ABSTRACT

May the full-scale Periapical Index predict disease development?

Aim – To evaluate if the full-scale Periapical Index (PAI) may predict the periapical status over time in non-root-filled and root-filled teeth.

Material and methods – Full-mouth radiographic surveys of a random sample from a general population were performed in 1997, 2003 and 2008. The present investigation included 330 persons who participated in all three examinations, and 143 persons who participated in the first and second examination. At each examination presence or absence of a tooth and of a root filling was recorded, and a PAI score (1-5) was assigned to all teeth. For root-filled teeth re-treatment of a root filling was recorded.

Results – At baseline non-root-filled teeth had lower PAI scores than root-filled teeth (P < 0.0001). A high baseline PAI increased the risk of extraction for both root-filled (P < 0.001) and non-root-filled teeth (P < 0.001). At 5-year follow-up PAI scores were higher when baseline PAI scores had been higher. The overall pattern for root-filled and non-root-filled teeth was similar, however the differences were statistically significant (P < 0.001). In particular, the follow-up PAI score for non-root-filled teeth with baseline PAI score 1 or 2 was significantly lower than that of root-filled teeth (P < 0.001). For root-filled teeth with baseline PAI score 3, 4 or 5, the trend was reversed as they overall had slightly lower PAI scores at follow-up (P = 0.023).

Conclusion – Repeated radiographic assessments of teeth using the full-scale PAI reveal that each of the five scores had distinct prognostic value for the course of periapical disease over a five-year period for both non-root-filled and root-filled teeth.

Prognostic value of the full-scale Periapical Index

Lise-Lotte Kirkevang, professor, ph.d., Department of Endodontics, Institute of Clinical Dentistry, Faculty of Dentistry, University of Oslo, Norway, Section of Oral Radiology, Department of Dentistry, Health, Aarhus University, Denmark

Dag Ørstavik, professor, dr. odont., Department of Endodontics, Institute of Clinical Dentistry, Faculty of Dentistry, University of Oslo, Norway

Ann Wenzel, professor, dr. et lic.odont., Section of Oral Radiology, Department of Dentistry, Health, Aarhus University, Denmark

Michael Væth, professor, Section of Biostatistics, Department of Public Health, Health, Aarhus University, Denmark

The goal of endodontic treatment is either to prevent or to treat apical periodontitis (AP), most often by performing root canal treatment (1). While the success of a root canal treatment may depend on several factors, it has repeatedly been demonstrated that the preoperative presence or absence of AP is one of the most important prognostic factors for a root-canal-treated tooth (2-5).

In surveys and clinical studies, an AP diagnosis is typically based on deviations from the normal periapical bone anatomy as displayed by radiography. Brynolf compared the histologic and radiographic appearances of periapical changes in humans and argued that the inflammatory process should be seen as "a biological sequence of development", and further that "the dynamic inflammatory process can change its direction" (6). Her data constitute a basis for the development and application of an ordinal scoring scale in the radiographic evaluation of AP. Ørstavik et al. used the results from Brynolf's study to develop a 5-point ordinal index for registration of AP, the Periapical Index (PAI) (7). This scoring system facilitates a more detailed assessment of degree/extent of disease, compared to the traditional binary approach (sound/diseased). It may, however, be discussed whether such a differentiation is of practical interest and relevant for the prognosis of a tooth.

EMNEORD

Apical periodontitis; PAI; longitudinal; prognosis; epidemiology

In most studies using PAI, the original five categories (full-scale) of the PAI scores were dichotomized: PAI 1 and 2 ("success" or "healthy") versus PAI 3, 4, and 5 ("failure" or "diseased") (8-13). Dichotomization may facilitate communication and comparison of

Radiographic parameters

Parameters	Score definitions
Root filling	0 = No root filling
	1 = Root filling material in the root canal
Re-treatment of root filling	0 = No radiographic signs of re-treatment of root filling
	1 = Radiographic signs of re-treatment of root filling
Periapical index	1 = Normal periapical structures
	2 = Small changes in bone structure
	3 = Changes in bone structure with some mineral loss
	4 = Apical periodontitis with well-defined radiolucent area
	5 = Severe apical periodontitis with exacerbating features
Tooth extracted	0 = Tooth present in radiograph
	1 = Tooth present in previous radiograph but missing in present radiograph

Table 1. Radiographic parameters and score definitions.

Tabel 1. Beskrivelse af radiologiske parametre.

results among studies, particularly follow-up studies; however, detailed information on the course of disease may not be revealed. The full-scale PAI has the potential to monitor changes along a disease continuum, and it would be of interest to know to what extent the PAI score at a certain moment in time will be predictive for the future status of the tooth.

The aim of the present study was to use the full-scale PAI to describe and analyse if the baseline PAI score may predict the periapical status over time in non-root-filled and root-filled teeth in a randomly selected population sample. Changes in PAI score were registered between successive examinations approximately 5 years apart and related to the baseline PAI and the endodontic treatment that the tooth had received.

Material and methods
The initial population consisted of 1199 randomly selected persons from Aarhus County, Denmark in 1997. The year of birth ranged from 1935 to 1975. The persons were contacted by letter and offered a full-mouth radiographic survey. Only persons who had at least one tooth were included in the study. Written informed consent was given by 311 males and 305 females, who attended the radiographic examination.

In 2003, the cohort of 616 persons who participated in 1997 were contacted again and offered a new full-mouth radiographic survey. Of these, 473 gave written informed consent and attended the radiographic examination in 2003 (234 males and 239 females). Analyses of non-participation were performed based on data from the 1997 study (11,14). In 2008 the baseline cohort (616 persons) was contacted once again and offered

a new full-mouth radiographic examination. Three-hundred-sixty-three persons (181 males and 182 women) consented and attended a new examination in 2008-09.

The study population of the present investigation was the 330 persons who had participated in all three examinations, and the 143 persons who had participated in the first and second examination only (Table 2). The Regional Committee of Ethics had approved the study design in 1997, 2003 and 2008.

Radiographic recording
All participants underwent a full-mouth radiographic survey consisting of 14 periapical and two bitewing radiographs. The radiographs were taken by a "GX 1,000" x-ray unit (Gendex Corporation, Milwaukee, Wisconsin, USA), using the paralleling technique, 70 kV, 10 mA, a film-focus distance of 28 cm. Film processing was automated (Dürr 1330, AC 245L, Bietigheim-Bissingen, Germany).

The radiographic procedure used in 1997, 2003 and 2008 did not differ, except for the radiographic film used. In 1997 Kodak Ektaspeed Plus film (Eastman Kodak, Rochester, NY, USA), and in 2003 and 2008 Kodak Insight film (Eastman Kodak, Rochester, NY, USA) was used. In all three studies the fastest and most recent film on the market was chosen (15) in order to minimize the radiation dose to the participants.

Radiographic registrations
One observer examined all radiographs (LLK). All teeth were recorded according to the FDI nomenclature. Third molars were excluded. In all teeth the variables and thresholds listed

Periapical Index
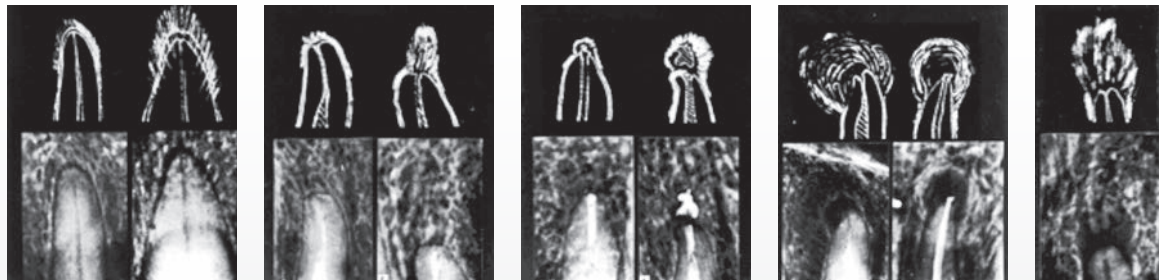
PAI 1
Normal periapical bone structure

PAI 2
Small changes in bone structure, no demineralization

PAI 3
Changes in bone structure with some diffuse mineral loss

PAI 4
Apical periodontitis with well-defined radiolucent area

PAI5
Severe apical periodontitis, exacerbating features

Fig. 1 The categories of the Periapical Index (PAI).

Fig. 1 Periapikalt Index (PAI).

The periapical status at each examination

Group 1	1997			2003			2008		
	NRF[a]	RF[b]	Total	NRF	RF	Total	NRF	RF	Total
PAI[c]1	8195	166	8361	8085	241	8326	7826	261	8087
PAI 2	101	47	148	47	23	70	112	7	119
PAI 3	23	142	165	77	133	210	125	146	271
PAI 4	5	35	40	9	47	56	13	46	59
PAI 5	7	17	24	5	19	24	12	25	37
NA[d]	4	2	6	4	1	5	13	1	14
Total	8335	409	8744	8227	464	8691	8101	486	8587

Group 2	1997			2003		
	NRF	RF	Total	NRF	RF	Total
PAI 1	3397	81	3478	3311	113	3424
PAI 2	43	20	63	23	14	37
PAI 3	23	75	98	42	75	117
PAI 4	15	24	39	7	28	35
PAI 5	3	11	14	10	9	19
NA	3	1	4	6	2	8
Total	3484	212	3696	3399	241	3640

[a] NRF: not root-filled   [b] RF: root-filled   [c] PAI: Periapical index   [d] NA: Registration not available due to insufficient quality of the radiographs

Table 2. The periapical status at each examination: the distribution of teeth according to PAI score and root filling status at each examination. Group 1: Teeth from 330 subjects who participated in all three examinations. Group 2: Teeth from 143 subjects who participated in first and second examination only.

Tabel 2. Periapikal status ved hver af de 3 røntgenundersøgelser: fordeling af tænder i forhold til PAI-score og rodfyldnings status ved undersøgelsestidspunktet. Gruppe 1: Tænder fra 330 personer, der deltog i alle 3 røntgenundersøgelser. Gruppe 2: Tænder fra 143 personer der kun deltog i de første 2 røntgenundersøgelser.

in Table 1 were assessed. Radiographic signs of re-treatment of a root filling included changes in length, density and shape of the root filling. To characterize the periapical status with regard to inflammatory changes the periapical index was used (Fig. 1) (7). Calibration of the observer to PAI was performed as described by Ørstavik et al. (7) resulting in a Cohen´s Kappa = 0.81.

Data management and statistical analysis

For each period between two successive examinations, the transitions in PAI-scores were related to the distribution of PAI scores at baseline PAI *and* to the presence/absence of a root filling. Teeth from persons who participated in three examinations (Group 1) contributed with two transitions, one from 1997 to 2003 and another from 2003 to 2008. Teeth from persons who participated in the first two examinations only (Group 2) contributed with one transition. Initially, it was examined if the distribution of the transitions from 1997 to 2003 differed between Group 1 and Group 2 and if the distribution of the transitions from 1997 to 2003 differed from the distribution of transitions from 2003 to 2008 for teeth with two transitions. These analyses were carried out as ordinal logistic regressions with allowance for clustering of teeth from the same person. In the succeeding analyses all transitions from both groups were considered together.

However, teeth without root filling at the baseline examination and teeth that initially were root-filled were considered separately, because the distribution of the transitions differed significantly between these two categories of teeth. For teeth without a root filling at the beginning of the 5-year period the relation between the baseline PAI and the PAI at follow-up was described by an ordinal logistic regression using robust standard errors to allow for clustering of teeth from the same person.

To facilitate the interpretation of the results the transitions were categorized according to the extent (number of steps on the PAI scale) of the change, with positive values indicating improvements in periapical status (lower PAI score), and negative values impairments (higher PAI score). The frequency and the proportion of new root fillings in each category were then computed. A similar analysis was carried out for root-filled teeth.

The association between baseline PAI and extraction at follow-up was assessed by a logistic regression with allowance for clustering of teeth from the same person.

Stata version 12 was used for all statistical analyses (Stata Statistical Software: Release 12. StataCorp LP, College Station, TX, USA).

Results

Three hundred and thirty persons (mean age 42.9 years, 8744 teeth) participated in all three examinations (Group 1); an additional 143 persons (mean age 42.3 years, 3696 teeth) participated only in the two first examinations (Group 2). In all, 21133 PAI score transitions between two successive examinations were possible. Of these 46 recordings were not included in the analyses due to insufficient quality of the radiographs.

KLINISK RELEVANS

Det periapikale index (PAI) er en 5-trins registreringsskala, der anvendes til diagnosticering samt vurdering af omfang og sværhedsgrad af apikal parodontitis. PAI-scoren (1-5) registreres på periapikale røntgenbilleder. Jo højere en PAI-

score en tand har, jo alvorligere er graden af sygdom, og jo dårligere er tandens prognose. PAI-scoren har betydning for både rodfyldte og ikke-rodfyldte tænders prognose – selv uden viden om andre kliniske parametre.

The periapical status at each examination

Table 2 shows the distribution according to PAI of teeth with and without a root filling at each examination for Group 1 and Group 2. The difference between the PAI score distribution of root-filled teeth and of teeth without root filling was statistically significant on all occasions (P < 0.0001), the teeth without root filling having a much lower PAI score. The PAI score distribution in Group 1 and Group 2 was similar, but there was a slight shift towards higher PAI scores in Group 2 (P = 0.02).

Changes in PAI scores related to baseline PAI scores

For each group and each 5-year period teeth were cross-classified according to PAI at baseline and PAI at follow-up (Table 3). Table 3a and b give the distribution of the first and the second transition for subjects in Group 1. Similarly, Table 3c gives the distribution of transitions for subjects in Group 2. Table 3d shows the distribution of transitions during a 5-year period when all transitions and groups are combined. For each baseline PAI score the transitions in teeth in Group 1 were compared to those in Group 2 (Table 3a vs. Table 3c). For baseline PAI score 2, 3, 4, and 5 no significant difference was seen. For PAI score 1 the follow-up scores were slightly higher in Group 2 (P = 0.01). Similarly, in Group 1 the transitions in the first period were compared with the transitions seen in the second period (Table 3a vs. Table 3b). No statistically significant differences were found except for a baseline PAI score 1 where the transitions in the second period had slightly fewer teeth with unchanged PAI score and more tooth extractions. Overall, the differences between groups and transition periods were minor, and the subsequent analyses were based on the combined data from all transition periods in Group 1 and 2 as shown in Table 3d. In the analyses the figures from Table 3d were further categorized according to presence or absence of a root filling at baseline.

Changes in PAI scores related to baseline root filling status

Fig. 2 illustrates the transitions in PAI scores during a 5-year period

Distribution of PAI scores at follow-up for each PAI category at baseline
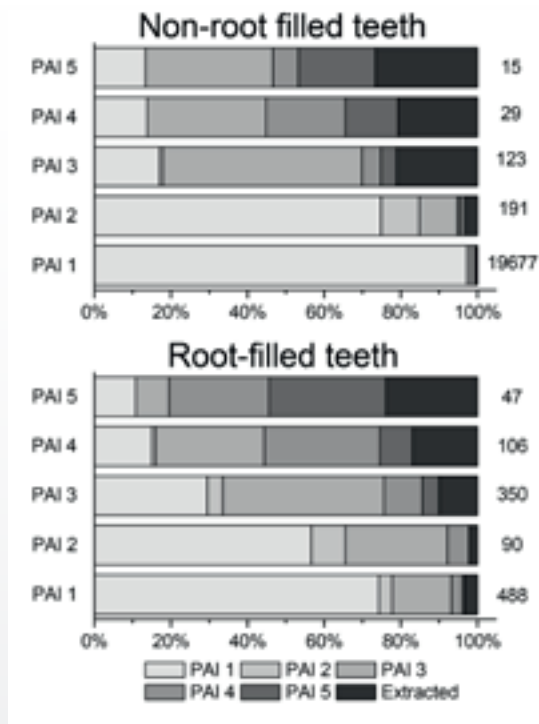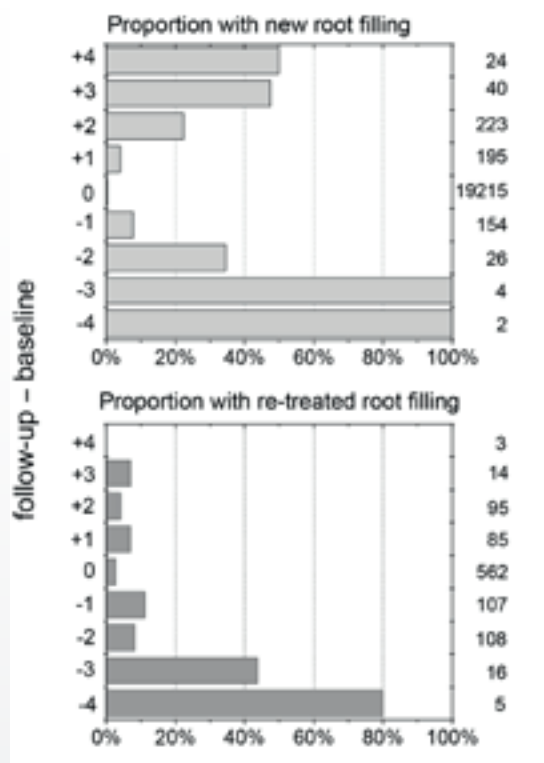

Fig. 2 Distribution of PAI scores at follow-up for each PAI category at baseline. Teeth without root fillings (top) and teeth with root fillings (bottom). Number of teeth in each baseline category is shown to the right.

Fig. 2 Fordeling af PAI-score ved follow-up for hver af de 5 PAI-kategorier ved baseline. Tænder uden rodfyldning (øverst), tænder med rodfyldninger (nederst). Antallet af tænder i hver kategori er angivet til højre.

Changes in PAI scores and their relationship to endodontic treatment

Fig. 3 Changes in PAI scores and their relationship to endodontic treatment. Positive values indicate a reduction in PAI scores (improvement); negative values an increase in PAI scores (impairment). Bars indicate proportion of teeth subjected to primary root filling (top) or re-treatment of previous root filling (bottom). Number of teeth in each category of change in PAI score is shown to the right.

Fig. 3 Ændringer i PAI-score og deres relation til endodontisk behandling. Positive værdier indikerer en reduktion i PAI-score (forbedring); negative værdier indikerer en forøgelse af PAI-score (forværring). Søjlerne angiver andel af tænder, der har fået en primær rodbehandling (øverst) eller er blevet reviderede (nederst). Antallet af tænder i hver kategori er angivet til højre.

for non-root-filled and root-filled teeth. Each bar shows the distribution of PAI scores at the follow-up examination for a particular baseline PAI score. The number of teeth in each PAI category at the baseline registration is shown at the right hand side of the figure. The association between baseline PAI score and follow-up PAI score was evident. A high baseline PAI increased the risk of extraction for both root-filled and non-root-filled teeth (P < 0.001 for both tooth categories). Moreover, the 5-year follow-up PAI score became gradually higher as the baseline PAI score increased. This pattern was clearly seen both for root-filled and non-root-filled teeth. Although the general pattern was similar, the difference between root-filled and non-root-filled teeth was statistically significant (P < 0.001). In particular, the follow-up PAI score for non-root-filled teeth with baseline PAI score 1 or 2, was significantly lower than that of comparable root-filled teeth (P < 0.001). For root-filled teeth with baseline PAI score 3, 4 or 5, the trend was reversed as they overall had a slightly lower PAI scores at follow-up (P = 0.023) (Fig. 2).

PAI score changes subsequent to root filling

In non-root-filled teeth, 185 teeth had been treated with root fillings between examinations. Re-treatment of root fillings was seen in 59 previously root-filled teeth. If a re-treatment was performed the PAI score most likely decreased (Table 4). To investigate if changes in PAI score (follow-up – baseline) may reflect treatment performed during the period between two registrations, the proportion of new treatments was calculated in categories defined by the extent of the change ("+" implies impairment and "-" implies improvement of the periapical condition). The calculations were done separately for teeth with and without root fillings at baseline. These proportions are shown in Fig. 3;

Changes in PAI scores related to baseline PAI scores

(a)				2003				
1997	PAI 1	PAI 2	PAI 3	PAI 4	PAI 5	Extr[b]	NA[c]	Total
PAI[a] 1	8155	50	104	17	9	20	6	8361
PAI 2	107	12	23	3	0	3	0	148
PAI 3	50	8	64	21	5	17	0	165
PAI 4	5	0	13	10	5	7	0	40
PAI 5	5	0	4	5	5	4	1	24
NA[c]	4	0	2	0	0	0	0	6
Total	8326	70	210	56	24	51	7	8744

(b)				2008				
2003	PAI 1	PAI 2	PAI 3	PAI 4	PAI 5	Extr	NA	Total
PAI 1	7986	105	133	24	12	52	14	8326
PAI 2	44	10	11	2	0	3	0	70
PAI 3	44	4	106	16	11	29	0	210
PAI 4	9	0	17	13	6	11	0	56
PAI 5	2	0	3	3	8	8	0	24
NA	2	0	1	1	0	3	0	7
Total	8087	119	271	59	37	106	14	8693

(c)				2003				
1997	PAI 1	PAI 2	PAI 3	PAI 4	PAI 5	Extr	NA	Total
PAI 1	3343	28	55	10	6	29	7	3478
PAI 2	43	5	9	1	3	2	0	63
PAI 3	30	3	41	4	4	15	1	98
PAI 4	6	1	9	15	2	6	0	39
PAI 5	0	0	2	5	4	3	0	14
NA	2	0	1	0	0	1	0	4
Total	3424	37	117	35	19	56	8	3696

(d)				follow-up				
baseline	PAI 1	PAI 2	PAI 3	PAI 4	PAI 5	Extr	NA	Total
PAI 1	19484	183	292	51	27	101	27	20165
PAI 2	194	27	43	6	3	8	0	281
PAI 3	124	15	211	41	20	61	1	473
PAI 4	20	1	39	38	13	24	0	135
PAI 5	7	0	9	13	17	15	1	62
NA	8	0	4	1	0	4	0	17
Total	19837	226	598	150	80	213	29	21133

[a] PAI: Periapical Index   [b] Extr: extracted teeth   [c] NA: Registration not available due to insufficient quality of the radiographs

Table 3. Changes in PAI scores related to baseline PAI scores: (a) Changes in PAI score from 1997 to 2003 in teeth from subjects in Group 1. (b) Changes in PAI score from 2003 to 2008 in teeth from persons in Group 1. (c) Changes in PAI score from 1997 to 2003 in teeth from persons in Group 2. (d) Changes in PAI score from one examination to the next when groups and periods are combined.

Tabel 3. *Ændringer i PAI-scorer i forhold til baseline PAI-scorer: (a) Ændringer i PAI-score fra 1997 til 2003 i tænder fra Gruppe 1. (b) Ændringer i PAI-score fra 2003 til 2008 i tænder fra Gruppe 1. (c) Ændringer i PAI-score fra 1997 til 2003 i tænder fra Gruppe 2. (d) Ændringer i PAI-score for begge grupper og perioder.*

the number of teeth in each category is shown at the right side of the figure. All non-root-filled teeth with a change of –4 and –3 in PAI score had received a root filling during the period. A similar but less pronounced pattern was seen for root-filled teeth.

Discussion

The main finding of this study was that all five scores in the PAI scale had distinct prognostic value for the course of periapical disease over a five-year period in non-root-filled and in root-filled teeth. The present study does not include clinical data; however, the prognostic value was evident from the radiographic data alone.

The radiographic data derive from a longitudinal observational investigation of a general, adult Danish population. Observational studies, based on general populations, are rare, but the results available from such studies are informative of the general/overall disease pattern. In clinical studies focusing on treatment of AP the treated teeth are followed over time to assess the effect of treatment. Observational studies, on the other hand, include all teeth present in the mouth at the beginning of the study, both root-filled and non-root-filled teeth. The teeth that have not received treatment, but have or develop AP, are interesting as they may illustrate the dynamics of periapical disease when no interference/treatment occur, whereas teeth that have received a root filling provide information on the effect of the endodontic treatment. Teeth receive treatment during the observation period and thereby contribute further with information on time lag between treatment and healing. Another characteristic of the observational study of general populations is that the observed treatment primarily has been performed by general practitioners and not specialists as often seen in controlled clinical studies.

Ordinal scales to assess levels of disease are well known both in medicine, e.g. the TNM classification of solid tumors (16)

and in dentistry, e.g. ICDAS for caries diagnosis (17. To assess different levels of disease seems to be relevant especially if this has a consequence for the treatment choice and/or treatment prognosis. Traditionally the periapical status has been assessed using a dichotomous scale: diseased/healthy. To assess improvement or aggravation of periapical status a more detailed assessment scale would however be preferable. The PAI allows assessment of different levels of inflammation, and during recent years it has been used increasingly in endodontic research. However, most longitudinal studies have transformed the original five-score scale into at dichotomous score healthy/diseased when reporting and analysing study results (8-13). One has reported PAI in five categories at baseline, but in aggregated form at follow-up (18).

The present study demonstrates that the use of the original five PAI scores will increase the diagnostic value of the index. It was shown that a specific prognosis of a tooth is associated with each of the five scores. A tooth presenting with PAI score 1 had a better prognosis during a 5-year period than a tooth with score 2, moreover a tooth with score 2 had better prognosis than a tooth with score 3 and so on (Fig. 2). This finding is readily applicable in the clinical situation when assessing the prognosis of a tooth. Consider for example a root-filled tooth with PAI score 3. Five years later this tooth would have a 33% chance of a PAI score 1 or 2, a 57% chance of a PAI score 3, 4 or 5, and a 10% risk of extraction. These figures are of course averages for the entire population of root-filled teeth. It is further shown that a re-treatment of a root filling will improve the PAI score in more than half of the re-treated teeth (Table 4). The findings in this example and other similar scenarios are not evident when the PAI score is dichotomized as healthy versus diseased.

In the present study teeth with and without root fillings having score 4 or 5 at baseline had similar disease patterns at follow-up, whereas the root-filled teeth having score 1 or 2

Change in PAI: improved, unchanged or impaired

Change in PAI score	Not root-filled at baseline		Root-filled at baseline	
	Not root-filled (n = 19698)	Root-filled (n = 185)	Not re-treated (n = 936)	Re-treated (n = 59)
Improved	1%	15%	22%	54%
Unchanged	97%	37%	58%	27%
Impaired	2%	48%	20%	19%
Total	100%	100%	100%	100%

Table 4. Change in PAI score for 20878 transitions from baseline to follow-up 5 years later categorized as improved, unchanged or impaired and stratified by root filling at baseline (presence or absence) and by treatment during follow-up (none or root filling/re-treatment). Two hundred and nine extracted teeth were excluded.

Tabel 4. *Ændringer i PAI-score for 20.878 tandregistreringer fra baseline til opfølgning 5 år senere kategoriseret som forbedret, uden ændring, forringet og stratificeret i forhold til om der var rodfyldning ved baseline eller ej, og om der var foretaget behandling (rodfyldning/revision) i observationsperioden eller ej. Ekstraherede tænder (N = 209) blev ekskluderede.*

at baseline had higher risk of developing AP during follow-up than the non-root-filled teeth. For PAI score 3 the root-filled teeth had a better prognosis than the non-root-filled teeth. It is well known that root canal treatment of vital teeth in a controlled environment yield success rates of more than 90% (1,5). It was found that relative to non-root-filled teeth, approximately 20% more of the root-filled teeth that had PAI scores 1 or 2 at baseline worsened during the 5-year follow-up. This may indicate that a contamination of the root canal system had occurred during or after the endodontic treatment.

Another striking finding was that the higher PAI score at baseline, the higher the risk that the tooth had been extracted at follow-up. This was seen consistently throughout the scoring scale and for both root-filled and non-root-filled teeth. These findings are unique since no previous studies have described that a differentiated assessment of the periapical status possibly could be used to provide the patient with a more exact prognosis for a specific tooth.

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The present study relies exclusively on radiographic information from consecutive examinations performed at 5-year intervals, so the timing of the changes in periapical status and of the treatment or re-treatment is not known. This certainly complicates the interpretation of the findings, in particular those presented in Table 4 and Fig. 3. Previous studies have indicated that improvements can be seen already three months after treatment, and that most of the teeth that will heal show signs of healing after one year (3,18); this may provide some guidance for the interpretation. Huumonen & Ørstavik reported an overall tendency of healing during the first two years after treatment, but approximately 20% of root-canal-treated teeth with PAI 3, 4 or 5 did not improve after treatment (18).

Table 4 shows that re-treatment of a root filling resulted in improvement of the periapical status in more than half of the cases. A re-treatment may usually only be performed if a previous root filling was unsuccessful, most probably with a PAI score 3, 4 or 5 at the time of re-treatment. For teeth that had no root filling at baseline the situation is more complicated. Evidently, the tooth could have had either pulpitis or AP. If the tooth was treated for pulpitis it probably had PAI score 1 at treatment time, whereas a tooth with AP would have had PAI 3, 4 or 5. The data in the present study does not provide information on the periapical status at the time when endodontic treatment was performed; therefore, no further analysis is possible. However, the finding that almost 50% of teeth with a primary root filling have a higher PAI score after five years is of concern.

Conclusion
Repeated radiographic assessments of teeth using the full PAI scale reveal that each of the five score categories had distinct prognostic value for the course of periapical disease over a 5-year period, for both non-root-filled and root-filled teeth. Moreover, the higher the baseline PAI, the higher is the risk for the tooth to be extracted. These findings were evident without additional information from clinical data.

Acknowledgement

ABSTRACT (DANISH)

Den prognostiske værdi ved anvendelse af den fulde skala af Periapikalt Index

Formål – At vurdere, om gradering af periapikal sygdom ved hjælp af den fulde skala i Periapikalt Index (PAI) kan forudsige sygdomsudvikling for henholdsvis rodbehandlede og ikke rodbehandlede tænder.

Materiale og metoder – En tilfældigt udvalgt population fik foretaget røntgenhelstatus i 1997, 2003 og 2008. Dette studie inkluderede 330 personer, der deltog i alle tre røntgenundersøgelser, og 143, der kun deltog i den første og den anden undersøgelse. Ved hver undersøgelse registrerede man, om tanden var til stede i mundhulen, om den var rodfyldt og PAI-score (1-5). For rodfyldte tænder blev det endvidere registreret, om der var foretaget en revision i en af de mellemliggende perioder.

Resultater – Ved baseline havde ikke-rodfyldte tænder en lavere PAI-score end rodfyldte tænder (P < 0,0001). En høj PAI-score ved baseline øgede risikoen for at en tand, rodfyldt eller ej, blev ekstraheret (P < 0,001). Hvis PAI-scoren ved baseline var høj, var PAI-scoren ved followup højere, end hvis baseline PAI-scoren havde været lav.

Rodfyldte og ikke-rodfyldte tænder udviste helt overordnet et sammenligneligt sygdomsmønster, men der var dog forskel (P < 0,001). Ikke-rodfyldte tænder, der ved baseline havde PAI-score 1 eller 2, havde en betydelig bedre prognose end de tilsvarende rodfyldte (P < 0,001). Samtidig havde rodfyldte tænder med en baseline PAI-score på 3, 4 eller 5 en bedre prognose end sammenlignelige ikke-rodfyldte tænder (P = 0,023).

Konklusion – Det blev vist, at hvert af de fem trin i PAI-skalaen havde en distinkt prognostisk værdi ved både rodfyldte og ikke-rodfyldte tænder.

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