

Background

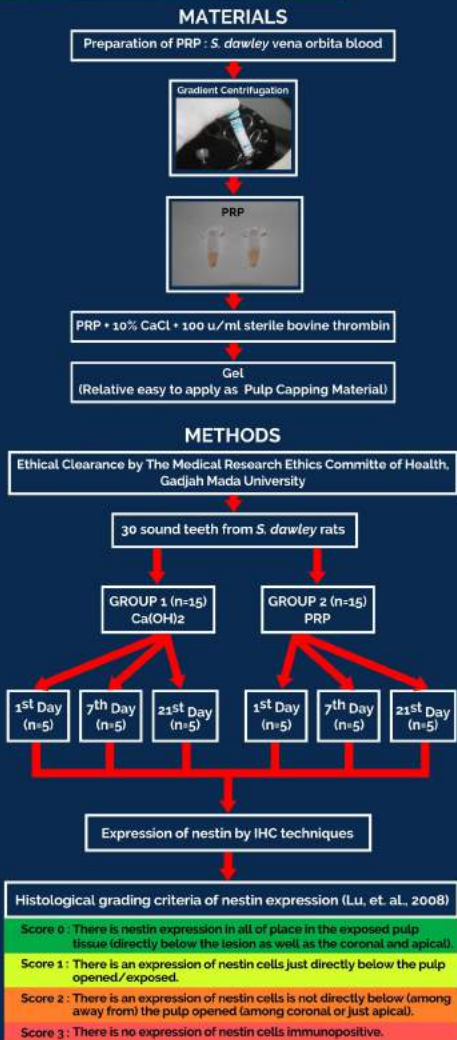
In direct pulp capping treatment, we usually use $\text{Ca}(\text{OH})_2$, but it has a lot weaknesses. Growth factors is one of recent development of pulp capping materials. Some research show that growth factors can accelerate the healing of injured tissue. Pulp of teeth can be exposed because of injury at the time of preparation due to operator error (iatrogenic), so direct pulp capping is needed. The direct pulp capping materials that used in this study is platelet rich plasma (PRP) (Lu, et.al., 2008).

Initial formation of reparative dentin is a new odontoblast like cells characterized by expression of nestin below the exposed pulp. Nestin is intermediate filament protein expressed on the process of tooth development and expressed back in the dentin-pulp complex in conditions of caries, after cavity preparation and tooth replantation. Nestin is a marker of the function and differentiation of odontoblast. It is related to the secretion ability of dentin matrix (Lu, et.al., 2008).

Aim of Study

The aim of this study was to evaluate nestin expression of pulp tissue following direct pulp capping with PRP.

Materials & Methods



Result

Nestin expression of $\text{Ca}(\text{OH})_2$ on the distance place of exposure on 1st day and 7th day were 80% and at 21st day was 60%. Nestin expression of PRP on the distance place on 1st day was 80%, 7th day 100% and 21st day were 80%. On day 21 observation, Kruskal Wallis test show nestin expression was increase significantly in PRP groups ($p < 0.05$) but it didn't increase significantly compare with $\text{Ca}(\text{OH})_2$.

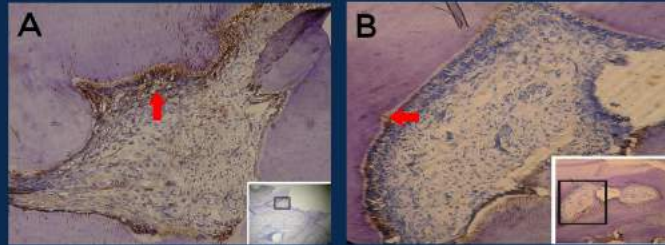


Figure 1. Microscopic picture of nestin expression by IHC staining (200x magnifications) on days 1st and 21st after direct pulp capping with $\text{Ca}(\text{OH})_2$. (A) application of $\text{Ca}(\text{OH})_2$ day-1st, nestin positive (red arrows). (B) application of PRP day-21st, nestin positive (arrows).

From these data, it can conclude that calcium hydroxide ($\text{Ca}(\text{OH})_2$) and platelet rich plasma (PRP) as a pulp capping have no increased expression of nestin just under an open lesion on the pulp. Platelet rich plasma (PRP) as a direct pulp capping has an influence on the expression of nestin in a place away from the lesion.

Discussion

PRP stimulates healing mechanism in the exposed pulp tissue through the same approach in stimulating the formation of new bone in the treatment of periodontal defects and maxillofacial surgery (Rieck et al., 1995). PRP has mitogenic effects that affect proliferation and differentiation odontoblast (Anila and Nadakumar, 2006). Several growth factors and their receptors can be detected in the levels of mRNA and protein for growing teeth (Rieck et al., 1995). Therefore the growth factor has an important role in the proliferation and differentiation of odontoblast cells.

The ability of growth factors to enhance the process of dentinogenesis, in particular the formation of reparative dentin so far unclear. The administration of exogenous growth factors in exposed dentin have potential in the process of reparative dentin formation signaling (Werther et al., 1993), and the synergistic interaction between the two types of growth factors are needed to induce proliferation and differentiation cells (Kim et al., 2002). Some of the growth factors contained in PRP (Carlson and Roach, 2002).

PRP is a growth factor that has a function as a biological mediator that controls tissue repair processes, including proliferation, differentiation, extracellular matrix synthesis and angiogenesis. The application of PRP in the healing process gives better results than the application of a single growth factor alone (Kim, et al. 2002).

Conclusion

PRP had ability as a direct pulp capping material to induce the function of odontoblast cells.

References

- Anila S, Nadakumar K. 2006. Application of platelet rich plasma for regenerative therapy in Periodontics. Govt Dental College. 20, 78-83.
- Carlson NE, Roach RB. 2002. Platelet rich plasma clinical user application in dentistry. J Am Dent Assoc. 132(10), 1383-86.
- Kim SG, Chung CH, Kim YK, Park JC and Lim SC. 2002. Use of particulate dentin-plaster of paris combination with / without platelet-rich plasma in the treatment of bone defects around implants. Int J Oral Maxillofac Imp. 17, 86-94.
- Lu Y, Liu T, Li H, Pi G. 2008. Histologic evaluation of direct pulp capping with a self-etching adhesive and calcium hydroxide on human pulp tissue. DOI. 41, 643-50.
- Petrovic V. 2009. The effect of hydroxyapatite and platelet-rich plasma on apexogenesis in monkeys. Acta Veterinaria (Beograd). 59(2-3), 277- 289.
- Rieck P, Oliver L, Engelmann K, Fuhrmann G, Hartmann C, Courtroy Y. 1995. The role of exogenous and endogenous basic fibroblast growth factor (FGF2) and transforming growth factor-1 (TGF-1) on human corneal endothelial cells proliferation in vitro. Exp Cell Res. 220, 36-46.

Acknowledgements

We would like to thank dr.Totok Utoro, D.MedSc, Sp.PA, Tetiana Haniastuti, DDS, PHD who have made great contribution to our work. Their effort, collaboration, insight and discussion are greatly appreciated.

CONTACT PERSON

Sartika Puspita, DDS, MDSc.
Lecturer at School of Dentistry, Medical and Health Science Faculty, Universitas Muhammadiyah Yogyakarta Indonesia.
Jl. Lingkar Selatan, Tamantirto, Kasihan, Bantul, D.I. Yogyakarta, Indonesia 55183
E-mail : tikadentist@yahoo.co.id