

Case report

Resolution of furcation bone loss after non-surgical root canal treatment: application of a peptidase-detection kit for treatment of type I endoperiodontal lesion

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Abstract: Here, we report the management of a type I endoperiodontal lesion with furcation bone loss. A 59-year-old female attended our hospital with the chief complaint of mobility of tooth 46 and recurrent gingival swelling around the tooth. She previously received dental treatment from two dentists, but her condition did not improve. The tooth manifested the symptoms of typical periodontitis, such as gingival swelling, tooth mobility, pus discharge from the periodontal pocket and furcation bone loss. The tooth had no caries and the pulp reacted to an electric pulp test. Careful examination of the gingiva revealed traces of dental fistula. X-ray examination via a gutta percha inserted into the fistula revealed that furcation bone loss was associated with the periapical lesion. We diagnosed a type I endoperiodontal lesion, and applied Periocheck, a detection kit for peptidase-producing bacteria, to check for decreases in bacteria in the furcation and root canals. Soon after non-surgical root canal treatment, the condition of tooth 46 improved without periodontal treatment. After confirming a negative score with Periocheck, the root canal was filled. After 3 months, the furcation bone loss was on the way to recovery. These results indicate that proper

diagnosis and confirmation of a decrease in root canal bacteria are important for treating endoperiodontal lesions. (J. Oral Sci. 47, 143-147, 2005)

Keywords: endoperiodontal lesion; furcation bone loss; Periocheck; peptidase; bacteria.

Introduction

In regular practice, we occasionally encounter complicated dental conditions, such as endoperiodontal lesions. Some of these cases are difficult to diagnose, and misdiagnosis can lead to prolonged treatment and/or loss of patient trust. For the diagnosis of endoperiodontal lesions, we classify them into three types according to the report by Rateitschak et al (1). A type I lesion is primarily of endodontic origin and the pulp is usually dead. A type II lesion is basically periodontal disease, which sometimes affects the pulp, and the pulp is usually normal or sometimes damaged by ascending pulpitis. A type III lesion is a combined case of a root canal problem and periodontal disease, and the pulp is usually dead. In this case report, we describe an atypical type I lesion that exhibited the characteristics of periodontitis and was difficult to diagnose.

The importance of bacteriological examination in endodontic treatment is generally accepted, and we previously reported the resolution of an external dental fistula after application of an anaerobic culture test for root canal bacteria (2). However, this anaerobic culture test requires several days to obtain results, and the opportunity

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to perform root canal filling may be missed. In the current case report, we applied Periocheck (Sunstar, Osaka, Japan), which is designed to detect specific peptidase-producing bacteria, in order to test the presence of bacteria in the root canals.

Periocheck is considered to be useful for periodontal treatment (3), because it specifically detects important periodontopathogens, such as *Porphyromonas gingivalis*, *Tannerella forsythia* and *Treponema denticola*. Furthermore, it is easy to detect peptidase activity, as it is expressed as double-plus, plus and negative according to the color of the peptidase substrate in 15 min.

After confirming a negative score with Periocheck, the root canal was filled with gutta percha points. Three months after root canal filling, the furcation bone loss was on the way to recovery. These results indicate that proper diagnosis and confirmation of a decrease in root canal bacteria are important for treating endoperiodontal lesions.

Case report

A 59-year-old female attended our hospital with the chief complaint of mobility of tooth 46 and recurrent swelling around the tooth. She first noticed the swelling about 6 months previously and visited a dental office. It was diagnosed as periodontitis, and she underwent incision of the abscess. The swelling subsequently disappeared for a short time, but reoccurred repeatedly. She was referred to another dental clinic, and the second doctor also diagnosed periodontitis and provided the same treatment as the first doctor. No improvement was observed and she attended our hospital.

Tooth 46 had a small resin filling in the buccal area, but no caries was detected. Gingival swelling was observed around the marginal area of the tooth (Fig. 1). The tooth could be moved both horizontally and vertically, and had a 5-mm periodontal pocket at the central buccal area (Fig. 2). A periodontal probe could be inserted from the buccal pocket to the furcation, and bleeding and pus discharge occurred. An X-ray photograph indicated furcation bone loss and enlargement of the periodontium around the mesial root of the tooth (Fig. 3). An electric pulp test indicated that tooth 46 was alive, although the response was slightly weaker than in control teeth. There was no obvious dental fistula on the gingiva around tooth 46, but after drying the gingiva, traces of a fistula were detected. Therefore, we inserted a gutta percha point into the pit and took an X-ray photograph. The point reached the periapical area of the mesial root of tooth 46 (Fig. 4). By careful drilling of the tooth without local anesthesia, the pulp could be opened. A rotten smell was detected and pus



Fig. 1 Lateral view of right teeth and gingiva at first visit. Gingival swelling is observed around the margin of tooth 46. Gingival condition in other areas is almost normal.

3	3	3	3	3	4	4	4	3	4	3	3	2	3	2
8			7			6			5			4		
3	3	3	3	3	4	3	5	3	3	2	3	3	2	3

Fig. 2 Probing depth of lower right teeth at first visit. A deep pocket is detected at the buccal furcation of tooth 46.



Fig. 3 X-ray photograph of tooth 46 at first visit. Bone resorption is observed at the furcation and the periodontium around the mesial root of tooth 46 is enlarged.

discharge occurred from the mesio-buccal and distal root canals, while the mesio-lingual root canal showed bleeding and sensitivity to filing. Therefore, local anesthesia was applied and the treatment of the infected root canals was continued. We inserted sterile paper points into the root canals and determined the peptidase activity using Periocheck. The score was found to be double-plus. The Periocheck score of the furcation area was also double-plus (Table 1).

At the next visit, the gingival swelling had disappeared (Fig. 5). However, the Periocheck score of the furcation area remained double-plus, although that of the root canals had decreased to plus (Table 1). As the endodontic treatment



Fig. 4 X-ray photograph of tooth 46 with gutta percha point inserted into fistula. The gutta percha inserted into the fistula reached the apex of the mesial root of tooth 46.



Fig. 5 Lateral view of right teeth and gingiva after initiation of infected root canal treatment. Soon after initiation of infected root canal treatment, gingival swelling disappeared.

progressed, tooth mobility decreased and the Periocheck score of the furcation area became negative. At the fourth visit, no clinical symptoms, such as pus discharge from the root canals or percussion pain, were observed, but the Periocheck score of the root canals remained plus. At the fifth visit, the Periocheck score was negative, and root canal filling was performed with gutta percha points (Fig. 6). Three months after the root canal filling, no swelling had reoccurred (Fig. 7), and the probing depths around the tooth were all less than 3 mm. X-ray examination indicated that the furcation bone resorption was on the way to recovery (Fig. 8).

Discussion

In the current case report, we described an atypical type I endoperiodontal lesion. The case had some of the characteristics of acute periodontitis, such as gingival swelling, tooth mobility, pus discharge from the periodontal pocket and furcation bone resorption on X-ray examination. Moreover, there was no caries and the pulp reacted to an electric pulp test. Therefore, it was difficult to diagnose



Fig. 6 X-ray photograph of tooth 46 after root canal filling. Furcation bone loss remains at the root canal filling.

Table 1 Clinical symptoms and results of Periocheck test

Visit for dental treatment	Pus discharge from root canals	Percussion pain	Periocheck test (a)	
			Furcation area	Root canals
1	++	±	++	++
2	+	-	++	+
3	+	-	+	+
4	-	-	-	+
5	-	-	-	-

(a) Sterile paper points were inserted into the furcation area or root canals and kept in place for 30 s. Exudates-adsorbed points were dropped into substrates and incubated at 37°C for 15 min. The color of the peptidase substrates was then examined.



Fig. 7 Lateral view of right teeth and gingiva three months after root canal filling. A metal crown has been applied to tooth 46. Occlusal and gingival conditions are normal.



Fig. 8 X-ray photograph of tooth 46 three months after root canal filling. Furcation bone loss is on the way to recovery, although some bone loss remains at the furcation.

as an endodontic lesion, and the case had previously been misdiagnosed by two dentists.

On the other hand, we could not exclude the possibility of a type I endoperiodontal lesion (4,5), as the periodontal problem was limited to tooth 46 and the overall periodontal conditions in other areas were relatively normal. Therefore, we carefully reexamined the gingiva and detected traces of a dental fistula. It was impossible to find the traces on the wet gingiva, but a small pit became visible after drying. X-ray examination with a gutta percha point inserted into the fistula revealed that furcation bone loss was associated with the periapical lesion. Therefore, we made a diagnosis of type I endoperiodontal lesion in tooth 46. However, because the electric pulp test was positive, we carefully

drilled the tooth without anesthesia. When we opened the pulp chamber, we found that the tooth was partly alive, although most of the pulp was in a necrotic condition. It was difficult to identify the true cause of the loss of pulp viability because there was no obvious caries in tooth 46. However, a resin filling was present on the buccal surface, and bacteria under the filling may have damaged the pulp.

Periocheck test scores indicated that both root canals and the furcation area were infected with periodontopathic bacteria such as *P. gingivalis*, *T. forsythia* and *T. denticola*. In the present case, we applied Periocheck to monitor the decreases in root canal bacteria and to determine the timing of the root canal filling, and we obtained a good treatment outcome. On the fourth visit, no clinical symptoms were observed, but the root canal filling was not performed because the Periocheck score was still positive. A positive Periocheck score indicates that peptidase-producing bacteria are present, while a negative Periocheck score does not necessarily mean that there are no bacteria. Therefore, we must take care when this test is applied. Periocheck should only be used to decide whether to postpone root canal filling. Furthermore, we need to determine the relationship between Periocheck score and the results for total root canal bacteria using anaerobic culture test (2).

It is interesting that enzyme activity of periodontopathogens was detected in the root canals. *P. gingivalis* and *T. forsythia* are known to have some interactions both *in vivo* (6) and *in vitro* (7), and have been detected in root canals (8) where they may have an effect on each other. Host responses to periapical lesions have been reported (9), and we have attempted to regenerate the bone loss associated with endodontic problems (10). To make such treatment successful, it is important to confirm a decrease in bacteria in the root canals. Therefore, the Periocheck test may become a useful tool for endodontic treatment as well as for periodontal treatment.

Furcation bone loss is often encountered in regular practice, and some of these cases are considered difficult to treat. This is also true for type II and III endoperiodontal lesions (1,4,5). These cases often require extensive periodontal treatments, including flap surgery, regeneration techniques, root separation and hemisection. However, resolution of bone loss is often only observed with type I endoperiodontal lesions after endodontic treatments (11,12). The present case had previously been misdiagnosed by two dentists, and did not improve after extensive treatment. However, after application of the Periocheck test, furcation bone loss was resolved following non-surgical root canal treatment.

The current results indicate that proper diagnosis and

confirmation of a decrease in root canal bacteria are necessary to treat complex cases such as endoperiodontal lesions.

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