

Radiological success evaluation of root canal fillings with N2 at lateral tooth areas after vital extirpation

a doctoral dissertation to the

Medical Faculty of the
Rheinisch-Westfälische Technische Hochschule Aachen/Germany

in fulfillment of the
requirements for the degree of
Doctor of Dental Science (DDS)

submitted by

Alexandra Steup
Bad Marienberg/ Westerwald, Germany

This dissertation has been accepted for the Medical Faculty of the Rheinisch-Westfälische Technische Hochschule Aachen/Germany by

Professor (DDS) J. Rotgans
University Professor (DDS) H. Spiekermann

Oral examination: 22 May 2001

Summary

In the endodontic field, N2 is controversially discussed mainly because it contains formaldehyde (50 mg in 1 g of powder). Considering the knowledge that a variety of conflicting studies discussing the success and/or failure of this product are available, a retrospective study was conducted to clarify its clinical effectiveness. Based on the patient files of a rural social practice founded in 1969 in Greater Aachen, at which root canal fillings were made by strictly following the N2DONTICS method according to Sargenti (by the practice owner and the assistant doctors who were employed in 1972), the study aimed to establish both success and failure of root canal filled lateral teeth, in regard to their survival and probable successful treatment.

1306 patient files as well as 1276 x-rays of female and 1357 male patients of all age groups (<14 to 79 years) were comprised, which means that a total of 2633 root canal filled lateral teeth (premolars and molars) were evaluated. Only those root canal treatments that followed vital extirpation, and which were x-ray controlled at least 2 years after treatment, were analyzed. A project-related recall did not take place.

Conclusions regarding the influence of various parameters, such as patients' age and gender, practitioner-specific differences, quality and duration of the root canal filling or prosthetic care, were supposed to be made on apical X-ray findings of the relevant tooth, respectively its retention in the oral cavity.

The result of the data analyses permits the following conclusions:

- Gender-specific relations to the endodontic treatment requirement are not in evidence.
- Gender-specific relations to the treatment success are in evidence for premolars ($p < 0.018$) as well as molars ($p < 0.029$); in favor of the male gender regarding premolars, respectively the female gender regarding molars.

- A practitioner-specific dependency from the endodontic treatment success is not in evidence.
- Relating to apical changes, the failure rate amounts to 4.3 % for premolars, and 10.2 % for molars.
- Retention time as a parameter to evaluate treatment success regarding apical changes is only statistically significant for combined lateral teeth ($p < 0.001$), but not for individual premolars ($p < 0.271$) and molars ($p < 0.153$).
- Although the quality of root canal fillings (marginal fit, homogeneity, bubble-freeness) has no impact on the survival or probable successful treatment of premolars and molars, it does have impact on the parameter "apical changes" when it comes to evaluating the treatment success in case of premolars ($p < 0.002$), but not in case of molars ($p < 0.267$).
- The root canal filling grade has no influence on the probability of treatment success in the sense of survival/probable treatment success for a long time: After 124 month (=10.4 years) it amounts to 92 % for all classes. After that (after 156 month = 13 years) the probability of success decreases rapidly to 60 % for classes with filling grade 1.0 to 1.1, 0.8 to 0.9 and 0.6 to 0.7.
Significant relations to the root canal filling grade in the sense of "apical changes" exists only for molars ($p < 0.001$), but not for premolars ($p < 0.294$).
- For both premolars and molars in the filling grade class 0.8 to 0.9, a dependency regarding treatment success exists between the root canal filling quality and the filling grade ($p < 0.001$).
- Schroeder's aerations (cortical trepanations) have no statistically backed influence on the later apical findings.
- Post-endodontic post and core treatments with crown reduces the failure quote from 7.9 % (treatment with plastic fillings) to 3.3 %, and increases their retention from 6.6 to 9.4 years.
- Extractions due to periapical findings are only necessary in 2.8 % of all cases within the entire population; the need for revisions (apicectomy) is low (1.7 %).

The collected data indicates that the N2DONTIC Method according to Sargenti is classified as successful method for the evaluated practice.