Management of Apical Periodontitis: Healing of Post-treatment Periapical Lesions Present 1 Year after Endodontic Treatment

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Abstract

Introduction: Post-treatment periapical lesions present 1 year after treatment may heal during the second year or later. The aim of this study was to assess second-year volumetric changes in post-treatment periapical radiolucencies detected 1 year after treatment. **Methods:** Post-treatment periapical radiolucencies were detected on cone-beam computed tomographic (CBCT) scans obtained from 93 single-rooted teeth 1 year after endodontic treatment. The outcome of these teeth was evaluated 2 years after treatment. Two examiners independently measured the volume of the radiolucencies on CBCT images twice. A Wilcoxon signed rank test was used to assess the 1- and 2-year post-treatment volumes. **Results:** The intraclass correlation coefficients for the CBCT volumetric measurements were 0.971 and 0.998 for the 2 examiners, and the interexaminer correlation coefficient was 0.998. Of the 93 teeth with post-treatment radiolucencies at 1 year, 61were examined at the second-year evaluation. The overall size of the radiolucencies significantly decreased during the second year (P = .01); the volume decreased in 38 teeth (63%), remained unchanged in 20 (33%), and increased in 2 (3%). **Conclusions:** The volume of post-treatment periapical radiolucencies detected 1 year after treatment was significantly reduced after the second year in 63% of teeth. *(J Endod 2015;41:1020–1025)*

Key Words

Cone-beam computed tomography, healing, post-treatment periapical lesions

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Post-treatment periapical lesions present 1 year after treatment may heal during the second year. As reported by Ørstavik (1), the success rate of treatment, based on radiographic findings, increased from 44% in the first year to 72% in the second year. Therefore, the post-treatment periapical lesions present 1 year after treatment often do not need further treatment.

Several studies have shown that cone-beam computed tomographic (CBCT) imaging is more accurate than radiography for identifying periapical lesions (2, 3). Furthermore, the volume and volumetric changes of periapical bone lesions can be measured accurately with the help of CBCT scans and the Amira software program (Visage Imaging GmbH, Berlin, Germany) (4).

In 3 recently published studies, teeth with preoperative periapical radiolucencies that were diagnosed on CBCT scans were endodontically treated (5–7), and complete absence of periapical radiolucency 1 year after treatment, as determined by CBCT imaging, was observed in 48%, 19%, and 16% of the teeth in these 3 respective studies. Thus, in 52%–84% of the teeth, post-treatment periapical radiolucency was still present 1 year after treatment. Therefore, it is important to study the volumetric changes of post-treatment radiolucencies in the second year after treatment and beyond. The aim of this study was to assess the volumetric changes of post-treatment periapical radiolucencies detected 1 year after treatment.

Materials and Methods

The study protocol was approved by the Ethics Board of Peking University Health Science Center (no. PKUSSIRB-2013057). In the Department of Operative Dentistry and Endodontics of the Peking University School of Stomatology, Beijing, China, 162 single-rooted maxillary and mandibular incisors, canines, or premolars in 130 patients were endodontically treated between 2010 and 2011, including 105 teeth in 105 patients who had 1 treated tooth per patient and 57 teeth in 25 patients who had multiple treated teeth per patient. One year after treatment, 126 teeth were examined using CBCT scans to analyze the volume of the periapical lesions. Eighty-four of these 126 teeth were from patients who had 1 treated tooth per patient; the 1-year outcome of the 84 teeth was reported in 2013 (6). Forty-two of the 126 teeth were from the patients who had multiple treated teeth, which were not included in the study (6). In the present study, teeth in patients with either 1 or multiple treated teeth were included.

At the 1-year recall assessment, complete absence of periapical radiolucency was observed in 32 treated teeth, and endodontic surgery was performed on 1 tooth. These 33 teeth were excluded. The other 93 treated teeth (81 patients) with post-treatment periapical radiolucency at 1 year were scheduled for an appointment 2 years after the initial treatment (23–32 months), at which time a CBCT scan of the treated teeth was taken and the teeth were clinically tested for the presence of pain, swelling, sinus tracts, and tenderness to percussion.

A standard treatment protocol of shaping, cleaning, and obturation was followed and previously described (6). Briefly, each treated tooth was isolated with a rubber dam. A crown-down preparation technique was performed using nickel-titanium rotary instruments (Race; FKG Dentaire, La Chaux-de-Fonds, Switzerland; #40/.06, #35/.08, #25/.02, and #25/.04 until #25/.06 reached the working length). Apical enlargement

TABLE 1. Percentage of Decrease in the Volume of Periapical Lesions on Cone-beam Computed Tomographic Imaging of All Reviewed Teeth Preoperatively and at 1 and 2 Years

No.	Preoperative lesion volume (mm^3)	1-year lesion volume (mm^3)	2-year lesion volume (mm^3)	Percentage of decrease at 1 year (%)*	Percentage of decrease at 2 years (%)†
1	339.7	10.5	11.8	97	−13
2	323.1	1.7	0.0	99	100
3	231.2	44.4	30.3	81	32
4	215.2	17.7	0.0	92	100
5	201.8	11.3	10.3	94	9
6	181.5	94.3	5.6	48	94
7	179.2	31.0	33.0	83	−6
8	159.5	42.5	24.7	73	42
9	153.9	174.6	116.9	−13	33
10	139.8	19.3	12.6	86	34
11	135.9	20.1	8.9	85	56
12	128.0	15.5	11.9	88	23
13	127.1	18.4	2.4	86	87
14	115.3	12.6	11.2	89	11
15	111.6	164.0	248.0	−47	−51
16	105.5	18.0	14.1	83	22
17	100.4	18.5	11.9	82	36
18	67.5	3.6	0.9	95	76
19	66.0	5.3	0.0	92	100
20	63.9	10.6	8.5	83	20
21	62.9	34.7	36.0	45	−4
22	61.4	2.2	0.0	96	100
23	56.2	32.2	0.0	43	100
24	52.6	36.7	38.2	30	−4
25	47.9	19.3	0.0	60	100
26	47.0	8.5	0.0	82	100
27	45.4	9.9	4.3	78	56
28	37.5	22.1	11.4	41	48
29	36.6	11.0	11.6	70	−6
30	32.2	1.7	1.7	95	1
31	31.8	18.4	14.1	42	24
32	31.4	1.6	0.0	95	100
33	31.4	9.2	7.4	71	19
34	30.9	10.9	6.9	65	37
35	28.5	1.6	0.0	94	100
36	28.4	7.0	1.8	75	74
37	28.0	5.3	5.3	81	0
38	27.3	5.4	5.9	80	−10
39	26.8	23.9	19.2	11	19
40	26.6	4.9	2.4	82	50
41	22.1	2.8	2.0	87	29
42	20.0	4.1	4.0	79	3
43	19.3	19.7	15.6	−2	20
44	18.5	19.2	22.5	−4	−17
45	18.1	2.0	1.2	89	39
46	16.3	7.0	0.0	57	100
47	15.6	1.7	1.9	89	−11
48	15.6	9.2	10.4	41	−13
49	15.5	21.1	17.0	−36	19
50	14.7	3.4	1.8	77	46
51	12.6	4.6	3.5	64	23
52	12.1	14.6	12.8	−20	12
53	11.8	2.4	1.7	80	28
54	10.6	1.0	1.1	90	−5
55	10.5	1.4	0.0	86	100
56	8.4	6.3	0.0	25	100
57	7.8	4.5	5.7	43	−27
58	6.3	0.8	0.0	87	100
59	4.2	3.9	1.9	9	51
60	2.6	1.5	1.7	42	−12

*Percentage of decrease at 1 year (%) = (preoperative lesion volume − 1-year lesion volume)/preoperative lesion volume.

†Percentage of decrease at 2 years (%) = (1-year lesion volume − 2-year lesion volume)/1-year lesion volume.

was finished using S-Apex instruments (FKG Dentaire, La Chaux-de-Fonds, Switzerland) until #40. Irrigation was performed with 5.25% sodium hypochlorite solution after each file was used. Root canals were filled with gutta-percha cones and AH Plus sealer (Dentsply DeTrey GmbH, Konstanz, Germany) using a warm vertical compaction technique (2 in 1; VDW, München, Germany). The CBCT scans (preoperative and at recall) were acquired with a 3DX-Accuitomo scanner (J Morita Mfg Corp, Kyoto, Japan) using a 4×4-cm field of view selection,