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ORIGINAL ARTICLE

Comparison of Partial and Complete Caries Excavation in Permanent Teeth: An 18 Months Follow-up

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ABSTRACT

Objective: To compare performance and survival of composite restorations in primary teeth using partial caries removal (PCR) versus complete caries removal (CCR).

Methodology: In this trial, 70 permanent molars having deep caries lesions were selected and divided equally into CCR and PCR groups. The study duration was Jan-2018 to Jan-2020. In CCR group, complete dentin removal was done and confirmed by applying dentin detector dye for 10 seconds. In PCR group, visual & tactile criteria were followed for dentin removal. After dentin removal all cavities were filled using RMGIC cement resin. Follow-up was done at 06, 12 and 18 months.

Results: Mean age in CCR group was 23.4+5.5 years and 25.6+4.9 years in PCR group. Male patients were 19 and 17 in CCR and PCR groups respectively (p= 0.59). Regarding lesion type, 25 patients in CCR were having occlusal and 5 having Occluso-proximal lesion. In PCR group, 27 teeth were diagnosed with occlusal lesion and 3 with occluso-proximal lesion (p=0.44). At 18 months' follow-up, success rate was 100% in CCR group and 93.3% in PCR group (p=0.49). Pulp exposure occurred in 23.3% procedures in CCR group and none in PCR group.

Conclusion: Partial caries removal has nearly similar success rates as that of complete caries removal and is associated with significantly less pulp exposure rate as compared to CCR.

Keywords: Deep carious lesions, Partial caries removal, Complete caries removal, Randomized clinical trial

INTRODUCTION

Dental procedures, now a days, are done more frequently using minimal invasive dentistry techniques, as these are associated with lower adverse complications than the invasive ones. There is also a shift in complete caries removal (CCR) to partial caries removal (PCR). PCR is associated with reduced pulp exposure and less interference with pulp vitality. It's hypothesized that preservation of pulp vitality enhances local defenses, proprioception and reduce tooth sensitivity.[1-3] It also prevents apical periodontitis occurrence.[4] More-over PCR is also more cost effective and patients friendly.

CCR has remained a gold standard from several years and still more than 70% dentists and many patients prefer CCR because of the risk of progression of residual caries to pulp and hence reduction in restoration life.[5] However, when CCR is done for deep lesions risk of complete pulp exposure is increased which may require further invasive procedures such as pulpectomy or pulpotomy resulting in higher cost and operating time.[1,2] PCR has been proven to be more successful regarding histological, radio-graphical, biochemical and micro-biological evidences.[6,7] Falster et al. reported that success of procedure is associated with sealing of the cavity, and is not effected by the materials used for induction and protection of remaining dentin.[8] Schwendicke et al. in a systematic review reported PCR has lower post-procedure pulp complaints than the CCR.[9]

However, there is still debate among dentists either to adopt PCR or CCR. As still only few trials have been published on this issue so we planned this study to compare performance and survival of composite restorations in primary teeth using partial caries removal (PCR) versus complete caries removal (CCR).

METHODOLOGY

This randomized trial was conducted in department of operative dentistry, Nishtar Institute of Dentistry, Multan. Approval from ethical committee was taken for this trial. Patients with deep carious lesions affecting half or more dentine of permanent molars were selected. Lesion was detected by X-rays and confirmed by cold and electric pulp teste. Detailed procedural information and study outcomes information was given to all participants before signing written consent. This study duration was Jan-2018 to Jan-2020.

A total of 70 teeth were selected and divided equally into CCR and PCR groups. Draw randomization using lottery technique was done. Local anesthesia was given to all patients and rubber band isolation of effected teeth was done. Hand excavator and low-speed metal-bur was used to remove carious tissue from the lateral wall and dentino-enamel junction. Low-speed round-bur was used for removal of superficial necrotic-dentin by keeping the wet layer adjacent to the pulpal wall. After that, cavity was cleaned using distilled water and dried using guaze swabs and dry air. In CCR group, complete dentin removal was done and confirmed by applying dentin detector dye for 10 seconds. In PCR group, visual & tactile criteria were followed for dentin removal. After dentin removal all cavities were filled using RMGIC cement resin followed by etching using phosphoric acid (37% solution) applied for 15 seconds. Restoration was done by composite resin applied using incremental technique and by polymerizing every increment for 40 seconds. If direct pulp exposure detected then pulp capping, or pulpotomy was done.

All patients were followed at 6, 12 and 18 months to determine success rate. Absence of irreversible pulpitis, and peri-apical alterations was defined as success of procedure. Standard digital x-rays was done to determine

success of procedure. All study variables were entered and analyzed in SPSS v23 software. Chi-square test was used for comparison of success rate between the CCR and PCR groups.

RESULTS

Baseline study variables are given in table 1. There was no statistical difference age, gender and occlusion type. Mean age in CCR group was 23.4+5.5 years and 25.6+4.9 years in PCR group. Male gender was pre-dominant; 19 in CCR group and 17 in PCR group (p-value 0.59). Regarding lesion type, 25 patients in CCR were having occlusal and 5 having Occluso-proximal lesion. In PCR group, 27 teeth were diagnosed with occlusal lesion and 3 with occluso-proximal lesion (p-value 0.44). At 06 and 08 months' follow-up, procedure was 100% successful in both groups. At 12 months', success rate was again 100% in both groups. At 18 months' follow-up, success rate was 100% in CCR group and 93.3% in PCR group (p-value 0.49).

Table 1. Baseline Variables.

	CCR (n=30)	PCR (n=30)	p-value
Age	23.4+5.5	25.6+4.9	0.10
Gender			
Male	19	17	0.59
Female	11	13	
Lesion Type			
Occlusal	25	27	0.44
Occluso-proximal	5	3	

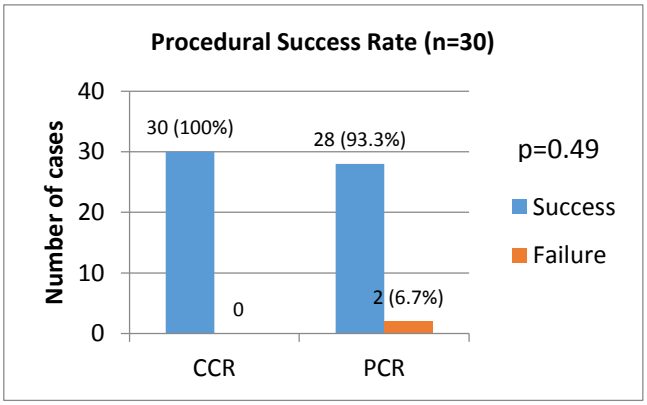

Figure 1. Procedural Success Rate.

DISCUSSION

Minimal invasive procedures have dramatically changed the world of surgery and same has happed in dental procedures. Minimal invasive procedures have gained significant priority in dental section as well in past few years. But effectiveness of these procedures over invasive ones is still questionable. PCR has newly got place for treatments of dental caries. In present study, we compared the clinical outcomes of PCR with CCR technique for treatment of dental caries in permanent molars.

In present study, pulp exposure occurred in 23.3% procedures all these occurred in CCR group and no in PCR group. Leksell *et al.* reported pulp exposure in 40% of procedures during CCR.[10] Orhan *et al.* reported exposure in 22% and Khokhar et al. reported in 18.88% CCR procedures[1,11] whereas Frazon et al. reported pulp exposure in 27.5% of procedures in CCR group and in 2% in PCR group. In our study, we did pulputomy in all teeth with pulp exposure.[2]

In present study, success rate was 100% in CCR group and 93.3% in PCR group. Khokhar et al. also reported similar outcomes, with success rate of 98.21% in CCR group and 92.53% in PCR group.[11] Frazon et al. reported success rate in 92% teeth in PCR and 96% teeth in CCR group in primary molars, however the authors conducted study on primary molar while we conducted on permanent molars. Their follow-up was 2 years and in present study we followed patients for 18 months only. Moreover they reported short procedural time in PCR group and concluded that type of lesion is a risk factors of failure of restorations and occluso-proximal lesions carry higher risk of failure of restorations.[2]

Another study by Frazon et al. reported restoration success in 66% procedures in PCR group and in 86% procedures in CCR group at 2 years' follow-up with significant statistical difference (p-value 0.03). and reported that PCR has significantly higher failure rates as compared to CCR.[12] Which is contrary to the other studies results.

Some authors are now in favor that PCR should be done only in those procedures where there is a risk of exposure of pulp. But still no clear guidelines are available on this issue. Removal of the enamel and only super-ficial dentin in an-other alternative method by keeping behind the moist soft dentin with the wall and many authors have favored this technique.[13-15] In present study we followed the same protocol. Another study conducted on permanent molars by Khokhar et al. completely removed the caries from the walls and found similar outcomes like that of present study.[11]

CONCLUSION

Partial caries removal (PCR) has nearly similar success rates as that of complete caries removal (CCR) and is associated with significantly less pulp exposure rate as compared to CCR.

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