



ABSTRACT

Current strategy in regenerative endodontics involves using appropriate scaffolds as three-dimensional structure to allow for proper migration and proliferation of stem cells, and to regulate their differentiation and metabolism. These scaffolds include platelet-rich-plasma (PRP), platelet-rich-fibrin (PRF), concentrated growth factor (CGF), and an induced blood clot (BC).

The purpose of this study is to combine the findings of three Randomized Controlled Trials to review the effectiveness of different scaffolds in the outcome of regenerative endodontic procedures (REP).

INTRODUCTION

In traditional root canal therapy, the predominant approach involves the complete removal of the pulp and subsequent filling of empty canal spaces using gutta percha. However, this technique necessitates the complete removal of vital pulp with partial inflammation or contamination to achieve a successful outcome.

Nevertheless, with recent advancements in tissue engineering and the discovery of dental stem cells, the focus of endodontics has shifted towards the regeneration of both pulp and dentin. Despite the current limitations in our understanding of regenerative endodontics, it holds tremendous potential for both endodontists and general dentists, offering opportunities to conserve tooth structure and enhance restorability.

Current strategies in regenerative endodontics involve using appropriate scaffolds as three-dimensional structures to allow for proper migration and proliferation of stem cells, and to regulate their differentiation and metabolism. These scaffolds include platelet-rich-plasma (PRP), platelet-rich-fibrin (PRF), concentrated growth factor (CGF), and an induced blood clot (BC).

The purpose of this study is to combine the findings of three Randomized Controlled Trials to review the effectiveness of different scaffolds in the outcome of regenerative endodontic procedures (REP).

METHODS

Pubmed search was completed with keywords: “regenerative endodontics,” “regenerative root canal therapy,” “scaffold.” Selection criteria: Randomized control trials that investigate on the effectiveness of different scaffolds in outcome of REPs. Three articles matching the selection criteria were selected by the author.

The interventions in the three studies are four different types of scaffolds used in REP, which include blood clot group (BC), platelet-rich plasma group (PRP), concentrated growth factor group (CGF), and platelet-rich fibrin group (PRF).

Four common measurements of successful outcome were combined from these studies: root length increase (RL), root wall thickening (RWT), apical closure (AC), and bone healing (BH).

Relative risk assessment was done with 95% confidence interval. BC group was used as the reference group to calculate relative risk of successful outcome in each intervention group (PRP, CGF, and PRF) compared to the reference group (BC).

RESULTS AND DISCUSSION

Outcome measures including RL, RWT, AC, and BH, for different intervention groups (BC, PRP, CGF, and PRF) are shown on table 1.

PRP, CGF, and PRF groups had lower relative risks for RL than BC group. However, their confidence intervals suggest that there is no statistical difference in RL between the BC group and the other groups.

PRP group had lower relative risk for RWT, AC, and BH than BC group. However, its confidence interval suggests that there is no statistical difference in RWT, AC, and BH, between BC group and PRP group.

CGF and PRF groups had similar relative risk for RWT and AC, and higher relative risk for BH, than BC group. However, their confidence intervals suggest that there is no statistical difference in RWT, AC, and BH, between BC, CGF, and PRF groups.

Overall, there is no statistical difference in successful outcome of REP between the four groups tested.

Scaffold type/Outcome	RL	RWT	AC	BH
BC (Reference)	20/23 (RR=1)	21/23 (RR=1)	21/23 (RR=1)	25/29 (RR=1)
PRP	16/20 (RR=0.92, 95%CI: 0.70~1.21, P=0.55)	16/20 (RR=0.88, 95%CI: 0.68~1.13, P=0.31)	16/20 (RR=0.88, 95%CI: 0.68~1.13, P=0.31)	21/26 (RR=0.94, 95%CI: 0.74~1.19, P=0.59)
CGF	3/5 (RR=0.69, 95%CI: 0.33~1.44, P=0.32)	5/5 (RR=1.01, 95%CI: 0.97~1.24, P=0.16)	5/5 (RR=1.01, 95%CI: 0.97~1.24, P=0.16)	5/5 (RR=1.16, 95%CI: 1.00~1.34, P=0.05)
PRF	8/11 (RR=0.84, 95%CI: 0.56~1.24, P=0.38)	11/11 (RR=1.01, 95%CI: 0.97~1.24, P=0.16)	11/11 (RR=1.01, 95%CI: 0.97~1.24, P=0.16)	16/16 (RR=1.16, 95%CI: 1.00~1.34, P=0.05)

Table 1. RL: Root length increase, RWT: Root Wall Thickening, AC: Apical closure, BH: Bone healing, BC: Blood Clot group, PRP: Platelet-rich Plasma group, CGF: Concentrated Growth Factor group, PRF: Platelet-rich Fibrin group.

CONCLUSION

In conclusion, there is no statistical difference in successful outcome of regenerative endodontic procedures between the four techniques used for scaffolding. All of the four materials studied showed high success rate with no statistical difference. This study was limited due to lack of articles matching selection criteria. Difference in sample sizes for each group is also a limitation of this study.

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