

Halitosis Manifestation and Prevention Means for Patients with Fixed Teeth Dentures

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SUMMARY

The objective of this research is to analyse the causal relationship between construction of fixed bridge dentures and the intensity of halitosis manifestations, as well as to establish basic hygiene requirements for construction of fixed dentures which would completely exclude retention of food particles and avoid bad breath. 48 patients (36 men and 12 women), who use fixed dentures for 2 – 10 years, have been involved in this research. 26 patients wore fixed bridge dentures made of punched tooth crowns, the other 22 patients wore cast fixed dentures. The obtained measurements of halitosis magnitude point to the close connection between bad breath and the construction of fixed dentures. Fixed dentures with tooth crown laps, saddle intermediate parts, as well as denture constructions, which impede complex of mouth hygiene measures, cause bad breath. In this research, the condition of patients' teeth, periodontium, and oral cavity hygiene have been evaluated as satisfactory; the tongue is not perceptibly coated, and patients etiologically have not experienced problems caused by respiratorial or gastrointestinal diseases. The examined patients have not complained of xerostomia problems.

In conclusion, it should be admitted that fixed dentures, which make difficult or even completely impede the complex of oral cavity hygiene measures, intensify the development of halitosis.

Key words: halitosis and fixed dentures.

INTRODUCTION

Oral cavity health is closely related with the dentures the patient wears. The latter cause retention of food particles, formation of plaque, as well as inflammation of oral cavity and periodontium. Both, removable and fixed dentures, may to a great extent cause problems of bad breath. Although the source of unpleasant breath is commonly related to location of bacteria colonies on the tongue, in pathological gingival pockets, on teeth and adjacent tissue, one should not forget about adhesive abilities of bacteria on the surface of dentures [4; 8; 9]. The ions of metal, acrilate polymer, composite and other denture materials have diverse binding abilities with fermentative systems of bacteria. Hence, the adhesive intensity of microbes on the surface of dentures may express differently. However, especially harmful is the great adhesive ability of paradental pathogenic anaerobe bacteria [7; 14]. These bacteria decompose sulphur amino acids in oral cavity, form hydrogen sulphides and cause unpleasant breath. Expired air resembles the smell of rotten eggs. The smell of putrescent manure is generated by sulphur compound - methylmercaptan (volatile sulphur compound). Even two decimals of millimeter thick plaque deposit create anaerobe conditions for bacteria. Hence the source of ideal conditions for formation of bacteria colonies appears [5; 7]. Obviously, one should not forget about the food particles which easily "catch" on the dentures, decompose in the oral cavity and cause halitosis manifestation in cases of poor oral cavity hygiene.

One should admit the utmost importance of the functional, medical and preventive importance of dentures. Each denture should be evaluated as a medical cure with a chain

of by-effects. Unambiguously, dentures determine a complex of new hygienic conditions in the oral cavity. Therefore, the duration of oral cavity care increases, creating a chain of new essential hygienic measures. Even high-quality dentures substantially change biological conditions in oral cavity [3; 6; 14]. Unfortunately, a good deal of fixed dentures have been prepared and produced without taking into consideration the minimal hygienic requirements [10; 11; 12]. Similar to "Chinese Wall" the dentures replace lost teeth. Hence clinical situation appears, that even making an effort it becomes impossible to carry out the necessary hygienic procedures. The dentures cause adhesion of bacteria colonies, as well as injuries and irritation of the prosthetic area. Adhesion of bacteria's is related to specific features of cell wall structure, as well as an ability to adhere to the surface of dentures [8]. Only food debris is possible to be detached with the help of water, however, already in three days the soft solid teeth plaque impregnates crystals of calcium phosphate, but dental calculus is observed within 20-30 days. The most important hygiene providing factors are the following: construction of dentures, polishing degree of dentures, the kind and quality of materials used for dentures [2; 13]. Dentures impede the self-cleaning ability of oral cavity. Oxygen - enriched saliva is not always able to reach all regions of the prosthetic area, which leads to formation of ideal conditions for intensive growth of anaerobe microflora [14]. In case the patient has poor hygienic routine, his oral cavity health substantially worsens, and it may cause bad breath problems. In its turn, the most serious complications appear in clinical situations when patients regularly, even intensively, carry out the hygiene of oral cavity, but the construction of dentures impedes this process [2; 3]. The supporting crown construction with laps or, just the opposite, the ones which are not in touch with teeth tissue cause the retention of food particles and deposition of plaque, which, consequently causes bad breath [1; 2; 3].

Both, the forms of intermediate parts of fixed dentures and relation with the mucous membrane of the prosthetic area, often eliminate or even completely exclude qualitative hygiene of oral cavity, causing for patients the feeling of

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discomfort and bad breath problems [3]. Bad breath may often be the cause for person's self-isolation, discomfort, and feeling of shame, which may lead to severe psychological problems. Reasonable modelling of dentures' design, not worsening the hygienic conditions in oral cavity, may substantially eliminate the intensity of manifestation of the denture by-effects. Therefore, it is utmost necessary to inform patients about the new clinical conditions, and to assure them to take care of their oral cavity and dentures.

MATERIALS AND METHODS

In order to select a group of patients to research manifestations of halitosis, patients at the age of 20 to 65 with fixed bridge dentures were examined. The dentures of corresponding patients were in use from 2 to 10 years. Only patients with no xerostomia problems, and those, who had not recorded pathology of respiratory or gastrointestinal tract, were selected for this research. A group of 48 patients (36 men and 12 women) was formed. 26 patients had fixed bridge dentures made of punched crowns, while 22 patients had cast fixed dentures. The patients were divided in 5 clinical research groups according to interrelations of artificial crown coating with teeth tissues and gums, as well as to forms of intermediate parts of fixed dentures and their location in oral cavity. Regularity and type of patients' hygienic measures, as well as opportunities to carry out a full-value hygiene of oral cavity under the intermediate parts of fixed dentures and artificial crown coating in the areas of their contact with proximal natural teeth were evaluated.

In order to avoid substantial changes of hygienic conditions, the patients were not given any instructions as to the opportunities for improving the hygienic conditions. The halimetry measurements were carried out on all patients prior to, and in 10 days after visit to dental hygienist.

The research was carried out at the Department of Therapeutical Stomatology, Department of Prosthodontics, Riga Stradins University, as well as the Training Centre of the Association of Dental Technicians (PAK).

The indicators of bad breath were evaluated by HALIMETER device (Interskan Corporation, Chastworth, California, USA). The obtained results were processed using SPSS 8,0 computer program. The hygienic condition of

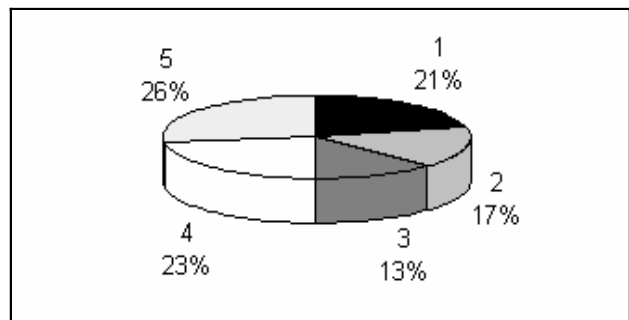


Figure 1. Patients with fixed dentures (n=48), classification according to clinical research groups.

- 1 – 1st group patients (artificial coated crowns without laps, intermediate part with hygienic angle – cleanable with dental thread), HI = 70%, gingival hemorrhage observed for 17%.
- 2 – 2nd group patients (artificial coated crowns without laps, saddle-form intermediate parts – not cleanable with dental thread), HI = 52%, gingival hemorrhage observed for 24%.
- 3 – 3rd group patients (artificial coated crowns without laps, intermediate part touches deep niches – not cleanable with dental thread), HI = 43%, gingival hemorrhage observed for 36%.
- 4 – 4th group patients – (artificial coated crowns with laps, intermediate part with hygienic angle – cleanable with dental thread), HI = 30%, gingival hemorrhage observed for 82%.
- 5 – 5th group patients (artificial coated crowns with laps, saddle-form intermediate part – not cleanable with dental thread), HI = 28%, gingival hemorrhage observed for 89%.

oral cavity of all patients was evaluated using the hygiene index (HI) and periodontium condition with PSR index.

RESULTS

After carrying out examination of 48 patients, it was stated that qualitative dentures, namely, artificial crown coating without laps, intermediate parts made with hygienic angle, thus cleanable with dental thread – had been found only in 21% of cases (1st group patients). In other cases, the clinical inaccuracy and technical errors, which had provoked formation of dental calculus, irritation of periodontium tissues and bad breath problems, were stated. In 17% of cases the coated crowns of fixed bridge dentures were without laps and had saddle form intermediate parts (2nd group patients). In 13% of cases no laps were stated in coated crowns, while the intermediate parts had been formed with deep niches and were not cleanable with a dental thread (3rd group patients). For 23% of cases the laps of coated crowns were stated with intermediate parts made with hygienic angle (4th group patients) and in 26% of cases – artificial coated crowns with laps and saddle-form intermediate parts were stated (5th group patients) (Figure 1).

For patients who had the dentures made in accordance with the clinical requirements (1st group), halitosis manifestations were not stated. However, the inaccuracies in constructions of coated crowns and intermediate parts are always connected with bad breath problems. The sulfur compound

Table 1. Classification of patients according to clinical research groups (before and after visit to hygienist).

Number of patients –48 (100%)	Halimeter measurements (ppb)				Total
	Up to 40	40 - 75	75- 120	Over 120	
<u>1st group patients</u> before/ after visit to hygienist	2	7	1		10 (21%)
<u>2nd group patients</u> before/ after visit to hygienist	3	6	1		8 (17%)
<u>3rd group patients</u> before/ after visit to hygienist	1		5	3	3 (13%)
<u>4th group patients</u> before/ after visit to hygienist		2	4	4	3 (13%)
<u>5th group patients</u> before/ after visit to hygienist		6	4	1	1 (23%)
		7	3	1	1 (23%)
		1	6	7	6 (13%)
			6	7	6 (13%)

value, less than 120 ppb, is considered to be normal, and objectively does not cause bad breath [5; 8; 9]. It was stated during the research analyses that the most severe bad breath problems were related with the forms of intermediate parts, that completely exclude hygienic possibilities in oral cavity (patients of 2nd, 3rd and 5th group). For patients with accurately made artificial coated crowns and saddle-form intermediate parts (2nd group), halitosis was stated in 38% of cases. However, with the intermediate parts, being formed with small hygienic angle, consequently with deep underneath niches, bad breath problems were stated for 67% of patients (3rd group). In cases when artificial coated crowns were formed with laps and saddle-form intermediate parts, halitosis manifested in 54% of cases (5th group). The halitosis problems were not considerable for patients with fixed dentures, not impeding to carry out the qualitative hygiene of oral cavity, as well as crowns without laps and intermediate parts made with hygienic angles (1st group). For the patients of the 4th group (crown laps and cleanable intermediate parts), halitosis was stated in 9% of cases.

The present research was not aimed to compare the punched and cast crown clinical manifestations. It may be unambiguously admitted, that punched coated crowns cannot provide the ideal transition to supporting teeth tissues, they do traumatize oral cavity mucous membrane, therefore the application of these crowns does not conform to the contemporary clinical requirements.

32% of examined patients (excluding 1st group patients) complained of itchy unpleasant feeling under the dentures and bad breath even after their visit to hygienist.

DISCUSSION

The constructive peculiarities of fixed bridge dentures and the relation between support elements and periodontium tissues, as well as the type of intermediate parts and

location against the mucous membrane alveolar growth, substantially effect the denture self-cleaning ability with tongue and saliva. Laps of artificial coated crowns and saddle-form intermediate forms promote retention of food particles and are often one of the the main reasons for bad breath [4; 5; 10].

The supporting elements of fixed bridge dentures may cause oral cavity hygiene and health problems. The majority of complications is caused by intermediate parts, replacing defects of teeth row. The intermediate part must restore the integrity of teeth row, it must be esthetic (natural teeth effect), must ensure the full-value hygiene, etc. This exposes conflict in denture construction (natural teeth effect and hygiene). The situation is even more intensified by the essence of fixed bridge dentures, namely, the fact that they are not removable. The dentist plans a bridge denture design, however, its practical solution is carried out by a dental technician whose work is often guided by function and appearance of the denture, close pressing possibility of a coated crown to the formed level of the support tooth, and other factors. However, in many cases insufficient attention is paid to the hygienic aspects of fixed bridge dentures. According to clinical experience [1; 2; 3; 13], the patient may not accept even the most esthetic fixed dentures due to serious oral health problems. Initially, the patient would mark the irritating unpleasant feeling under his fixed dentures, followed by pain and gingival hemorrhage, and finally, he would complain of bad breath. The mechanism of such problems is basically very simple. The fixed denture, which closely touches the mucous membrane of alveolar growth, is made. Food micro particles and teeth plaque, the inevitable integral part of which is bacteria, is located also on the basal surface of intermediate parts. Putrefaction products of food remains, and bacteria toxins cause the irritation of alveolar bone mucous membrane, accompanied by such symptoms as pain, reddening, oedema, etc. The hypertrophy of mucous membrane, caused by oedema, would still intensify

the severity of the pathological process, as a result of which, the intermediate parts of fixed bridge dentures "grow into" gums. The anaerobe bacteria, located in this area, "feel comfortable". Primarily, the bacteria are provided with airless conditions, secondly, the presence of sulfur amino acids is intensified, thirdly, teeth plaque is not removable with simple hygienic means (tooth brush), fourthly, such clinical conditions (moist and warm) is ideal setting for growth of bacteria colonies. As a result, the patient (at his own expense) has received a painful oral cavity, considerable feeling of discomfort and bad breath problems. Therefore, we may assure that the type and form of fixed bridge denture intermediate parts and relations with gums, is one of determinant criteria of oral health, hygiene, and fresh breath.

In the process of modelling fixed bridge dentures, it is necessary to develop such a design of denture intermediate parts, which could provide qualitative and complete possibilities for care of oral cavity and intermediate basal surface [3]. Many authors [5; 6; 7; 9] relate the prob-

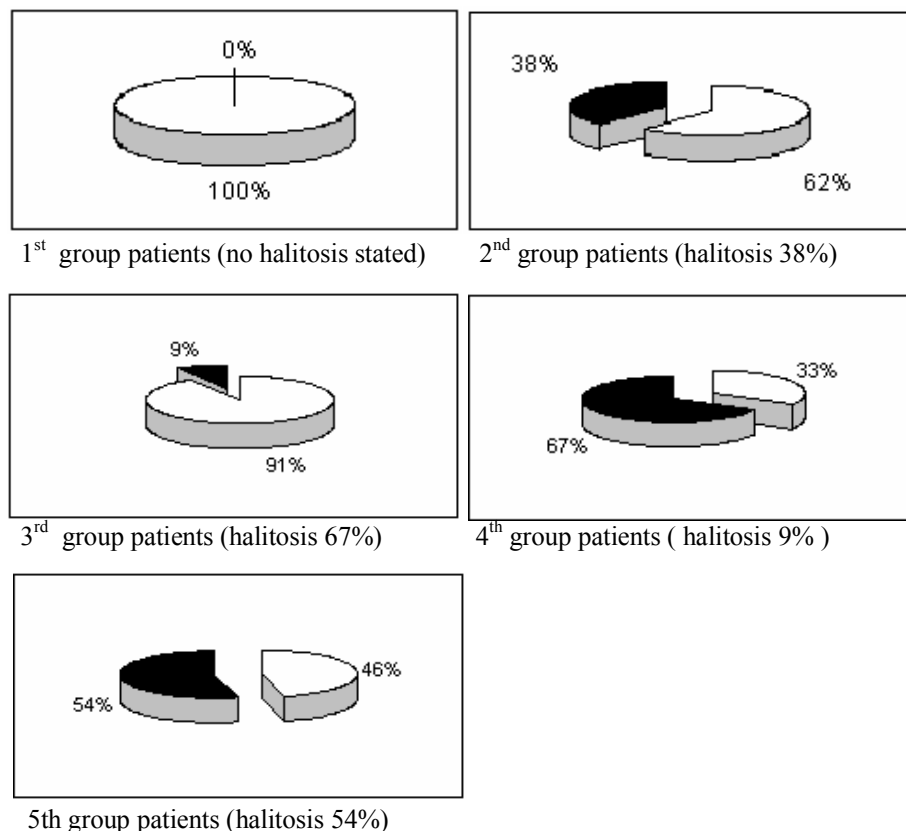


Figure 2. The intensity of halitosis manifestation for patients with fixed bridge dentures.

lems of halitosis with unhealthy oral cavity, bad hygiene, tongue plaques, xerostomia. It has been mentioned that dentures are the factor that cause halitosis [1; 4; 11; 12; 13] although one should not forget, that particularly the construction of fixed dentures cause the retention of food particles, creation of plaque and impede hygienic possibilities that form "good soil" for bad breath. The research carried out unambiguously indicates that one of the main determining factors for fixed denture constructions is the ability to provide hygienic conditions in oral cavity. The only clinically accepted construction of fixed dentures is the one with artificial coated crowns, which are closely attached to tooth tissues without laps, and the intermediate parts are formed with a hygienic angle and are freely cleanable with dental thread. The clinical observations show that intensified care measures for oral cavity and visits to dental hygienist, would not essentially change the hygienic conditions in oral cavity, as the retention of food particles is not prevented, and it is impossible to carry out a full hygiene of oral cavity with dental thread. The accumulation of bacteria and plaque would intensify, which would result in bad breath problems. The only possibility for ensuring full hygiene of oral cavity and prevention of halitosis caused by dentures, is to make new clinically valuable and hygienically acceptable fixed bridge dentures.

CONCLUSIONS

1. Fixed dentures impair the hygienic conditions in oral cavity, impede the abilities of self-cleaning with saliva and often serve as a factor causing halitosis.

2. If bridge dentures have crown laps and saddle form of intermediate parts, application of tooth care means and dental hygienist services would only temporary eliminate halitosis manifestation.

3. Improper construction of fixed dentures (crown laps, saddle forms of intermediate parts) cause mechanical traumas of gums, embarrasses the oral cavity hygiene, and causes bad breath.

4. Hygienic measures (intensified cleaning of teeth, visits to hygienist) would not cause substantial changes in oral cavity until the etiological factor – the existing low-quality denture - is not abolished.

5. Constructions with artificial crowns closely attached to the support tooth level and forms of intermediate parts, made with a hygienic angle, are acceptable, thus the hygienic possibilities in oral cavity are provided, and the risk of halitosis creation is eliminated.

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