

Chapter 9

PROSTHETIC STOMATITIS

Hakan Demir¹

¹ Department of Prosthodontics, Faculty of Dentistry, Sivas Cumhuriyet University, 58140 Sivas, Turkey

Introduction

Denture stomatitis is defined as local or general chronic inflammation of the mucosa with which the denture base comes into contact. Clinically, redness and burning sensation are the most prominent symptoms. more rarely, it is characterized by petechiae, and it may rarely show vesicular symptoms.¹⁻⁴

In histological examination, proliferative and degenerative changes are observed with decreased keratinization and thinned epithelial layer in the tissues.²

Prosthetic stomatitis cases are generally asymptomatic, but complaints such as burning, change in taste, halitosis, mucosal bleeding and dry mouth have been reported rarely.^{2,3}

Denture stomatitis of multifactorial origin is the most common mucosal lesion in individuals using full dentures. It is expressed with different names. In this sense, denture stomatitis; can be named as prosthetic mouth pain, inflammatory papillary hyperplasia and chronic atrophic candidiosis.³⁻⁵

Factors causing denture stomatitis; ^{5,6}

1. Change of oral microflora,
2. Candida albicans infection,
3. Mechanical irritation of tissues due to incompatibility of the prosthesis,
4. Relief areas in the upper prosthesis,
5. Always wearing the prosthesis,
6. Inadequate oral care and inadequate denture cleaning,
7. Systemic diseases,
8. Immunological responses.

Oral microflora plays a key role in the development of stomatitis. Therefore, it is necessary to have detailed information about oral microflora. Many factors play a role in the formation of oral microflora. Some of those; age of the individual, oral hygiene, existing additional disease, teeth eruption, missing teeth, prosthesis use.¹⁻⁵

Prostheses in the mouth prepare a suitable ground for microorganisms to settle. Prostheses can cause various levels of damage to the tissue in the area where they are placed by mechanical effects.⁵⁻⁷ Acrylic resins used in the production of prosthetic base plates, although they have been

prepared with technological methods, are no longer monomers. This monomer irritate the surrounding tissue by removing them. Food residues and microorganisms belonging to the oral flora settle in the tissues that are injured for different reasons and initiate various inflammatory events. This situation can progress and become a clinical problem. In patients with prosthetic stomatitis, the use of the prosthesis is also difficult.^{6,7}

Prosthetic Stomatitis Classification

Denture stomatitis can spread to different regions with different microorganisms.⁵ Newton classified prosthetic stomatitis into three categories.¹ These;

Type 1: Hyperemic foci in the form of dots, local inflammation,

Type 2: Widespread hyperemia, widespread inflammation in the area covered by the prosthesis,

Type 3: Papillary hyperplasia with widespread inflammation.

Type 1 prosthetic stomatitis, which is seen as very small bleeding foci under the prosthetic base plate, is usually prosthetic-related trauma; Type 2, which is characterized by widespread hyperemia within the prosthesis margins, is associated with *Candida* infection. It is thought that the combination of trauma and *Candida* infection is effective in Type 3 prosthetic stomatitis in which diffuse hyperemia is accompanied by mucosal hyperplasia.¹ It has been reported that Type 2 stomatitis, which is not treated for a long time, may progress to Type 3.³

The reasons for the emergence of these types in Newton's classification also differ. Type I prosthetic stomatitis is usually due to traumatic causes. Type II and III prosthetic stomatitis occurs with the accumulation of plaque on the surface of the prosthesis and on the mucosa under the prosthesis.^{8,9}

Etiology of Denture Stomatitis

Prosthetic stomatitis etiological factors are divided into two groups. These are prosthesis-related factors and infective factors. Incompatible prostheses, Insufficient prosthesis cleaning, Insufficient oral hygiene, Causing trauma in the mucosal contact areas of the prosthesis are factors associated with the prosthesis.

The presence of the prosthesis is a sufficient cause for prosthetic stomatitis due to *Candida* species. Infection may develop over time in individuals who wear the prosthesis constantly. This infection situation disappears when the prosthesis is removed for a while. Various bacteria can also be isolated in the infected area.¹⁰ In areas where the prosthesis touches the mucosa, the transformation of palate epithelial cells is

stimulated due to traumatic causes and the barrier function and the degree of keratinization of the epithelium are reduced. This helps the bacterial and fungal antigens to pass into the tissue.^{8,11}

Yeast growth is facilitated in patients who have poor oral hygiene, are fed with intensive carbohydrate, whose saliva flow decreases, and who constantly use the prosthesis. In this case, the pathogenicity of the prosthetic plate increases.¹²

Candida-associated denture stomatitis occurs in several stages. After microorganism colonization, adhesion occurs to the hard surfaces of acrylic resin or denture lining materials. Adherent cells then emerge. These cells are seen by the cosine of other cells in the environment. With the increase in the number of candida on the prosthetic surface, the production of acid also increases. This situation is directly toxic. Acid proteinase and phospholipase produced by Candida increase their adhesion to the surface. The progression of microorganisms in the prosthetic plates to the respiratory system or digestive system creates a risk for various infections in patients with a low immune system.^{13,14}

Prosthetic Stomatitis Treatment

Since the etiology of prosthetic stomatitis is multifactorial, many different methods are used in its treatment; Many different methods such as the use of antifungal agents, prosthesis disinfection, rehabilitation or renewal of the existing prosthesis, use of soft lining materials, use of antiseptic mouthwash are among the treatment options.^{15,16}

Antifungal agents can be used systemically or topically. The effectiveness of the antifungal agent depends on its concentration and the susceptibility of the disease agent Candida genus.

Nystatin, amphotericin-B, mycostatin and hexetidine are commonly used topical agents. Micostatin binds to ergosterol, impairing the permeability of the cell membrane and causing cell death. Amphotericin-B and nystatin prevent the adhesion of Candida to buccal epithelial cells and inhibit germ tube formation.

Nystatin and amphotericin-B taste bad, causing patients to complain. Mycostatin and hexetidine are used in the form of mouthwash.^{15,17}

Denture disinfection is very important in stomatitis treatment. It has also been reported that the formation of stomatitis is related to the Candida biofilm on the acrylic base instead of the biofilm on the palatal mucosa, however, Candida in the plaque on the impression surface of the prosthesis produce more toxins than those colonized in the mucosa.^{18,19} For this reason, in stomatitis treatment, especially in cases where the number of

Candida has increased, it is recommended that the treatment be directed to the prosthesis and to ensure the hygiene of the prosthesis. Brushing alone is insufficient for the control of prosthetic biofilm. Mechanical cleaning should be supported with chemical agents.^{3,19}

Chlorhexidine is an antiseptic and disinfectant agent. It is effective against bacteria, viruses and fungi. It shows a pronounced effect on the target cell depending on its concentration. At low concentrations, bacteria and fungi attach to the cell wall and cause the structure of the membrane to deteriorate. In high concentrations, it affects the cytoplasmic components. Can be used as mouthwash, topical gel or dip solution.^{20,21}

Mechanical Cleaning

Using soap or toothpaste with a brush is the most common method of cleaning dentures. It has been reported to be a highly effective method against stains and plaque on the prosthesis.²² Twice a day brushing with toothpaste has been reported to be effective, but brushing with soap has also been shown to be highly effective on plaque. Although the use of toothpaste is effective in removing microorganisms, the abrasive effect of the paste causes roughness on the prosthesis surface and abrasion on the base material and artificial teeth.^{22,23}

The use of ultrasonic devices is also one of the mechanical cleaning methods. However, its use alone is not sufficient for disinfection. If a disinfectant solution is put into ultrasonic devices, the effectiveness of the disinfectant can be increased and a significant reduction in the number of microorganisms can be achieved.

Microwave ovens are tools that can be used for cleaning prostheses. It has been known that prostheses infected with *C.albicans* are sterile in 6 minutes in a kitchen-type microwave oven (2450 MHz, 350 W). This method provides a more effective sterilization than keeping the prostheses in a solution of 0.02% and 0.0125% sodium hypochlorite for 8 hours.²²

Chemical Cleaning

Disinfectants, 0.4 and 1% potassium permanganate solution, 2% glutaraldehyde solution, chlorine dioxide and chlorhexidine gluconate solutions are also used in the disinfection of removable dentures. It has been reported that a 2% glutaraldehyde solution provides disinfection for 10 minutes.^{22,24}

Enzyme-containing cleansers act by breaking down glycoprotein, mucoprotein and mucopolysaccharides in plaque. They are effective on organic deposits on the prosthesis, but EDTA must be added in order to

affect inorganic substances. Enzymes such as papain, mutase, protease and amylase are included in cleaning solutions.²²

They contain alkaline hypochlorites, sodium hypochlorite. They show bactericidal and fungicidal effects by dissolving the organic structure.²⁵ Sodium hypochlorite is effective on many microorganisms, including spores. It has been reported that holding prostheses in 5.25% solution for 5 minutes is the most effective bactericidal and fungicidal method. They are in the form of alkaline peroxides, powder or effervescent tablets. Peroxide cleaners are most effective on newly formed plaque and stains.²⁶

There are many studies arguing that the most important factor in the etiology of prosthetic stomatitis is trauma, so treatment should eliminate trauma.^{2,4,27} Prevention of prosthesis-related trauma may be in the form of improvement or replacement of incompatible prostheses, or it can be applied by reducing the pressure on the tissue by using soft lining materials.

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Chapter 10

LIMBIC SYSTEM

Gönül GÜROL ÇİFTÇİ¹

¹ Doç Dr., Sakarya Üniversitesi, Tıp Fakültesi, Fizyoloji Anabilim Dalı, gonulgurol@sakarya.edu.tr, ORCID: 0000-0001-5343-9189

