Abstract
Here, we introduce some confusing endodontic cases, which we had experienced in our clinic. The first case had been misdiagnosed as a skin lesion and received extended skin treatment. The second case had been misdiagnosed as a periodontal lesion and received periodontal treatment by two former dentists. The third case exhibited oral malodor and the patient worried about his breath odor for a long period. These three cases have received endodontic treatment in our clinic, and the patients were free from their long-lasting problems. We also discuss other confusing cases with literature mini-review.

Keywords: Diagnosis, Endodontics, Skin Lesion, Periodontics.

Introduction
Making a diagnosis is one of the most important stages in dental treatment. We sometimes encounter endodontic cases in which making a straight forward diagnosis can be a real challenge. Furthermore, endodontic lesions sometimes manifest symptoms that are similar to those of other diseases. However, one of the difficult points in endodontic treatment is that the lesion cannot be seen from the outside, and unless we take a 3D radiograph, we need to speculate about what is happening in the bone. It is also dangerous for dentists to make a diagnosis with preconceptions. Here, we report endodontic cases that had been misdiagnosed as skin or periodontal diseases. Conversely, certain diseases, including malignant diseases, are sometimes misdiagnosed as endodontic lesions. We also present a literature review of these diseases that show similar manifestations to endodontic disease.

Case Reports on Endodontic Lesion-derived Symptoms that had been Misdiagnosed

Skin problem caused by an endodontic lesion
A 22-year-old male patient visited the Fukuoka Dental College Hospital complaining of a prolonged fistula in the right lower cheek skin.1 His former doctor treated the patient for 6 months. Repeated skin incisions and long-term antibiotic therapy were not effective and the doctor referred the patient to us. An external dental fistula with a diameter of about 10mm and continuous pus discharge was observed (Figure 1A). By X-ray findings and electric pulp examination, we diagnosed an external dental fistula caused by chronic purulent apical periodontitis of tooth 46 (Figure 1B). We performed an infected root canal treatment including anaerobic culture examination. The response to the root canal treatment was good. The size of the external dental fistula dramatically decreased and the skin lesion became dry at the third visit (Figure 2A). After confirming that intra-root canal bacteria were negative, the root canals were filled (Figure 2B). The external dental fistula completely closed after 2 months. Two and half years after the root canal filling, the patient came for tooth maintenance. The external dental fistula had not recurred (Figure 3A) and radiolucency in the periapical and furcation area had disappeared (Figure 3B).
External dental fistula after the initiation of endodontic treatment. The pus discharge has stopped and the external dental fistula is dry.

Dental X-ray photograph at the root canal filling. The radiolucency at the apex and furcation area of tooth 46 has disappeared.

Right facial view at 2.5 years after the root canal filling. The external dental fistula has not recurred.

Dental X-ray photograph at 2.5 years after the root canal filling. The radiolucency at the apex and furcation area of tooth 46 has disappeared.
Gingival swelling and furcation bone loss caused by an endodontic lesion

A 59-year-old female attended our hospital with a chief complaint of mobility of tooth 46 and recurrent gingival swelling around the tooth (Figure 4A). She had previously received dental treatment from two dentists who performed gingival incisions, scaling and root planning, but her gingival condition did not improve. Her tooth 46 manifested the symptoms of typical periodontitis, such as gingival swelling, tooth mobility, pus discharge from the periodontal pocket and furcation bone loss (Figure 4B). The tooth responded to electric pulp examination but a gutta-percha point inserted from the fistula reached the mesial root apex. Consequently, we diagnosed a type I endoperiodontal lesion of tooth 46. Soon after root canal treatment, the gingival condition at tooth 46 improved without periodontal treatment (Figure 5A). After confirming the absence of bacteria, the root canals were filled (Figure 5B). After 3 months, the furcation bone loss was on the way to recovery (data not shown). At 5 years after the root canal filling, the patient came for treatment of other caries. The gingival condition was good and the furcation bone loss had not recurred (Figure 6A, B).

(Fig. 4A) Lateral view of the right teeth and gingiva at the first visit. Gingival swelling is observed around the margin of tooth 46.
(Fig. 4B) X-ray photograph of tooth 46 at the first visit. Bone resorption is observed at the furcation area, and the periodontium around the mesial root of tooth 46 is enlarged.
(Fig. 5A) Lateral view of the right teeth and gingiva after initiation of endodontic treatment. Soon after initiation of the infected root canal treatment, the gingival swelling has disappeared.
(Fig. 5B) X-ray photograph of tooth 46 after the root canal filling. Furcation bone loss remains at the root canal filling.
(Fig. 6A) Lateral view of the right teeth and gingiva at 5 years after the root canal filling. Gingival condition is good.
(Fig. 6B) X-ray photograph of tooth 46 at 5 years after the root canal filling. There is no furcation bone loss.
Oral malodor caused by an endodontic lesion

A 72-year-old male patient visited our breath clinic complaining of strong breath odor. Former dentists had performed periodontal treatments including scaling and root planing, but his oral malodor did not decrease.

We measured the breath odor and compared it with that at the initial visit. All of the malodor scores were found to have decreased (Figure 9) and the patient was satisfied with our treatment.

A bad odor was confirmed by halitosis measurements including an organoleptic test, a portable sulfide monitor and gas chromatography. We performed an oral examination, but no remarkable problems such as gingival swelling, deep periodontal pockets, big caries or dry mouth, which may cause oral malodor production, were detected (Figure 7A). The patient also complained of an uneasy feeling in tooth 16. There was an improperly fitted restoration in tooth 16 and we sensed some malodor when compressed air was applied. An X-ray of the tooth did not reveal a periapical lesion, but the root canals appeared to be poorly treated (Figure 7B). Immediately after removing the metal crown and core, a large amount of pus accompanied by malodor coming from the root canals. We diagnosed that part of the oral malodor was caused by a periapical lesion of tooth 16, and performed an infected root canal treatment. The condition of the root canals had improved at the second visit, and the root canals were filled at the third visit and restored with metal bridge (Figures 8A, B). The results of organoleptic tests and the concentrations of three volatile sulfide gases are shown.
Endodontic lesions are sometimes difficult to diagnose. Endodontodontal lesions are sometimes misdiagnosed, and the importance of a differential diagnosis is noted. There is a possibility that oral malodor can be caused by an endodontic lesion. These cases may be rare, but dentists need to consider such cases in the diagnosis of oral manifestations. We have also reported a case of oral malodor associated with internal root resorption. The main causes of oral pathologic halitosis are periodontal disease and tongue coating, and oral malodor caused by an endodontic lesion is rarely reported. However, careful examination is necessary if no apparent causes are found in the oral cavity of a patient with oral malodor.

The main theme of this case series report is to introduce several symptoms caused by endodontic lesions. However, the opposite cases are sometimes reported, in which the manifestations of other diseases are very similar to those of endodontic lesions. Periapical cemental dysplasia is known to be similar to periapical granuloma. To prevent misdiagnosis, application of electric pulp examination and confirmation of the dental history are recommended. Giant cementoblastoma can also be misdiagnosed as an endodontic lesion. Paradental cysts mimicking a radicular cyst and a simple bone cyst have been reported. Since there is a possibility that these cases can be misdiagnosed as endodontal lesions, detailed clinical and radiographic examinations are necessary. Other osseous diseases, such as ossifying fibroma, focal cemento-osseous dysplasia and Stafne’s bone cavity, have also been reported. We need to be careful in the diagnosis of these diseases, because they sometimes manifest similar symptoms to those of a periapical lesion.

There is also a possibility to misdiagnose malignant diseases as an endodontic lesion. In fact, a gingival squamous cell carcinoma mimicking a dentoalveolar abscess has been reported. Some metastatic carcinomas manifesting as periapical lesions have also been reported as well as an oral-derived carcinoma. An osteosarcoma and a mesenchymal chondrosarcoma resembling dental periapical lesions have also been reported. Some lymphomas were misdiagnosed as endodontic lesions and the proper treatments were delayed. Although some cases may be difficult to diagnose, we always need to consider the possibility of malignant diseases.

In this way, making diagnosis is important in the treatment of endodontic cases and cases, which manifest endodontic-like symptoms.

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References


