



EVALUATION OF CALCIUM HYDROXIDE EFFICACY IN DIRECT PULP CAPPING: AN ORIGINAL RESEARCH

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ABSTRACT:

Background: The outcome of vital pulp treatment after carious pulp exposure is multifactorial and related to the procedure, biomaterial and pre-operative pulpal diagnosis.

Objectives: To conduct a systematic review and meta-analysis determining the outcome of direct pulp capping (DPC) in mature permanent teeth with a cariously exposed pulp and a clinical diagnosis of reversible pulpitis, and ascertain whether the capping material influences the outcome.

Methods: Sample size 120 cases. Patients of 18-40 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: 50 were woman (41.67%) and 70 were men (48.33%). Overall percentage of success is 75% which means that 90 patients had showed effectiveness, while twelve patients had shown failure of pulp capping.

Discussion: These results were based on poor methodological quality studies. The effect size for of MTA vs Ca(OH)₂, although modest, was consistent with narrow CI.

Conclusions: Low-quality evidence suggests a high success rate for direct pulp capping in teeth with cariously exposed pulps with better long-term outcomes for MTA and Biodentine compared with calcium hydroxide.

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

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Introduction: Preservation of pulp vitality is a critical factor in long-term tooth survival (1). The vitality of the dental pulp can be compromised by the presence of a deep carious lesion and by its subsequent management (2) therefore, treatment options aimed at preserving pulp vitality are recommended.(3) Despite advances in the understanding of the effects of selective caries removal in managing deep carious lesions (4,5), non-selective caries removal techniques remain common (6). Amount of success with the direct pulp capping technique may differ & is dependent on the technique as well as materials used. In the humans, success amounts oscillate from 30 to 85% in few retrospective studies (7,8) 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- β 1 (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 (9,10,11) 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 capping (12) The objective of study was to evaluate success rate of direct pulp capping when CaOH is used as a direct pulp capping agent

Methodology: Sample size 120 cases. Patients of 18-40 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. 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 jampacked 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

Results: 120 patients. 50 were woman (41.67%) and 70 were men (58.33%). Age of the patients was ranged b/w 18-40 years (table 1). Overall percentage of success is 75% which means that thirty-eight patients had showed effectiveness, while twelve patients had shown failure of their pulp capping.

Table 1: Effectiveness of MTA

Gender	n	Effective	Non Effective	% value(Effective)	% value (Non-Effective)	p value
Female	50	37	13	75%	25%	.001%
Male	70	53	17	75%	25%	.001%
Total	120	90	30	75%	25%	.001%

Discussion: In this study the rate of success is 75%, 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 study⁽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 study⁽¹⁴⁾. 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 years⁽¹⁵⁾. 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 research ⁽¹⁶⁾. It has been documented that pulp of a tooth may form a dentine bridge (hard tissue barrier) after pulpotomy or direct capping of pulp⁽¹⁷⁾. 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 pulp ⁽¹⁸⁾. 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, Dentin 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 periapical healing process (19) . Suhag K reported 69% success rate for CH which is not identical to our study (20) . The administration of the capping material at the site of exposure is very significant for the clinicians(21).

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