

## SUCCESS OF PULP CAPPING IN MAXILLARY ANTERIOR TEETH - A RETROSPECTIVE ANALYSIS

<sup>1</sup>Ashwin Shravan Kumar, <sup>2</sup>Dr. Pradeep.S\*

<sup>1</sup>Graduate Student, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences (SIMATS) Saveetha University, Chennai, India. Mail id: 151701017.sdc@saveetha.com

<sup>2</sup>Associate Professor, Department of Conservative dentistry and Endodontics Saveetha dental college Saveetha Institute of Medical and Technical Sciences (SIMATS) Saveetha University, Chennai, India. Mail id: pradeeps@saveetha.com 9710404482

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### ABSTRACT

**Introduction:** The ability of the pulp to form reparative dentine is a mechanism that protects pulp tissues from bacterial toxins diffusing from carious lesions. The amount of reparative dentine produced is proportionally equal to the amount of dentine destroyed previously. The factors that change dentine permeability includes alteration to the odontoblastic processes that occurs in dentinal tubules and the lining of the tubules, the lamina limitans. Dentinal sclerosis under caries lesion reduces the permeability, thus decreasing the quantity of irritants that are introduced into the pulp

**Materials and methods:** The clinical records of 54 pulp capping cases during the period between January 2020 and 1 March 2021 were . Total number of root canals done after pulp capping were taken into account. Gender and age of the patients were also included in the study.

**Results:** From the above graphs it can be seen that majority of anterior maxillary pulp capping were successful in male compared to females. Direct pulp capping involves the placement of a medicated dressing on the pulp exposure and is indicated when a healthy pulp has been exposed during an operative procedure or trauma. The tooth has to be asymptomatic, and the exposure site has to be pinpoint and free of contamination

**Conclusion:** Within the limitations of the study it can be said that successful pulp capping were mostly reported in indirect type in the upper anterior region.

**Keywords:** Anterior, Capping, Innovative, New, Pulp

### INTRODUCTION:

The ability of the pulp to form reparative dentine is a mechanism that protects pulp tissues from bacterial toxins diffusing from carious lesions. The amount of [1,2]reparative dentine

produced is proportionally equal to the amount of dentine destroyed previously . The factors that change dentine permeability includes alteration to the odontoblastic processes that occurs in dentinal tubules and the lining of the tubules, the lamina limitans. Dentine sclerosis under caries lesions reduces the permeability, thus decreasing the quantity of irritants that are introduced into the pulp[3] . The inflammatory reaction of the pulp develops long before it is actually infected. Before the inflammation appears in the pulp tissues, there are changes in the odontoblastic layer, in the form of a reduction in the number and the size of odontoblasts [4]. The extent of pulpal inflammation beneath caries depends on the depth of bacterial invasion, the degree of dentinal sclerosis and reparative dentine formation. The inflammation includes vascular and cellular responses; vasodilatation increases blood vessel permeability leading to the accumulation of leukocytes . Neutrophils migrate from blood vessels to the injury site. These elements appear when complement is activated in the presence of antigen-antibody complexes. Histologically cariously exposed pulp has micro-abscess formation under the penetrating caries [5].

Physical trauma of teeth results in dentinal fluid desiccation that may cause sufficient damage to the pulp and its blood supply to result in inflammation. This immediate response results in the production of endogenous inflammatory mediators, that is, kinins, neuropeptides and prostaglandins, which increase vascular permeability, blood stasis, and leukocyte extravasations [6]. The resultant compromised circulation may lead to haematogenous pulpal infection. In severe trauma with the immediate interruption of the blood supply, the pulp becomes necrotic without bacterial invasion. In this situation the optimal time for treatment is within the first 24 hours, when pulp inflammation is superficial.

## TREATMENT PLANNING

### Retaining immature teeth

Retaining immature permanent teeth may present endodontic and restorative problems. Restorative treatment is difficult because :

- the apex is immature and open;
- there is thin root dentine;
- the dentine tubules are large and patent;
- the pulp volume is large and the canal is wide;
- there is a short clinical crown leading to an adverse crown-root ratio.

The success of conventional root canal treatment and filling in mature teeth is dependent on a closed apex against which the correct working distance can be measured, the canal prepared and the gutta percha condensed. In immature teeth, there is no apical stop and instead of normal flared shape of the canal, the walls of the root canal are parallel or even wider at the apex than the coronal level. Canal preparation requires large instruments and in some cases conventional cold gutta percha filling may not obturate the canal fully. Even after root filling has been achieved, there is still risk of failure; the thin dentine walls may not be strong enough to support a post and adhesive crown-ratio of the immature tooth means that the length of post is

insufficient to support a crown. It has been shown that endodontic preparation can significantly diminish resistance to coronal-radicular fracture[7]. When there is a poorer long term prognosis for the first permanent molars and the crown cannot be restored they are usually extracted. Our team has extensive knowledge and research experience that has translate into high quality publications[8–17],[18–21],[22–26],[27].

The aim of this article is to evaluate the success of pulp capping in maxillary anterior teeth.

## **MATERIALS AND METHODS**

The study was done as a retrospective, single centered study. Ethical approval was obtained from the Institutional Ethical Committee (Ethical approval number. SDC/ SIHEC/ 2020/ DIASDATA/ 0619-0320). We reviewed case records of the data of patients who had pulp capping in maxillary anterior teeth . Incomplete data were excluded. Age, gender and the site of pulp capping were collected. These data were cross verified with photographs and radiographs. The collected data were analysed using SPSS statistical software. Descriptive statistics (percentage, mean, SD) and inferential test (Chi-square test) were done appropriately.

## **RESULTS AND DISCUSSION**

Extracting immature teeth, There are potential restorative and orthodontic problems in managing space, should the tooth be lost. The replacement of a lost immature incisor by a simple denture until the occlusion has stabilized i.e. with all the permanent dentition present will often mean that the child has to wear a denture for a period of up to five years.

The prosthesis needs to be regularly checked and adjusted to allow the eruption of adjacent teeth. There are also the aesthetic and social disadvantages of an active child wearing a denture which may well bring unwanted attention to his/her dental handicap extracted [28] .

The extractions of immature permanent molars cause orthodontic problems in the management of buccal segment spaces. Satisfactory results may be achieved by extractions only in Class 1 cases with mild crowding, providing the timing of the extraction is correct.

It is accepted that “early” extraction, which is at a dental age of 8-9 years when the bifurcation of second molar is calcifying, will frequently allow eruption of the mandibular second permanent molar into a good relation with the mandibular second pre- molar. In the maxillary arch, timing is less critical [1,29,30].

The review of dental problems associated with tooth loss and root canal treatment is outlined above suggests that an alternative approach would be dis- cussed. The maintenance of pulp vitality of immature permanent teeth will help reduce the needs for ex- tensive treatment and avoid root fracture even after successful apexogenesis which causes the tooth loss. Such methods of treatment as pulp capping, partial and cervical pulpotomy can help to prevent the ap- pearance of these problems [2].

From the above graphs it can be seen that majority of anterior maxillary pulp capping were indirect. Direct pulp capping involves the placement of a medicated dressing on the pulp exposure and is indicated when a healthy pulp has been exposed during an operative procedure or trauma. The tooth has to be asymptomatic, and the exposure site has to be pinpoint and free of contamination [31]. If there is trauma, the interval before first treatment must be short (<24 h.). Usually the dressing material placed over the wound is calcium hydroxide; the cavity is then sealed to prevent microleakage.

The success of pulp capping procedures relies on the ability of calcium hydroxide to disinfect the superficial pulp and dentine. The quality of the bacteria-tight seal provided by the restoration is also an important factor in successful pulp capping. Recontamination through restoration microleakage reduces the success of the procedure [32]; in such a situation calcium hydroxide loses its antibacterial effect leading to a hard tissue barrier which has structural defects, increasing dentine permeability and provides the potential for bacteria to gain direct contact with the underlying pulp.

The reported success rate of pulp healing for incisors is 80%, and for molars – 40-50% [33,34]. Some study has been done on the dependence of success rate from age, sex, teeth, spontaneous pain, size of exposure and bleeding; calcium hydroxide has been used as a dressing material.

No significant influence on the success rate of previously mentioned factors was found except that less bleeding rises up the healing of pulp tissues [1]. Recent research gives a possibility to use bonding agents as a dressing materials, but the results are not clear [3,5].

Our study did reveal statistically significant association between success of pulp capping and maxillary anterior teeth, but this could also be due to the small study size.

## **CONCLUSION:**

Within the limitations of the study it can be said that successful pulp capping was mostly reported in indirect type in the maxillary anterior region. In future more sample sizes are required to evaluate the performance of various pulp capping procedures with different materials.

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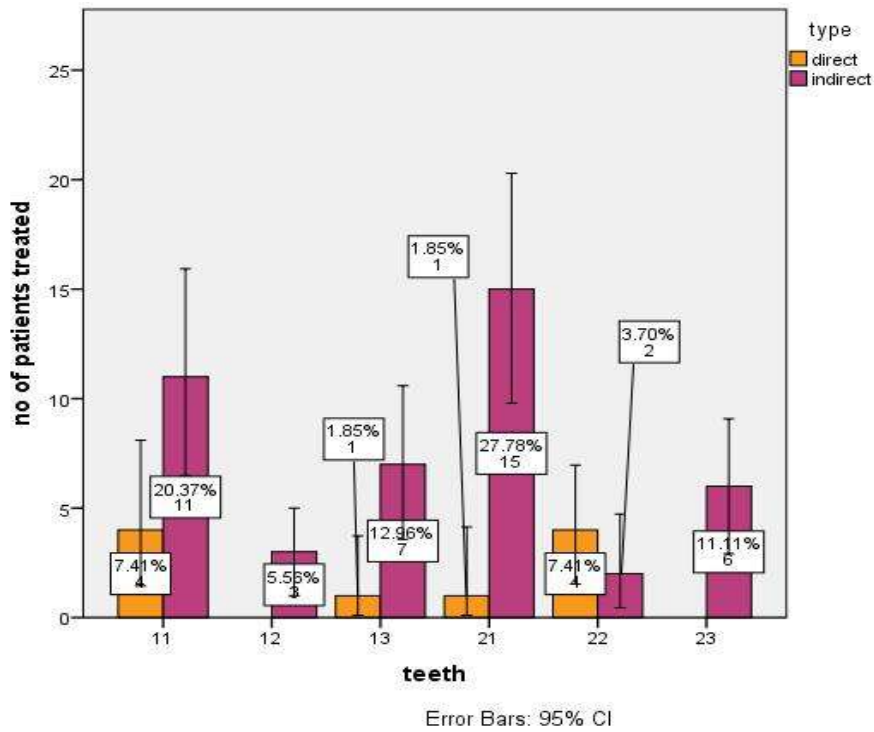
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**Fig 1** represents the total number of successful pulp capping in each maxillary anterior teeth by type of pulp capping. X axis represents teeth (11,12,13,21,22,23), Y axis represents type (orange- direct ,violet -indirect ). Chi square analysis was done and the p value was <0.01 and there is statistically significant difference between teeth and type of pulp capping. Indirect pulp capping procedures were done the most.

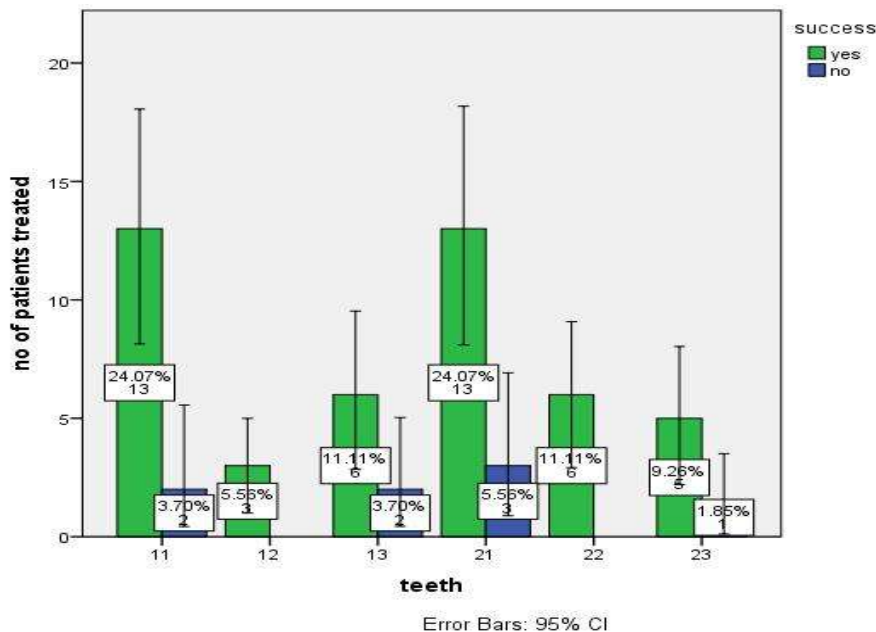




Fig 2 represents the total number of successful pulp capping in each maxillary anterior teeth by type of pulp capping. X axis represents teeth (11,12,13,21,22,23), Y axis represents outcome (green=yes, blue=no). Chi square analysis was done and the p value was <0.01 and there is statistically significant difference between teeth and outcome. Successful outcome presented in all the teeth.

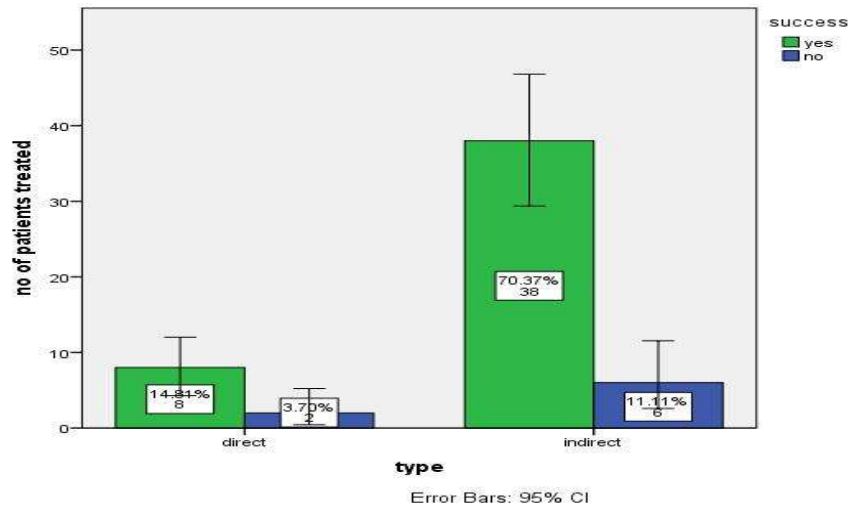


Fig 3 represents the total number of successful pulp capping in each maxillary anterior teeth by type of pulp capping. X axis represents type (direct, indirect), Y axis represents outcome (green=yes, blue=no). Chi square analysis was done and the p value was <0.01 and there is statistically significant difference between type and outcome of pulp capping. Indirect pulp capping had more successful outcomes.