

Persistent Oral Malodor Associated with Periodontitis Caused by Tooth Perforation

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Abstract

There are many causes for oral malodour, and tongue coating, periodontitis, deep caries and unfitted restorations are main causes of bad breath odour. It is not difficult to reduce oral malodour by careful examination and proper treatment. However, we sometimes encounter oral malodour associated with other problem. Here, we report a case of persistent oral malodor associated with periodontitis caused by tooth perforation. The patient (a 41 year old, female) had visited our breath clinic complaining of a strong breath odor. Oral malodor was detected by several tests including organoleptic test, portable sulfide monitor and gas chromatography. She had consulted two dentists to reduce her breath odor. The dentists performed periodontal treatments including scaling, and root planing. However, her oral malodour did not decrease, and she had been worrying about her breath odor for 15 years. The patient's oral hygiene was not bad at the first visit. Periodontal condition was not severe except tooth 24, and there were deep pockets in the proximal of the tooth. We performed initial periodontal treatment, but the condition of 24 did not change. We performed a surgical inspection and perforation of the tooth 24 was considered to be the main cause of periodontitis. Large number of periodontopathic bacteria was detected from the saliva and examination revealed the strong oral malodor. After extraction of the causative

tooth, periodontal condition improved, and bacterial number was decreased. The patient's breath odor was reduced to less than the threshold level and she was free from long-lasting worries on oral malodor.

Keywords: Oral malodor; Periodontitis; Perforation; Bacterial Examination

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Introduction

Oral malodor is one of the most important factors which disturb the good communication with other people and increasing number of halitosis patients are visiting the breath clinics [1]. The major source of bad breath is volatile sulfur compounds (VSCs) and most of them are considered to originate in the oral cavity [2, 3]. VSCs are mainly produced by bacteria in the periodontal pockets or tongue coating [4]. Oral malodor usually decreases after proper oral hygiene or periodontal treatment. Recently, with much information on oral malodour, people are conducting proper tooth cleaning or visiting dental clinics to reduce or control their breath odor. In

this case report, we describe a case with persistent oral malodor. The patients visited two dental clinics and received periodontal treatment, but her strong breath odor did not decrease, so she came to our hospital. The oral malodor was associated with periodontitis, but it did not respond to initial periodontal treatment, because tooth perforation was the cause of periodontitis. After extraction of the causative tooth, her breath odor was reduced to a normal level, and she was free from the 15 years-worries.

Case Report

A 41-year-old female attended Center for Oral Diseases, Fukuoka Dental College complaining of oral malodor. She first noticed her oral malodor because her family member pointed out her bad breath about 15 years ago. She visited two dental clinics to reduce her breath odor. The former dentists performed periodontal treatment including scaling and root planing. However, her oral malodor did not decrease, and she had been worrying about her breath odor.

When the patient came to our breath clinic, we first measured her breath odor. The severity of oral malodour in this patient was determined using an organo-leptic test [5], portable sulphide monitoring (MS-Halimeter E[®]; Interscan Corporation, Chatsworth, CA, USA) [6] and gas chromatography (model GC14B; Shimadzu Works, Kyoto, Japan) as described before [7].

The organoleptic score was 4 (tolerable bad smell) according to the classification [8, 9], and the Halimeter score was 587 (threshold: 100). Concentration (ng/10ml mouth air) of hydrogen sulfide, methyl mercaptan and dimethyl sulfide were 2.25, 2.45, and 0.29, respectively (Table 1).

We performed an oral examination to identify the cause of the oral malodor. The oral view at the first visit is shown in (Fig. 1A). Overall periodontal conditions were not bad except tooth 24. The tooth had 7 mm pockets in the proximal areas (Fig.2), and X-ray examination indicated the vertical bone loss (Fig 1B). The bacterial examination by BML (BML, Inc., Kawagoe and

Saitama, Japan) detected a large number of periodontopathic bacteria including *Porphyromonas gingivalis* and *Tannerella forsythia* (Table 2). We diagnosed the halitosis as a pathologic halitosis caused by periodontitis, and started initial periodontal treatment that included tooth brushing instruction, scaling and root planing. The gingival condition improved, but the 6mm pocket remained around tooth 24 (Table 1). Then, we performed a surgical examination with flap reflection and found a tooth perforation on the proximal surface. The perforation was too big to fill and the tooth needed to be extracted (Fig 3). After extraction, periodontal condition improved (Table 1) and the number of periodontopathic bacteria was reduced (Table 2). We applied a non-metal clasp denture according to the patient's request (Fig 4). The organoleptic test, Halimeter test, and gas chromatographic examination indicated the drastic decrease of breath odor (Table 1) and the patients was free from long-lasting worries in these 15 years.

Table 1: Change of periodontal and malodor parameters at each treatment stage

parameters	treatment stage		
	baseline	after initial treatment	after extraction
deepest periodontal pocket ¹	7	6	3
organoleptic score	4	3	1
Halimeter score ²	587	355	85
hydrogen sulfide ³	2.25	1.95	0.41
methyl mercaptan ³	2.45	1.55	0.09
Dimethyl sulfide ³	0.29	0.15	0.01

¹ mm

² ppb

³ ng/10ml mouth air

Table 2: Change of bacterial number at each treatment stage

bacterial strain	bacterial number*		
	baseline	after initial treatment	after extraction
<i>Aggregatibacter actinomycetemcomitans</i>	240	180	55
<i>Prevotella intermedia</i>	5,200	2,300	200
<i>Porphyromonas gingivalis</i>	13,500	9,500	90
<i>Tannerella forsythia</i>	118,000	25,000	280
<i>Treponema denticola</i>	2,100	550	130
<i>Fusobacterium nucleatum</i>	350,000	65,500	35,000

* copy number/10µl saliva

Figure 1: Oral view (A) and X-ray photograph of tooth 24



(B) At the first visit

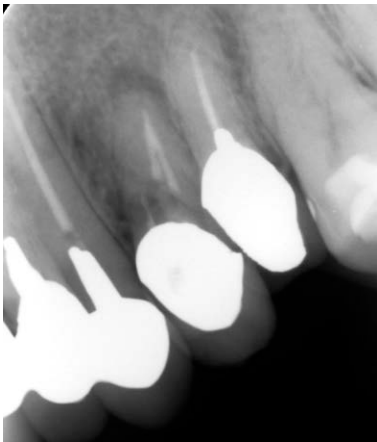


Figure 2: Result of periodontal examination at the first visit

mobility	M0	M0	M0	M0	M0	M0	M0	M0	M1	M0	M0	M0	M0
BOP	+	+	+	+	+	+	+	+	+	+	+	+	+
buccal	432	334	323	323	323	323	322	222	222	732	323	333	333
	7	6	5	4	3	1	1	2	3	4	5	6	7
palatal	423	323	323	323	222	222	334	324	325	722	332	333	334
BOP	+	+	+	+	+	+	+	+	+	+	+	+	+

Periodontal conditions of lower jaws

mobility	M0	M0	M0	M0	M0	M0	M0	M0	M0	M0	M0	M0	M0
BOP	+	+	+	+	+	+	+	+	+	+	+	+	+
lingual	333	333	333	333	333	222	222	223	333	433	433	333	323
	7	6	5	4	3	2	1	1	2	3	4	5	6
buccal	333	323	323	323	323	323	322	222	223	323	323	333	333
BOP	+	+	+	+	+	+	+	+	+	+	+	+	+

Figure 3: Proximal view of the extracted tooth 24



Figure 4: Oral view after treatment



Discussion

Oral malodor is primarily associated with the condition of the oral cavity, including the oral hygiene level and periodontal condition [4, 6, 10], and is mainly the result of the microbial metabolism of amino acids in local debris [11]. When deep pockets are found, periodontal treatment usually results in a good outcome. In this case, the patient had noticed her breath odor and visited two dentists and received periodontal treatment. But the condition did not change and she worried about her bad breath for 15 years.

Reflection of a flap revealed a perforated tooth that results in vertical bone loss. We sometimes encounter localized periodontitis, which does not respond to an ordinary initial periodontal treatment. In such cases, surgical inspection with flap reflection may reveal the cause, such as root fracture, cemental tear, and perforating defects. We had also experienced an oral malodor associated with periodontitis caused by internal resorption [12].

VSCs are mainly produced by periodontopathic bacteria and the importance of bacteriological examination in

the treatment of periodontitis and halitosis is generally accepted [4]. In this case, large number of periodontopathic bacteria including *P. gingivalis* and *T. forsythia* were detected. They are known to compose of so-called “red complex” and play an important role in the progression of periodontitis [13]. After treatment including tooth extraction, the number of bacteria decreased, and the VSCs were also dramatically decreased.

There are many causes for oral malodour. Tongue coating, periodontitis, deep caries and unfitted restorations are main causes of bad breath odor. However, we sometimes encounter other causes such as oral malodour associated with endodontic lesions [14], tooth perforation and internal resorption [12], so it is necessary for us to carefully examine and find the actual cause of the malodor.

Acknowledgements

This study was in part supported by a Grant-in-Aid for Scientific Research (C) 26463176 and Grants-in-Aid for Advanced Science Research from the Ministry of Education, Culture, Sports, Science and Technology, Japan.

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