DISCUSSION

In this study the rate of success is 80%, which is like that stated in another study by Mostafa NM (77.6%)¹³. In the research of Ghajari MF, clinical rate of success for CEM cement group was 94.8%, which is better than the outcome of our study¹⁵.

Consequences of the pulpal exposure from tooth preparation, trauma or caries might be severe & serious, resulting in pain and the infection. The morbidity related with treating the pulpal exposures is consequential, and often demanding either extraction or the root canal therapy/treatment. Both, the tooth loss and its replacement, or tooth restoration and the endodontic treatment, involve numerous appointments as well as considerable cost. The substitute procedure to the endodontic therapy or extraction is pulp capping¹⁶.

In straight pulp capping procedure, dental material or medicine/medicament has been used for dressing of exposed pulp, keeping in mind the aim to preserve overall health as well as vitality of entire pulp. Several endodontists have been consuming this technique of straight pulp capping for over 200 years¹⁷.

Clinical practitioners have used various procedures & materials for straight pulp capping, together with CaOH, resin modified GIC, tricalcium phosphates, hydrophilic resins, and more latest MTA¹⁸. One study stated a 100% decrease in microbes associated with the pulpal infections after 1hour contact with the calcium hydroxide. Calcium hydroxide is thought to influence pulpal repair by 1 or more of various mechanisms of action¹⁹.

Success rate for CaOH in straight pulp capping is 79.4%²⁰. This outcome is like that of our study. Johannes Mente et al made comparison of radiographic & clinical evaluation of MTA & CaOH in the direct capping. Effectiveness in our study is same as in that research²¹.

It has been documented that pulp of a tooth may form a dentine bridge (hard tissue barrier) after pulpotomy or direct capping of pulp²². An imperative aspect of pulpal treatment is that an issue of selecting that biological/ biotic material for pulp capping which can affect the remaining vital pulp¹⁸.

The characteristics of CaOH arise from its dissociation into the hydroxyl ions and Calcium ions. Action of these two ions on bacteria and tissues clarifies the antimicrobial & biological properties of this material. We can say that, Dentine is thought as best pulpal

shielding/protective, and CaOH has proved, via several researches, its capability of encouraging the development of the mineralized bridge over entire pulp tissue. It is essential, when possible, to offer time for CaOH paste to manifest its potential of action on microbes present in the endodontic infections. The preservation of a great concentration of the hydroxyl ions can alter the enzymatic activity of bacteria and stimulate its inactivation. Site of the action of hydroxyl ions of CaOH includes those enzymes present in cytoplasmic membrane. Calcium hydroxide also promotes, have improved and shown great results on peri-apical healing process²³.

Suhag K reported 69% success rate for CH which is not identical to our study²⁴. The administration of the capping material at the site of exposure is very significant for the clinicians²⁵.

CONCLUSIONS

Calcium hydroxide is a choice for the direct pulpal capping. When a site of exposure is sealed/wrapped by means of calcium hydroxide, the odds of the failure may decrease, and prognosis might be good.

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