Journal of Clinical Gerontology & Geriatrics 7 (2016) 17–20

Contents lists available at ScienceDirect

Journal of Clinical Gerontology & Geriatrics

journal homepage: www.e-jcgg.com

Original article

Retrospective analysis of post-treatment apical periodontitis and quality of endodontic treatment and coronal restorations in an elderly Turkish population

Evren Sarıyılmaz, PhD, DDS [a], Cangül Keskin, DDS [b, *], Öznur Özcan, DDS [b]

[a] Ordu University Faculty of Dentistry Department of Endodontics, Ordu, Turkey
[b] Ondokuz Mayis University Faculty of Dentistry Department of Endodontics, Samsun, Turkey

ARTICLE INFO

Article history:
Received 12 May 2015
Received in revised form
30 July 2015
Accepted 20 August 2015
Available online 27 November 2015

Keywords:
apical periodontitis
epidemiology
radiographic evaluation

ABSTRACT

Purpose: The aim of this cross-sectional study was to determine the prevalence of apical periodontitis in 1768 root canal-treated teeth in an elderly Turkish population and to evaluate correlations between several factors and periapical status.
Methods: Panoramic radiographs were collected of 818 patients who were older than 60 years and attended the Faculty of Ordu University Dentistry for dental care. Teeth were classified as healthy or diseased, according to the periradicular status. Root canal filling, coronal restoration quality, and presence of postretained restorations were also evaluated.
Results: The prevalence of apical periodontitis was 26.7% in the elderly population. A statistically significant association between root canal filling quality and periapical health was detected. Coronal restoration quality also exhibited a statistically significant relationship with periapical health. No significant difference was recorded between the periapical status of teeth restored with and without posts.
Conclusion: Both technical quality of root canal filling and coronal restoration play key roles in endodontic treatment outcome. In the elderly population, the prevalence of poor root canal filling quality was very high and this problem might increase the need for retreatment or tooth loss in this population.

1. Introduction

Apical periodontitis (AP) is one of the most common bacterial diseases, with reported prevalence ranging between 25% and 61%.[1–3] Post-treatment AP describes a periradicular lesion of root canal treated teeth and endodontic failure is indicated.[4] Diagnoses of post-treatment AP are frequently made by clinics and on radiographic examinations. During radiographic examination of the homogeneity of root canal fillings, the apical level of obturation and structural features of periapical bones were evaluated.[5]

Root canal filling quality has been strongly correlated with the rate of post-treatment AP.[6,7] Coronal restoration quality has also been investigated as another contributing factor to the presence or development of AP.[8,9] Torabinejad et al[10] found that in root canal-treated teeth without coronal restorations, bacterial ingress to root canals were detected after 3 weeks. Ray and Trope[11] reported a strong association between adequate coronal restoration and periradicular status of root canal-treated teeth. They also suggested that the quality of coronal restoration was the main contributor to AP rather than the quality of the root canal filling. Other studies reported the quality of root canal filling to be more significant than coronal restoration for periapical health.[12,13] A consensus has not been reached yet, but healthy periradicular structures of a root canal-treated teeth is recognized to depend on the quality of both the root canal filling and coronal restorations.[5]

Improvement in the life span of humans has led to the expectation of the maintenance of dentition in elderly patients; therefore, it has led to an increase of root canal treatment needs in this population.[14] Epidemiological studies have shown the requirement for the improvement of root canal procedures.[1] AP prevalence has been reported to increase with age.[15] Therefore, studies focused on populations may help to define the needs for endodontic treatment and optimal treatment outcome in order to prevent AP. Specifically

* Corresponding author. Ondokuz Mayis University, Department of Endodontics, Samsun, Turkey.
E-mail address: canglkarabulut@gmail.com (C. Keskin).

http://dx.doi.org/10.1016/j.jcgg.2015.08.003

in Turkey, a study on AP prevalence in the elderly population has not been available.

The aim of this study was to determine the prevalence of AP and relate root canal filling and coronal restoration quality with periapical status in an elderly Turkish subpopulation.

2. Methods

Orthopantomographs (OPGs) of 818 patients presented to Ordu University Faculty of Dentistry for dental care for the first time from June 1, 2012 to December 31, 2012 were randomly selected from faculty of dentistry databases and recorded as a BMP file. These OPGs were taken for diagnosis of dental treatment needs of patients that were referred to this dentistry faculty. The inclusion criteria were: (1) availability of OPGs for patients older than 60 years; (2) having at least one root canal-treated teeth; and (3) no record of endodontic treatment for at least 1 year. All OPGs were taken with a digital panoramic and cephalometric system in 2012 in the Oral Radiology Department of the University Hospital (Kodak 8000C; Eastman Kodak Company, Rochester, NY, USA) by a dental radiologist, following the manufacturer's specified instructions. OPGs with poor imaging quality were excluded from the study.

Age, sex, count of existing teeth and root canal-treated teeth of every patient, the quality of root canal fillings, and coronal restoration and periapical index (PAI) scores of teeth were recorded on previously prepared forms. There were 1768 root canal-treated teeth from OPGs of 818 patients evaluated by two experienced endodontists. Interexaminer agreement was detected by a calibration against a set of 20 reference teeth and Cohen's κ (0.82). When disagreements were encountered, a third endodontist was asked to help reach a consensus. The OPGs were evaluated in a darkened room on a computer screen.

The quality of root canal fillings and coronal restorations were recorded as adequate or inadequate, according to the criteria determined by Tronstad et al.[8] When all canals were obturated without voids and when the root canal fillings ended 0–2 mm short of the radiographic apex, the quality of the root canal treatment was recorded as adequate. Teeth where root canal fillings ended > 2 mm short or extended beyond the radiographic apex and voids were recorded as inadequate.

Adequate restoration was regarded as a restoration that was radiographically intact, whereas inadequate restoration was regarded as a restoration with detectable signs of open margins, fracture, and/or secondary caries. Loss of restoration of a root canal-treated tooth was categorized as absent restoration. The presence of post-retained restorations was also recorded as another categorization.

The periradicular structures were determined as healthy when width and contour of the periodontal ligament space and lamina dura were within normal limits. PAI was used to score apical status, as proposed by Ørstavik et al[16] as follows:

1 = Normal periapical structures
2 = Small changes in bone structure
3 = Changes in bone structure with some mineral loss
4 = Periodontitis with well-defined radiolucent area
5 = Severe periodontitis with exacerbating features

PAI scores > 2 (PAI ≥ 3) was considered to be a sign of AP.

SPSS software (version 21.0; IBM, Chicago, IL, USA) was used for statistical analyses. The χ^2 test was applied to independent variables, sex, age, quality of root canal treatment, and quality of coronal restoration in relation to periapical status. The significance level was established at 5%.

3. Results

Table 1 gives an overview of the data distribution. Out of 818 patients, 508 (62%) were women. The largest concentration of people by age group was aged 60–70 years (68%) and the mean age was 68.4 years. The mean number of teeth per patient was 18.7 and the mean number of root canal-treated teeth was 2.1. The most root canal-treated teeth were incisors (68.3%). Maxillary teeth corresponded to 63.3% of the teeth.

Out of 1768 root canal-treated teeth, 1296 (73.3%) did not exhibit any signs of periradicular disease; 772 (43.7%) teeth had adequate endodontic treatment. Of these, 732 (94.8%) were recorded as healthy (Table 2). Of the 996 (56.3%) teeth with inadequate endodontic treatment, 564 (56.6%) were recorded as healthy. Statistically significant differences were found between the two groups ($p < 0.001$). AP was detected more frequently in teeth with inadequate root canal treatment ($\chi^2 = 721.14$, odds ratio = 10.39).

Due to the small number of absent coronal restorations, the data were pooled with inadequate coronal restorations. Of the 1236 (69.9%) teeth that were recorded to have adequate coronal restorations, 982 (79.4%) were recorded as healthy. Of the 532 (31.1%) teeth with inadequate or absent coronal restorations, 314 (59.1%) were recorded as healthy. The difference between the adequate and inadequate/absent restoration was statistically significant ($\chi^2 = 178.94$, $p < 0.001$, odds ratio = 2.32).

In the present study, 102 teeth were restored with a post. Of these, 78 (76.4%) teeth were recorded as healthy. There were no significant differences between the periapical status of teeth restored with posts and those not restored with posts ($\chi^2 = 18.94$, $p = 0.794$, odds ratio = 1.49).

4. Discussion

Previous studies revealed that AP is a widespread disease amongst adult populations. Epidemiological studies pointed that the prevalence of AP is directly affected by increasing age.[15,17] Advancements in medicine have led to an increasing mean lifespan of humans, so the determination of AP and the possible reasons of AP in older people has become more important. Root canal treatment procedures become more difficult because of changes of root canal systems due to aging, cooperation issues, systemic diseases, and conditions of the elderly population. This study provides the first

Table 1
Distribution of root canal-treated teeth according to the tooth group ($n = 1768$).

Variables	*n*	%
Sex		
Women	508	62
Men	310	38
Age (y)		
60–70	555	68
70–80	187	22.8
80–90	72	8.8
>90	4	0.4
Quality of root canal filling		
Adequate	772	43.7
Inadequate	996	56.3
Quality of coronal restoration		
Adequate	1236	69.9
Inadequate	503	28.4
Absent	29	1.7
Post		
Yes	102	5.7
No	1666	94.3
Periradicular status		
Healthy	1296	73.3
Diseased	472	26.7