MASTEROPPGAVE

Decision making in endodontics among the endodontic profession and general practitioners in Norway

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ABSTRACT

Background: Considerable variation between and within groups of NEF members and general practitioners (GPs) has been shown in the choice of endodontic retreatment options. However, uniform criteria and consensus in decision-making would be of importance when the clinical training in the dental school is arranged in a community setting by GPs employed as clinical instructors.
Objectives: To assess the level of consensus in decision making in endodontic re-treatment among members of the Norwegian Endodontic Society (NEF) and a group of GPs employed at the extern clinics associated with the Institute of Clinical Dentistry at the University of Tromsø, Norway.
Methods: All 65 practicing NEF members with valid e-mail addresses and all 39 GPs employed at the 10 extern clinics were addressed. A questionnaire with 26 radiographs from potential endodontic re-treatment cases and a fabricated patient history common to all of them was sent online by Questback internet program. Six treatment options were given, four of them suggesting active treatment. The results were analysed with SPSS (17.0) and Likelihood Ratio was calculated to show the differences between the groups.
Results: 42 NEF members (65%) and 26 GPs (66%) responded. Half of the cases showed statistical significant differences ($p<0.05$) between the groups in the choice of treatment. There was no consensus among either of the groups in any case, but the NEF members showed relative consensus between active and non-active treatment in three cases. The NEF members favoured active treatment in cases where the majority of GPs would have waited another 12 months.
Conclusions: The results show lack of consensus in the clinical decision-making in both groups, thus reflecting the need for continuing education in the key literature behind the rationale of various treatment options.

Introduction

The purpose of endodontic treatments and re-treatment are to prevent/heal any periapical infection from the jaw originating from a tooth. Since all infections are a hazard to the local and the general health, an infected tooth should be disinfected and sealed with a tight root-filling to prevent further development of the infection and re-infection (Reit, 2010a; Reit C, Bergenholtz G, Hørsted-Bindslev P, 2010). If there is any periapical radiolucency in connection to a root-filled tooth visible on radiograph more than 4 years after initial treatment, the treatment should be counted as a failure, indicating need for re-treatment in one way or another (Strindberg, 1956). When observing a radiographic radiolucency associated to periapical tissues Brynolf (1967) showed in a histological study on cadavers that a periapical infection is likely to be present.

Despite general guidelines, dentists have to make their own decisions when confronted with a clinical situation. The subject of clinical decision making has been studied by several occasions, including; dental restorations and secondary caries (Elderton, 1990), multidisciplinary dentistry (Bigras et al, 2008), and endodontics (Reit and Gröndahl, 1984; Lavonius et al, 1998), all showing that dentists choose very different treatments when being presented the same cases.

The aim of the present study is to assess the level of consensus in decision making in endodontic re-treatment among members of the Norwegian society of endodontics (NEF) and a group of general practitioners (GPs) in the public clinics associated with the Institute of Clinical Dentistry (IKO) at the University of Tromsø (UiT), Norway.

Materials and methods

An internet distributed questionnaire (Questback.no) containing 26 periapical radiographs was conducted. The radiographs were selected from the Digora database in Troms County, showing either pathology and/or deficient root fillings. Norwegian society of Endodontics (NEF) was asked to distribute the questionnaire to all of their 70 members, but three of the e-mail addresses were not valid. Thus the questionnaire was sent to 67 NEF members. Two members reported that they no longer were in clinical practice and were excluded from the study; hence the group of NEF members only counts 65 respondents. The clinical instructors at all of the 15 external dental clinics, linked to

IKO/UiT, were requested to collect the e-mail addresses of their colleagues at their own clinic. All addresses of 39 GPs employed by 10 of the external clinics were received and the questionnaire was sent to all of those. A total of 42 NEF members (65%) and 26 GPs (66%) responded to the questionnaire.

A fictive patient history was made up so that a diagnosis could be based on the radiographs alone: "*The patient is 50 years old, healthy, takes no medication. There are no symptoms from the tooth, or the surrounding soft tissue in question. The x-rays were taken because of a routine control or because of treatment to an adjacent tooth. The clinic has no previous records or x-rays of the tooth, but the patient tells you that the root canal treatment was performed about 10 years ago".* The participants were given 6 treatment options to choose from: 1) No therapy indicated, 2) Wait 12 months, then new examination, 3) Postpone the orthograde re-treatment until the restoration/crown needs to be replaced, 4) Orthograde re-treatment at once, 5) Apicectomy, 6) Extraction of the tooth or other surgical procedure, except apicectomy. Hence, the two first treatment options suggests no active treatment and whereas the rest suggests active treatment.

Reminders to participate in the study were sent after two, four and five weeks. To analyze the data, SPSS for Windows (version 17.0) were used to calculate likelihood ratio, showing statistically significant differences between the two groups of dentists.

Results

Neither the GPs, nor the NEF members were unanimous in their choices of treatment in any case (Figure 1 and 2). Two or three different treatment options were suggested in 12 cases, four or five options were suggested in 13 cases, and all six treatment options were suggested in one case: case no. 7 by the NEF members and case no. 2 by the GPs. The NEF members show a relative consensus in three cases, where all agree in whether to actively treat or not. The GPs did not show even this relative consensus in any case. Between the two groups, 13 of the cases did not show any statistically significant differences in the choice of treatment of the majority of respondents. In the other 13 cases, there were statistically significant differences assessed by likelihood ratio ($p<0.05$) as follows: Seven of the cases (no. 3, 4, 6, 7, 8, 19, 22) show that the NEF members wanted to perform orthograde re-treatment (options 3 or 4), while the GPs wanted to do noting,

or wait and see (options 1 or 2). As an example, see Figure 3. The opposite was not present in any case. In three cases (no. 9, 18, 21) the majority of the NEF members wanted to do orthograde re-treatment at once, while the choice of treatment of the GPs were evenly distributed on three or more of the options. For example, see figure 4. In further one case (no. 10) the two groups were quite similar, except that a significant part of the NEF members wanted to do orthograde re-treatment while none of the GPs would to do so (Figure 5). In yet two cases the two groups were close to similar, but in one case (no. 11), a significant part of the GPs wanted to wait for orthograde re-treatment, while most of the NEF members wanted to do it at once. In the last case with statistically significant differences between the groups (no. 25), 15.4 % (n=4) of the GPs wanted to wait and see for 12 months, while none of the NEF members would do so (Figure 6). For each case, an analysis of the radiograph and a likely diagnosis and treatment plan based on the case history, these findings and current literature is given in Table 1.

Discussion

The two groups, the NEF members and the GPs show a response rate at 65% and 66% respectively, rendering the data representative for both groups. Practically all NEF members were asked to participate in the study, as only 3 e-mail addresses were missing. The respondents representing the NEF members are not all necessarily specialists in endodontics, but they have presumably a special interest and experience in endodontics, making the group representative to Norwegian endodontic profession. The GPs in the present study are all employed by the counties where the external clinics were seated at the time of the questionnaire: Finnmark, Troms, Nordland, Nord-Trøndelag, Hedmark and Telemark. Hence, the GPs are not representing e.g. public dental clinics in the western part of Norway, or any of the dentists in private practice in Norway. However, the sample is representative to GPs working in public dental clinics, especially in the four northernmost counties of Norway.

The radiographs were collected from real life patients, and the anamnesis, though it was fabricated, represent a realistic clinical situation. Likelihood ratio was used to calculate the significance of the differences between the groups, since it is able to show significance between smaller groups than Pearson Chi-Square test. Unfortunately, the two

groups comprise too few participants to significantly show if the GPs disagree more or less with each other than the NEF members. The study is therefore focused at investigating how the groups differ from each other regarding the choice of treatment options. The study does not compare the cases to each other, e.g. level of consensus when treating a front tooth versus a molar, or choice of treatment in relationship to the degree of pathology shown in the different cases.

Even though the study compares the treatment of choice of the two groups, it has to be emphasized that one group cannot perform "better" than the other, because there are often no distinct treatment of choice in endodontic re-treatment cases. In a clinical setting, there are usually several treatment options who would be as good as any other in each and every case. Current literature, as summarized by Reit (2010b) could though be used as a gold standard to guide the treatment options, when the radiological findings and the case history are known (Table 1). In the cases where there were statistically significant dissension between the groups in the choice of treatment, the NEF members tend to come closer to these suggestions compared to the GPs (Figures. 1 and 2, Table 1). It seems that the GPs tend to be hesitant to (re-)treat teeth showing technical defects and/or pathology, while the NEF members chooses, in a greater extent, to re-treat at once. This may be because NEF members in general have access to better equipment to carry out difficult endodontic re-treatment than GPs, such as microscope, tools for removing posts and cores, more variety of endodontic files, rotating enddontic files, etc. The "optimal" choice of treatment to an endodontic specialist might therefore be different from that of a general practitioner. The questionnaire did not specify if the dentists should choose a treatment option from what they would do themselves or from what they think is the optimal treatment choice for the tooth and patient. Nothing could therefore be said about the level of knowledge in endodontic decicion making among the participating dentists in the two groups. Moreover, one must keep in mind, that at its best, the dentist is only suggesting a treatment plan that the patients then accept or not. Unfortunately, this aspect could not be incorporated into the present study design. It is worth noticing that in addition to many of the GPs also many of the NEF members want to "wait and see for 12 months" when no further healing of a periapical lesion is expected more than four years after initial treatment (Strindberg, 1956).

The aim of the study by Reit and Gröndahl (1984) was to investigate the decision strategies used among a group of chief dental officers, when confronted with asymptomatic periapical lesions in root filled teeth. They found that there where little or no consensus between the dentists in any of the 33 cases they presented. In fact, all of their five treatment options (no therapy indicated, wait 12 months and then a new examination, endodontic re-treatment, periapical surgery, extraction of the tooth) were chosen by the participants in eight of the cases. The number of teeth suggested to be treated, varied from seven to 26 of the cases. Lavonius et al (1998) added a sixth treatment option to the five used by Reit and Gröndahl (1984): "Postponing the endodontic re-treatment until the restoration/crown needs to be replaced". In one of the 20 cases presented to Finnish GPs by Lavonius et al (1998), all six options were suggested, and in 13 of the cases, five of them. No consensus was achieved in any of the 20 cases. In the present study, the dissensions in both groups are substantial, and thus in line with the dissensions found in the previous studies. An example of this is the two cases (no. 2 and 7) where all six treatment options are suggested.

Put in a context with previous studies in Sweden and Finland, it seems that consensus in clinical decision making regarding endodontic re-treatment cases is just as low in Norway today, as it was 26 years ago in Sweden. This indicates that teaching on the rationale of diagnostics, should be more emphasized in both under graduate, as well as post graduate studies and continuing education programs.

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Table 1 Analysis of radiographs and diagnosis/treatment choice based on it (N=26):

Apical diagnosis: N=Normal periapical anatomy, PDL=Widening of PDL, Scl=Sclerotic bone apically, PRad=Periapical radiolucency, Perio=Periodontal pocket reaching to the apex. **Length of root filling:** 0-2mm=0-2mm from apex, Sh=Short (>2mm from apex), L=Long (<0mm), 0mm=Ending precisely at the apex (0mm), SPuff=Sealer puff without problem with the length it self. **Quality of root filling:** TS=Tight seal, Vo=Voids along or in root filling, ESBet=Empty space between root filling and restorative treatment, ESAp=Empty space apically to root filling. **Prosthetics:** Cr/F=Crown/filling, BrPil=Bridge pillar, Post=Post and core, NoF=No filling. **Treatment choice:** 1) NoTx=No therapy indicated, 3) PostpTx=Postpone the orthograde re-treatment until the restoration/crown needs to be replaced, 4) RCT now=Orthograde retreatment at once, 5) ApEct=Apicectomy, 6) Ex= Extraction of the tooth or other surgical procedure, except apicoectomy

CASE	Apical radiographic findings	Length of the root filling	Quality of the root filling	Prosthetic restoration	Choice of treatment [a]
Case 1	PRad	Sh	TS	Cr/F	4) RCT now
Case 2	PRad	Sh	ESAp	Cr/F	4) RCT now
Case 3	PRad	Sh	ESAp	Cr/F, Post	4) RCT now
Case 4	Scl, PRad	0-2mm	TS	Cr/F	4) RCT now
Case 5	N	0-2mm	ESBet	Cr/F, Post	1) NoTx
Case 6	PRad	Sh	ESAp	BrPil	4) RCT now
Case 7	PDL	0-2mm	Vo	Cr/F	3) PostpTx
Case 8	N	Sh	ESBet	Cr/F, Post	1) NoTx
Case 9	PRad	0-2mm	TS	NoF	4) RCT now
Case 10	PRad	Sh	TS	BrPil	5) ApEct
Case 11	PDL	Sh	Vo, ESAp	Cr/F	4) RCT now
Case 12	N	0-2mm	ESBet	Cr/F, Post	1) NoTx
Case 13	PRad, Perio	0-2mm	TS	Cr/F	6) Ex
Case 14	N	Sh	TS	Cr/F	1) NoTx
Case 15	N	Sh	Vo	Cr/F	1) NoTx
Case 16	N	SPuff	Vo	Cr/F	1) NoTx
Case 17	N	0mm	ESBet	Cr/F, Post	1) NoTx
Case 18	PDL, PRad	Sh	Vo	Cr/F	4) RCT now
Case 19	PDL	Sh	ESBet	Cr/F	4) RCT now
Case 20	N	Sh	TS	Cr/F	1) NoTx
Case 21	PRad	0-2mm	ESBet	Cr/F, Post	4) RCT now
Case 22	Scl	0-2mm	ESAp	Cr/F	3) PostpTx
Case 23	PRad	0-2mm	Vo	Cr/F	4) RCT now
Case 24	N	0-2mm	ESBet	BrPil, Post	1) NoTx
Case 25	PRad	L	ESBet	Cr/F, Post	5) ApEct
Case 26	N	SPuff	TS	Cr/F	1) NoTx

a Based on the history, radiographic finding and current literature (ESE Guidelines; Reit 2010b)

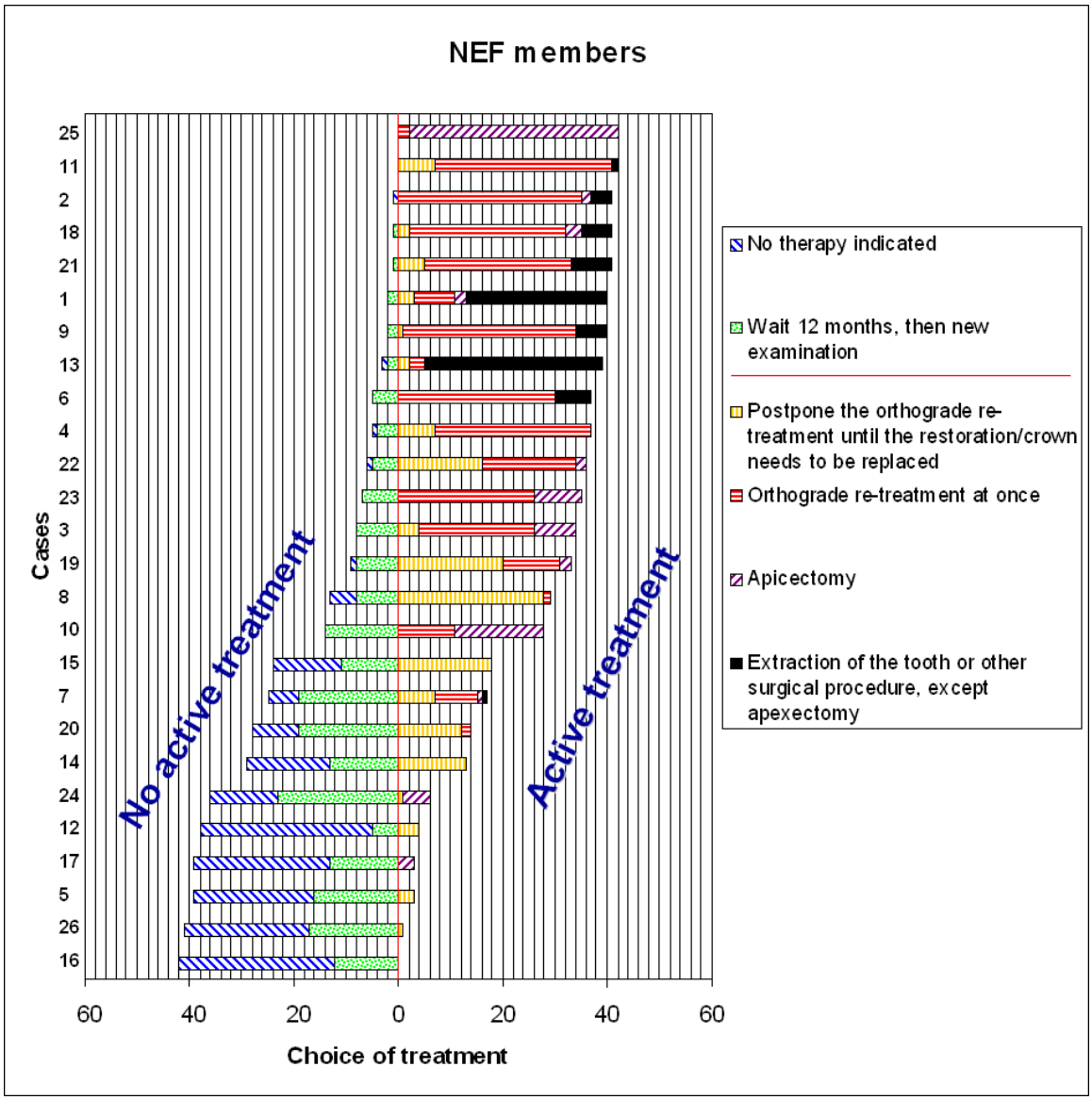


Figure 1: Choice of treatment made by the NEF members. Each bar is representing one case with the case number listed on the y-axis. The x-axis is representing the number of dentists.

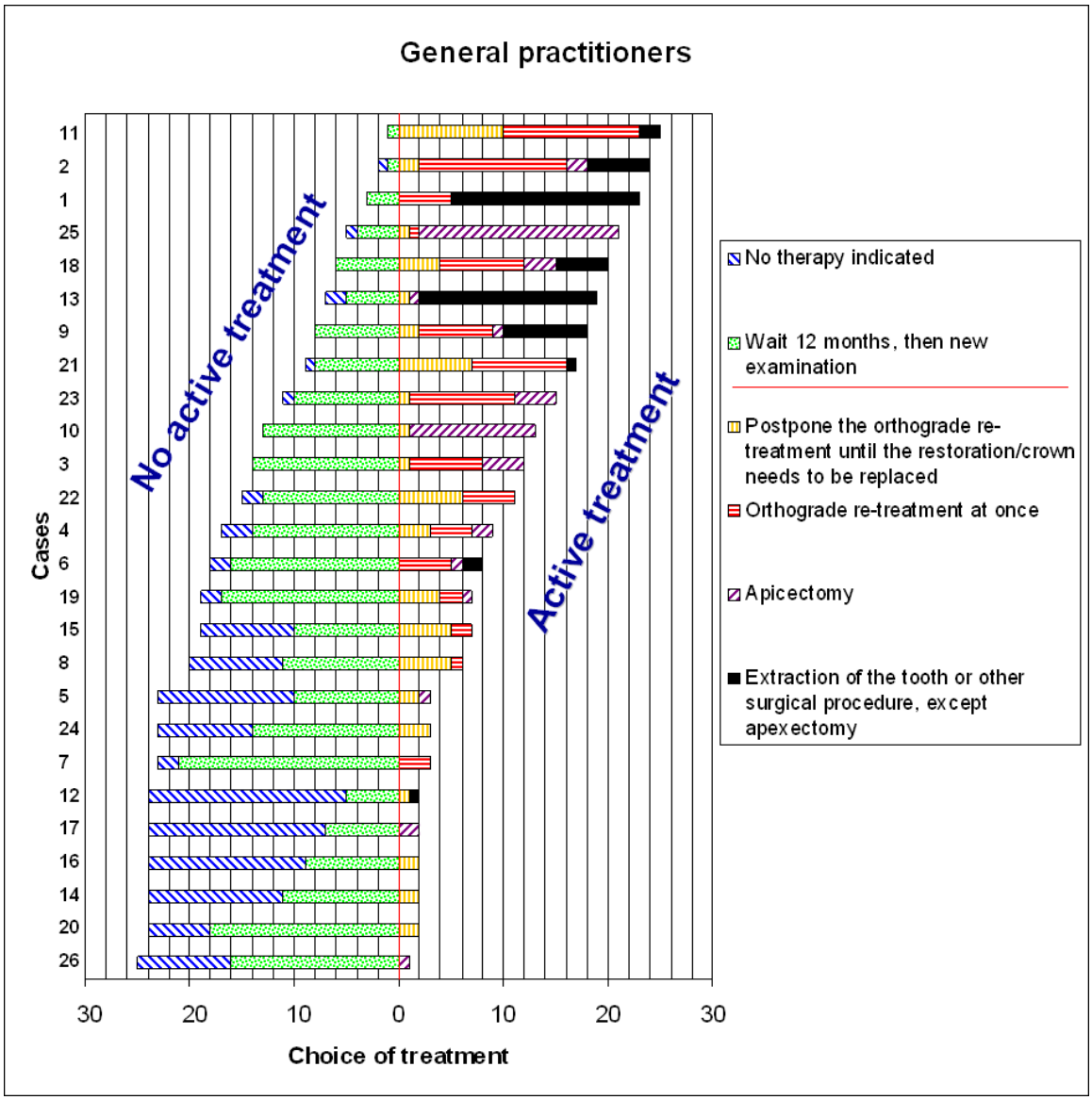


Figure 2: Choice of treatment made by the GPs. Each bar is representing one case with the case number listed on the y-axis. The x-axis is representing the number of dentists.

Case nr. 6, p=0,001

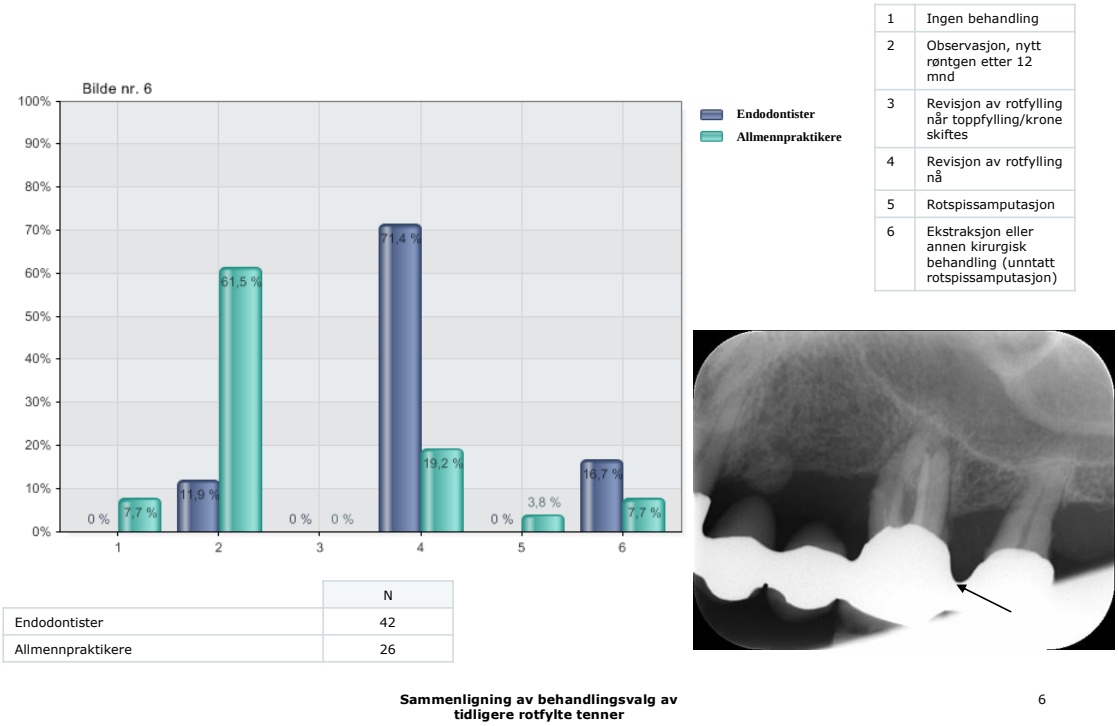


Figure 3: Case nr. 6, d. 26, NEF members chooses to do orthograde re-treatment at once (alternative 4, dark column), while the GPs will wait and see for 12 months (alternative 2, light column).

Case nr. 18, p=0,006

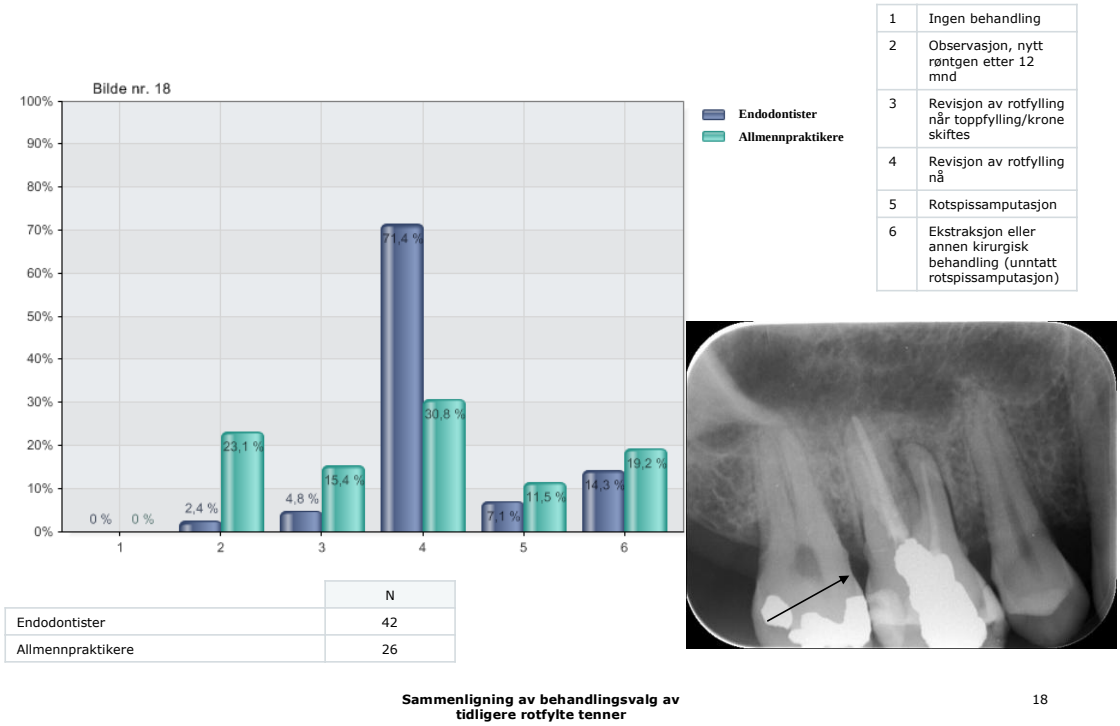
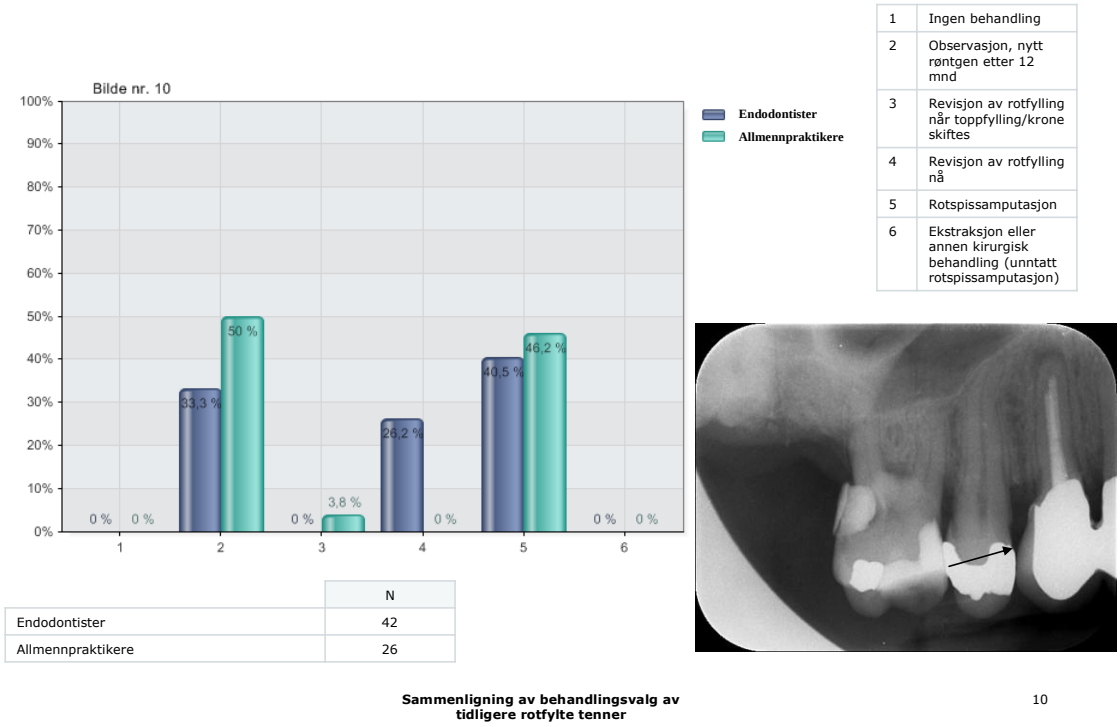


Figure 4: Case nr. 18, d.16, NEF members chooses to do orthograde re-treatment at once (alternative 4, dark column), while the choice of treatment of the GPs are more or less evenly distributed at three options or more (light columns).

Case nr. 10, p=0,003



1	Ingen behandling
2	Observasjon, nytt røntgen etter 12 mnd
3	Revisjon av rotfylling når toppfylling/krone skiftes
4	Revisjon av rotfylling nå
5	Rotspissamputasjon
6	Ekstraksjon eller annen kirurgisk behandling (unntatt rotspissamputasjon)

	N
Endodontister	42
Allmennpraktikere	26

Sammenligning av behandlingsvalg av tidligere rotfylte tenner 10

Figure 5: Case nr. 10, d.14, a statistically significant part of the NEF members chooses to do orthograde re-treatment at once (alternative 4, dark column), while none of the GPs wants to do so (no light column at alternative 4).

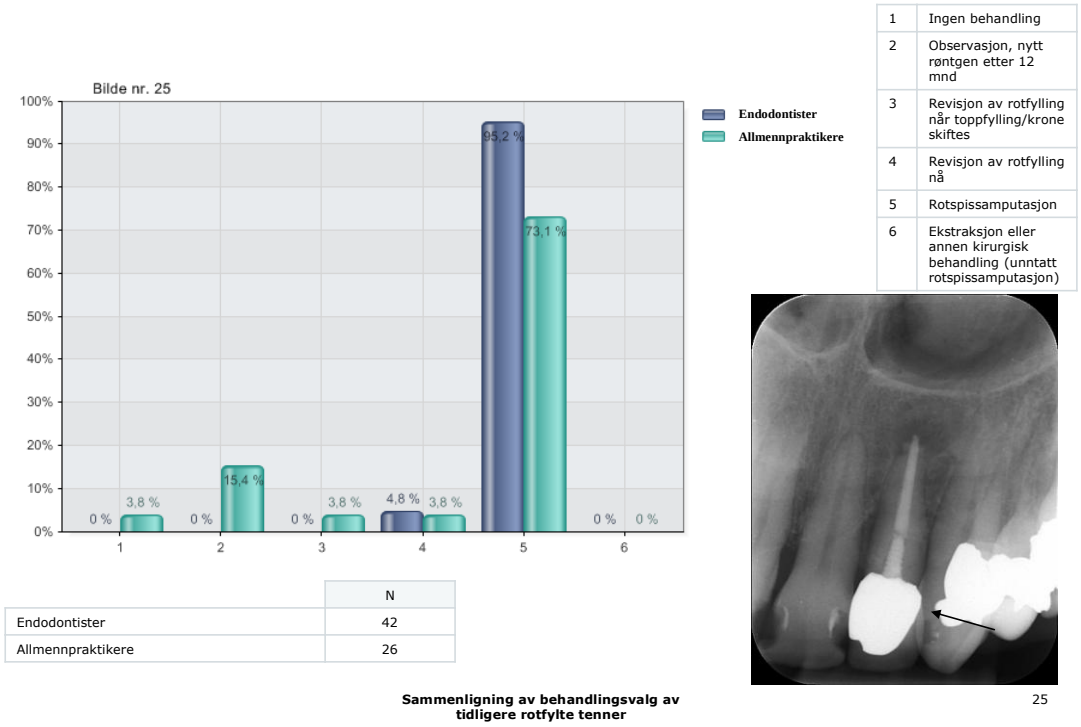


Figure 6: Case nr. 25, d.22, four of the GPs (statistically significant) wants to wait and see for 12 months (alternative 2, light column), while none of the NEF member want to do so (no dark column at alternative 2).

Appendix 1: All 26 cases as they were presented to the respondents. Statistics included.