Clinical Evaluation of Canal Irrigation Using Super Acidic Water

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Purpose of the study

In case of endodontic treatment of infected root canals, complete sterilization within the canal is aimed at, and bacteria culturing tests are used to evaluate the effect of treatment. In the past studies, some reports pointed out the situation where a bacteria culturing test turned out negative right after mechanical and chemical cleaning operations of root canals whereas the result turned positive at the time of next patient's visit. One of the reasons for this is found to be the smear layer. It is also known that just alternately using sodium hypochlorite and hydrogen peroxide solution regularly used in clinical treatments leaves most of the smear layer along the canal walls, and various methods are developed to remove this residue. Among others, EDTA solution is especially useful for removing the smear layer. There is a report that the rate of turning positive has decreased more rapidly when it is used for root canal irrigation than conventional method in bacteria culturing test at the time of the patient's next visit. Thus, removal of the smear layer cannot be ignored as one of the factors that can contribute to sterilization of root canals. Previously, we have reported that supersonic cleaning with super acidic water can remove as much smear layer as EDTA solution. This time, we have clinically tested the use of super acidic water for cleaning root canals and conducted culturing tests of bacteria collected from there. The following is the report of our testing.

Test materials and testing method

1. Tested teeth and cleaning agent

Among the patients who visited our Dept. of Operative Dentistry in Asahi University Hospital, those who agreed with our intent of studies and are willing to cooperate with us and diagnosed chronic apical periodontitis were selected, and 30 of their teeth with infected root canals were tested. The teeth were divided into 2 groups, one to be cleaned with super acidic water, and a control group that is to be applied EDTA solution. A needle-type supersonic tip was used to be able to fill root canals with fresh solution all the time. Teeth that cannot wear a rubber dam were excluded from the testing.

2. Collecting samples and cleaning method

Samples were collected three times. The first and second samples were taken when the patients visited us for the first time. Under the waterproofing of a rubber dam, infected teeth were disinfected with tincture of iodine and the medullae were expanded according to the conventional way, and after measuring their lengths, they were expanded to K-file No. 25, and the contents inside the root canal attached to the file were applied to the media. The second samples were collected after the root canal expansion. After alternate cleaning of root canals with 5% solution of sodium hypochlorite and 3% solution of hydrogen peroxide and expansion up to No. 50 to 70, they were cleaned with each solution using supersonic wave for a minute. Then, the solution was washed off with distilled water, and after drying,

the root canal contents were collected by a disinfected file in the final expansion size, which were applied onto the media. Instead of applying adhesive medicine, a sterilized swab was inserted into the root canal, which was temporarily double-sealed with a stopping and zinc oxide + eugenol cement to complete the treatment for the first visit.

The third group of samples were collected at the next visit in about a week. Under the waterproofing of a rubber dam, infected teeth were disinfected with tincture of iodine, and the temporary seal was removed. Then, a file in the final expansion size was inserted into the root canal, and its contents were taken to be applied on the media.

3) Used media and culturing method

All the samples taken from the tested teeth were applied on the CDC-treated blood agar media, and were anaerobically cultured in an anero-box at 37℃ for 48 hours.

Test results and analysis

Looking at results of the bacteria culturing tests, there was no difference in the ratio of negative samples between the second and third tests in both cases of super acidic group and the control group. This indicates that removal of the smear layer is quite possible when super acidic water is clinically used for root canal irrigation, and super acidic water is valid as an irrigation agent.