Management of Deep Carious Lesion with Single Visit Indirect Pulp Capping: A Case Report

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Abstract

Background: Preservation of pulp vitality is of utmost importance during management of deep caries cases. There remains a possibility of pulp tissue to repair upon excavation of caries with no pulpal exposure. However, in case of exposure of pulp, such type of minimally invasive management becomes doubtful & impulsive. Indirect pulp capping(IPC) treatment plays an essential role in these cases to prevent pulpal exposure.

Case Presentation: This case report describes the single visit indirect pulp therapy in mandibular molar. Patient reported with a chief complaint of food lodgement and mild intermittent pain. There was no history of night pain and/or spontaneous pain. The clinical and radiological evaluation revealed no peri-radicular pathosis and no pulpal involvement. The tooth was examined for vitality using electric pulp test and revealed vital pulp. The treatment was done with the protocol of Single Visit Indirect Pulp therapy using light cure calcium hydroxide and cavity was disinfected with 2% chlorhexidine. Cavity was lined with Glass Ionomer Cement and final restoration was done using Composite resin restoration. The patient was followed up till 6 months and showed satisfactory outcome eliminating the need for more invasive approach as root canal therapy.

Conclusion: Indirect pulp therapy is a safe, economical and proven treatment option in the teeth that have not involved pulp and with sound peri-radicular tissues. The success of Indirect Pulp Capping relies on proper case selection and diagnosis, complete isolation, caries removal and disinfection with selection of suitable pulp capping material.

Keywords: *Indirect pulp capping, indirect pulp therapy, single visit indirect pulp capping, calcium hydroxide, pulp capping, deep carious lesion.*

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Introduction

Deep carious lesion has always been the major topic of attraction.[1] The diagnosis of actual condition of pulp is complicated by the overlying caries, hence it is difficult to precisely diagnose the tooth vitality.[2] Preservation of pulp vitality is of utmost importance during management of deep caries cases. There remains a possibility of pulp tissue to repair upon excavation

of caries with no pulpal exposure. However, in case of exposure of pulp, such type of minimally invasive management becomes doubtful & impulsive. Also there will be a significant decrease in favorable outcome in situations of pulp becoming infected & pulp exposure during excavation.[3]

Indirect pulp capping (IPC) treatment plays an essential role in these cases to prevent pulpal exposure. This type of management could be single step or 2 step procedure or stepwise caries excavation.[4,5] Indirect pulp capping, in cases where removal of entire caries would result in pulp exposure, it requires infected dentin removal & leaves behind affected dentin layer. Both IPC & final restoration of teeth can be carried out in a single appointment.[6] This was recommended from the data from some earlier studies which checked the tooth which undergone indirect pulp capping & was again reopened. The studies came to a conclusion that there was hard demineralized dentin showing no signs of progression of caries.[7] A superfluous risk for pulp exposure might be present during re-entering the cavity for entire removal of caries in 2nd appointment.[8] Therefore single visit indirect pulp capping is indicated wherein the entire procedure in carried out within single appointment and tooth is not revisited again. For pulp protection, remineralization can be induced by placing calcium hydroxide(bactericidal or bacteriostatic liner) on carious dentin, which is considered as a traditional procedure for indirect way of pulp treatment.

Calcium hydroxide is white, odorless powder, less soluble in water & has increased ph.[9] If remaining thickness of dentin is minimum of 0.5mm without any pulpal exposure, the relevance of acidic conditioner on either enamel or dentin would not lead to irreversible pulpitis. [10,11]

Case Report: A 30 year old male patient came to dental OPD with complaint of food lodgment in lower left back region of jaw since 1 month which was associated with intermittent pain. The pulpal status & periradicular tissues were suspiciously examined. When clinically examined, adjacent gingival tissue was normal in appearance & occlusal caries involving enamel as well as dentin was noticed. No peri-apical radiolucency was observed and no periodontal ligament widening was seen. (fig 1) Pulp sensitvity was found well-matched with reversible pulpitis which was confirmed by using thermal test. On application of cold stimulus pain disappeared quickly.

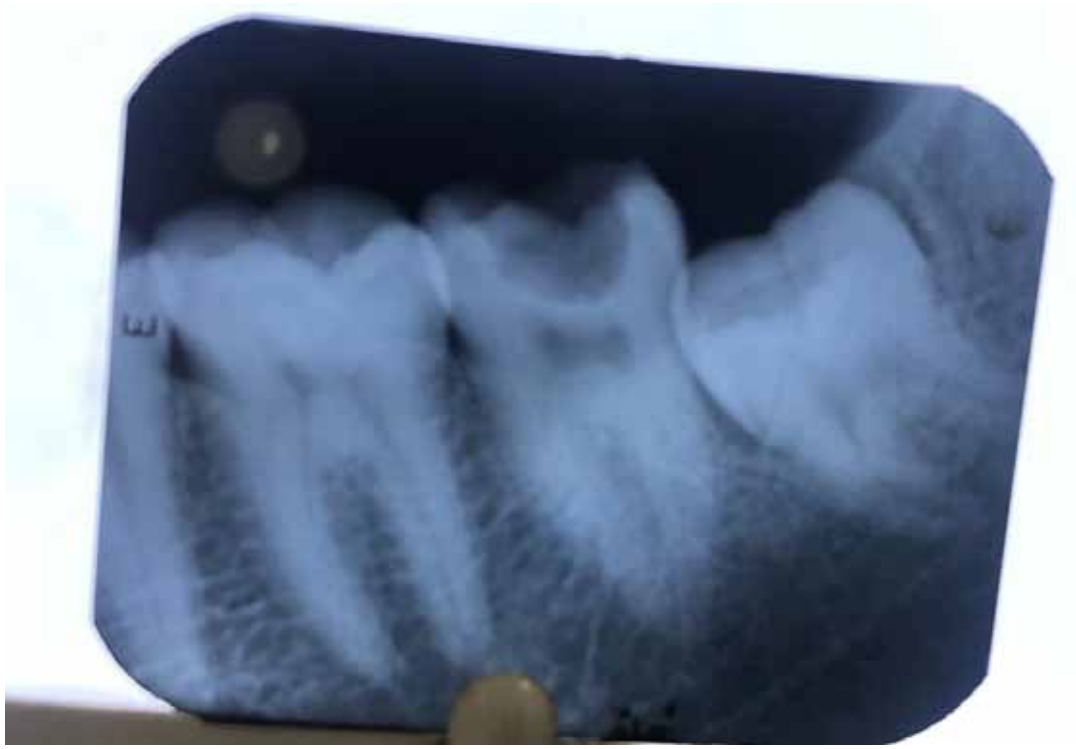

Figure 1 Pre-operative Radiograph

The steps followed during treatment was: The procedure began with the scaling of teeth, subsequently IAN block was given (2% lignocaine 1:2,00,000). Rubber dam isolation was done in the operative field. #6 Round diamond bur along with water coolant was used to remove the infected carious dentin.(fig 2).

Figure-2 Caries removal

Spoon excavator was used to remove the peripheral carious dentin which was followed by using a low-speed round carbide bur which was well-matched in accordance to the size of cavity. Careful caries removal was performed such that only the wet infected dentin was removed with the dry affected dentin left. Careful inspection of the cavity was done so as to remove the complete carious tissue and check for pulpal exposure, if any. Further cavity was disinfected by using 2% chlorhexidine (Consepsis, Ultradent) for 60 seconds. Then the placement of a layer of light cured $Ca(OH)_2$ over the affected dentin was done & cured for 40 sec. (fig 3).

Fig-3 Placement of calcium hydroxide

After that mixing and placement of a layer of GIC, GC Fuji II was over light cured calcium hydroxide was performed. Excess material was removed from the walls & margin.(fig-4).

Figure- 4 Placement of GIC

Sterile dry cotton pellet was placed in the cavity & patient was asked to wait for 15 min for GIC to set. After removing the cotton pellet, tooth was etched with 35% phosphoric acid gel (Scotchbond™ Etchant, 3M/ ESPE) for 30 seconds followed by rinsing and drying. The application of bonding agent (Single Bond™, 3M/ ESPE) was done as per manufacturer's instructions. Incremental technique was used for placing composite increments (Filtek Z250™, 3M ESPE) and each increment light cured for 40 second. (fig5)Occlusion was checked followed by removal of rubber dam.

Figure 5 Composite restoration

Follow-up: After 1 month follow up, on clinical examination & evaluation on radiograph,the results were constant with regular vital pulp. 6 months and 1 year followed up also showed satisfactory result.

Discussion

Indirect pulp capping treatment is opted after the thorough clinical examination and radiographic assessment. The clinical examination should reveal no frank pulp exposure, sensibility test showed positive response and radiograph excluded the peri-radicular pathosis. In the present case, the radiographic images & clinical assessment pointed towards the indirect pulp capping treatment.

Material which could be placed on the dentin still remains a topic of discussion. Materials having bacteriostatic or bactericidal action are applied over affected dentin, for example: zinc oxide eugenol, calcium hydroxide & glass ionomer cements. The use of calcium hydroxide has demonstrated to arrest caries lesion by its action on bacterial activity and growth.[12] Kiranmayi G et al conducted a systematic review and meta-analysis and concluded that calcium hydroxide proved similar results as MTA when used for Indirect Pulp treatment. MTA and calcium hydroxide both demonstrated favorable outcome for this indirect pulp modality.[13] In deep cariesthe success rates of indirect pulp capping using $Ca(OH)_2$ liner ranges from 92%-97%.[14] It was found that the IPC with $Ca(OH)_2$ liner and a consequent high-quality sealing of margins decreased the substrate for micro-organism, reduced progression of lesion and allowed a physiological response in the pulp-dentin complex.[15]

Glass Ionomer cement was placed over calcium hydroxide. It has been suggested that ionomer cement helps to arrest caries and provide antimicrobial effect. Glass Ionomer release fluoride ions and it has thermal expansion variable very close to that of tooth structure and is biocompatible.[16] The permanent restoration can be done with composite resin restoration so as to provide adequate strength at the time of mastication and esthetic results. The restoration with resin composite should be placed so as negligible or minimum amount of microleakage will be anticipated.[17]

Conclusion

Indirect pulp therapy is a safe, economical and proven treatment option in the teeth that have not involved pulp and with sound peri-radicular tissues. The key determinants for successful indirect pulp capping are accurate case selection, adequate isolation, disinfection of the cavity, caries restriction and selection of suitable pulp capping material.

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Conflict of Interest: Nil.

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