

READER'S FORUM

Won-Young Park, Min Soo Kim, Min-Seok Kim, Min-Hee Oh, Su-Young Lee, Sun-Hun Kim, Jin-Hyoung Cho

Effects of pre-applied orthodontic force on the regeneration of periodontal tissues in tooth replantation.

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I thank the authors for the interesting article. I would like to ask them the following questions.

Q1. In the study 7-week-old rats were used to investigate effect of pre-applied orthodontic force on the periodontal ligament (PDL) healing after replantation. Can you explain how the PDL healing or gene expression changes according to maturity of the root?

Q2. Also, I would like to ask how the outcomes would be if the orthodontic force is applied after, instead of before, replantation.

Q3. In this study orthodontic force was applied 50 cN. How do you think PDL healing or gene expression might change if you applied orthodontic force more or less than 50 cN?

Questioned by

Heekyu Jung

Department of Orthodontics, The Institute of Craniofacial Deformity, Yonsei University College of Dentistry, Seoul, Korea

A1. Because there are few research studies available about the success rate of transplantation according to development stage of donor tooth, it's hard to answer with scientific evidence. However, the regenerative potential of the PDL cell is high in the developing tooth, as the success rate of the transplantation has been reported to be higher in developing tooth than in fully developed tooth. So, I think further research about this topic would be valuable. Moreover, the 7-week-old rats used in this study, which are compatible with adolescents in human, have fully developed teeth with closed apex. We used the teeth of these 7-week-old rats because of their low risk of ankyloses or fracture for the reliability of experiment. We also referenced research of the precedent investigators about the age of the experiment rats.

A2. There're also few researches about the application of the orthodontic force after transplantation. However, in clinical situation such as subluxation or transplantation, the recommendation for tooth fixation method is under change. Recently, minimum fixation which allows physiological tooth movement is recommended,¹ on the contrary to the rigid fixation in the past. This implies that physiologic function after transplantation might promote proliferation of the PDL cell of the transplanted tooth. As a result, the application orthodontic force after transplantation might help regeneration of the periodontal tissue and prevent ankyloses in my personal opinion. Needless to say, the orthodontic force should be within the physiological range.

A3. It is generally known that application of heavy force might induce unexpected side effects. We also tried not to apply heavy force with application of 50 cN of force level, which was most commonly used in other

rat experiments. Even though we wanted to give as light force as possible, it wasn't easy to control the smaller force in the actual experiment condition. However, the Suzuki et al.² applied 1.5 cN of force before replantation, which was possible because the design of the appliance was different from what was used in our study. In my opinion, the force stronger than what was used in this experiment might trigger unwanted reactions in the periodontal tissue. However, further investigation should be performed to establish which amount of force results in the best tissue responses.

Replied by

Jin-Hyoung Cho

*Department of Orthodontics, School of Dentistry and Dental 4D
Research Institute, Chonnam National University, Gwangju, Korea*

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