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**MANAGEMENT OF COATED TONGUE RESEMBLES
PSEUDOMEMBRANOUS CANDIDIASIS IN A MULTIDRUG-THERAPY
PATIENT**

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ABSTRACT

Introduction: Coated tongue or tongue coating is characterized by white deposit covering dorsum of the tongue. The thick-coated tongue almost resembles oral candidiasis. It is challenging to make the diagnosis and provide the proper treatment especially when supporting examination tools are unavailable. **Objective:** To discuss the diagnosis making and management of coated tongue with suspicion of pseudomembranous candidiasis with a lack of supporting examination tools. **Case(s):** A 61-year-old man was referred to the Oral Medicine Clinic for oral examination. No complaints of pain in the oral cavity. He had a history of type-2 diabetes mellitus, coronary heart disease (CHD), and pleuritis and was taking medication. During hospitalization, never cleaned his oral cavity. **Case Management:** Intraorally, white plaque covering almost the entire dorsum of the tongue, which could be scraped off on the anterior 1/3 but not on the posterior 2/3. The diagnosis was suspected coated tongue with oral candidiasis as the differential diagnosis. The treatments were compressing the tongue using gauze soaked in 3% hydrogen peroxide (H₂O₂) solution, scrapping off using a tongue scraper, then rinsing with water. The thick-coated tongue can be easily removed. He was also given 0,2% chlorhexidine gluconate (CHX) mouthwash as an antiseptic and petroleum jelly for dry lips. The tongue condition improved on 2nd day therapy after rinsing regularly using 0,2% CHX. **Conclusion:** Recognizing the signs, symptoms, and associated factors of Candida infection is important. Coated tongue which resembles pseudomembranous candidiasis was successfully treated using 3% H₂O₂ compresses, tongue scraping, and 0.2% CHX mouthwash.

Keywords: Chlorhexidine gluconate, Coated tongue, Hydrogen peroxide, Infection, Oral candidiasis

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INTRODUCTION

Tongue is a muscular organ and is covered with moist, pink tissue called mucosa and tiny bumps called papillae that give a rough texture to the tongue surface. Tongue is a complex organ that can be affected by various pathological conditions with different etiologies such as inflammation, infection, neoplastic, or even systemic conditions.¹ It is also a major habitat for Candida species, which can cause severe infections in immunocompromised hosts, for example in patients in the perioperative period and bedridden elderly patients. These microorganisms combine with the desquamated mucosal epithelium, food debris components, saliva, as well as with other constituents, covering the surface of the tongue, and it is known as coated tongue.² This coated tongue can develop

into a more severe condition due to fungal infections such as oral candidiasis.³ It can occur if there is an alteration in the oral cavity environment that supports the growth of Candida, as well as influenced by poor oral hygiene and high consumption of carbohydrates.^{4,5}

It is estimated that as many as 30%-60% of healthy adults have Candida species in their oral cavity. Most of these microorganisms are more commensal rather than pathogenic. Understanding the difference between Candida species as commensal organisms in the oral cavity microbiome and Candida acting as pathological entities is important. While evaluating a patient and determining therapeutic options, a clinician must be able to differentiate between commensalism and pathogenesis. Pathological colonization of Candida species is

generally associated with several factors, including extreme age, nutritional deficiencies, metabolic diseases, concomitant infections, prolonged antibacterial therapy, immunocompromised conditions, radiotherapy, transplant patients, salivary gland hypofunction, and long-term use of steroid therapy.⁶ The clinical appearance of thick coated tongue in some cases sometimes makes it difficult for dentists to determine the diagnosis whether coated tongue or oral candidiasis. The aim of this case report is to discuss the difficulty in establishing the diagnosis and management of coated tongue with suspicion of pseudomembranous candidiasis due to lack of supporting examination tools.

CASE

A 61-year-old man was referred from the Internal Medicine Department of the Air Force Hospital (RSAU) dr. M. Salamun for oral cavity examination. There were no complaints of pain in his oral cavity. Previous history of recurrent oral ulcerations was denied. He had never seen a dentist. His medical history was diabetes and lung disease from 2 years ago. The diagnosis from the Internal Medicine department was type 2 diabetes mellitus, coronary heart disease (CHD), and pleuritis et causa pleural effusion. The therapy provided were salt capsules, 5 mg lisinopril, 10 mg amlodipine, 20 mg simvastatin, 5 mg isosorbide dinitrate (ISDN), 40 mg furosemide, ezelin, 1 g ceftriaxone, 1 g paracetamol, apidra, 750 mg levofloxacin, 500 mg metronidazole, and tramadol. The results of laboratory examination showed increasing fasting blood sugar (404 mg/dl), 2-hour postprandial blood sugar (442 mg/dl), HbA1c (14.1%), urea (51 mg/dl), leukocyte count (14,900 /mm³), neutrophils (89%), neutrophil lymphocyte ratio (17.66/mm³) and decreasing sodium level (130 mmol/L) as well as absolute lymphocyte count (760%). He had stopped smoking 3 years ago and history of alcohol consumption was denied. During the hospitalization, he had never cleaned his oral cavity.



Figure 1. Patient condition on day 1. A) The lips were dry and exfoliative, there was desquamation on the upper and lower lips. B) The tongue before scraping off, a thick-yellowish white plaque covering almost the entire surface dorsum of the tongue. C) The tongue after being scrapped off using a gauze soaked in 0.2% chlorhexidine gluconate, the yellowish white plaque still appeared on 2/3 of the dorsum of the tongue which was difficult to remove. D) The tongue after being compressed using gauze soaked in 3% H₂O₂ and scrapped off using a tongue scraper.

CASE MANAGEMENT

The patient was in a weak condition along with shortness of breath, a nasal cannula was attached to his nose, and a tube in the right chest area. Extraoral, the lips were dry, exfoliated, and desquamated on the upper and lower lips (Figure 1A). Intraoral, on dorsum of the tongue there was a yellowish white plaque which could be scrapped off on the 1/3 anterior without leaving erythematous area and pain, but could not be scrapped off on the 2/3 posterior of the tongue (Figure 1 B, C). There were retained roots of teeth 17, 27, and mobility in tooth 41 (grade 3).

Based on clinical findings, the patient was diagnosed with suspected coated tongue on Miyazaki scale 3 with differential diagnosis of pseudomembranous type oral candidiasis, chronic apical periodontitis et causa gangrene radix 17 and 27, and chronic periodontitis of tooth 41. The non-pharmacological treatment was oral hygiene instructions (OHI) and gave education to the patient. The pharmacological treatment for the tongue condition was to compress it using a gauze soaked in 3% H₂O₂ for 5 minutes, followed by scrapping it off using a tongue scraper then gargling 2 times with distilled water for 1 minute, cleaning the tongue 4 times until the white plaque could partially be removed (Figure 1D). The patient was instructed to apply a thin layer of petroleum jelly on his lips, gargling with 10 ml of 0.2% chlorhexidine gluconate mouthwash for 30 –

60 seconds, 3 times a day, and referred to the Oral Surgery department for the management of chronic apical periodontitis et cause tooth root gangrene 17 , 27 as well as chronic periodontitis of tooth 41.

The next day there were no more complaints of pain in the oral cavity. The instructions given had been carried out. Extraoral, the lips were moist and there was no more desquamation on the upper and lower lips (Figure 2A). Intraoral, on the dorsum of the tongue, there was a yellowish white plaque that could not be scraped off on the 2/3 posterior of the tongue (Figure 2B). The treatment was to compress the tongue again using a gauze soaked in 3% H₂O₂ for 5 minutes, then scraping it off using a tongue scraper and gargling 2 times with distilled water for 1 minute, cleaning the tongue 3 times until the white plaque could be removed. The patient was instructed to maintain his oral hygiene, continue using 0.2% chlorhexidine gluconate mouthwash and petroleum jelly. The condition of the tongue after using 3% H₂O₂ was shown in Figure 2C.



Figure 2. Patient's condition on day 2 (1 day after therapy). A) The desquamation lesions on the lips had improved, the lips were moist. B) The tongue before being scrapped off showed a yellowish white plaque that could not be scrapped off on the 2/3 posterior dorsum of the tongue. C) The tongue after was compressed with 3% H₂O₂ and scraped off using a tongue scraper, the yellowish white plaque still appeared on the 1/3 posterior of the dorsum of the tongue.

The third day after the first visit, he was referred to another hospital for further treatment of his systemic condition and the monitoring of his oral cavity condition was carried out via telemedicine assisted by the patient's grandson (Figure 3).



Figure 3. Patient's condition on day 5 (4 days of therapy). White plaque on the 1/3 posterior dorsum of the tongue was improved (photo taken by the patient's grandson).

DISCUSSION

According to the case discussed, there are several characteristics that differentiate between coated tongue and pseudomembranous oral candidiasis. Regarding the clinical appearance and etiology, coated tongue is characterized by a clinical appearance on the dorsum of the tongue as if it is coated with a white layer or another color layer depending on the type of food consumed. This layer is formed from hyperkeratinization and elongation of the dorsum papillae of the tongue, exfoliated epithelium, remnants of white blood cells, microorganisms (fungi and bacteria), and food debris found between the filiform papillae.^{7,8} The etiology of coated tongue is not fully understood, but there are several predisposing factors, including the presence of painful lesions in the oral cavity, dehydration, consuming drugs (both locally and systemically), and soft food diet.⁹ Discoloration of coated tongue is associated with smoking, poor oral hygiene, coffee consumption, *Candida albicans* infection, periodontal disease and the side effects of medications such as antibacterial and psychotropic agents.¹⁰

Meanwhile, oral thrush or pseudomembranous oral candidiasis is an acute opportunistic infection caused by the *Candida albicans* species, a commensal pathogen in 20% - 30% of patients. This condition is generally found in elderly individuals, immunocompromised patients, especially AIDS and diabetes mellitus, patients undergoing corticosteroid therapy, long-term broad-spectrum antibiotic therapy, hematological disorders, and other malignancies. Pseudomembranous candidiasis on the surface of the tongue has the clinical appearance of yellowish-white confluent plaques that resemble milk curds or cottage cheese. This plaque is composed of desquamated epithelial cells, collections of fungal hyphae, yeasts, fibrin, cell detritus, and necrotic material. It has a centrifugal

growth pattern. It affects the tongue as well as any parts of the oral mucosal surface, especially buccal mucosa, lateral surface of the tongue and oropharyngeal region.^{11,12}

According to symptoms felt by the patients, coated tongue is asymptomatic while pseudomembranous candidiasis can develop symptoms, including redness, irritation, itching, pain or a burning sensation on the tongue, making it difficult to eat and drink. Severe oral thrush can even cause difficulty in swallowing and speaking. It may cause dysphagia when the lesion affect the oropharynx region.¹⁴

The diagnosis of coated tongue is confirmed by the clinical appearance of plaques that can be removed with a light scrap without leaving pain and erythematous area. Unlike coated tongue, making the diagnosis of oral candidiasis can be done based on the patient's medical history and clinical condition, which can be confirmed by exfoliative cytology, microbiological culture, potassium peroxide staining, oral swab specimens for culture analysis, saliva analysis, and mucosal biopsy.¹³ The clinical appearance of pseudomembranous oral candidiasis is plaques that can be removed with a light scrap and leave an erythematous area on the mucosal surface, sometimes accompanied by pain and bleeding.^{11,12} Microscopic examination of fresh samples of *Candida* using 10% potassium hydroxide (KOH) which will dissolve the epithelial cells and left only the remaining intact *Candida* cells. A negative or normal KOH test indicates no fungi (no dermatophytes and yeasts). In other hand, a positive result of KOH test indicates yeasts cells, blastospores, or pseudohyphae.^{14,15}

The recommended treatment for coated tongue is mechanical cleansing, either by tongue brushing or tongue scrapping.⁷ Meanwhile, the management of oral candidiasis are topical and systemic antifungal agents. Patients who are intolerant or do not respond to topical preparations or have a tendency to develop systemic infections, systemic antifungal preparations such as fluconazole, itraconazole and miconazole are more appropriate to be provided. First-line therapy for cases of non-invasive candidiasis is topical antifungal agents such as nystatin, miconazole, amphotericin B, and clotrimazole. Nystatin is the antifungal most often prescribed by dentists and is available in the form of topical cream, oral pastilles, and oral suspension. This drug is not absorbed in the gastrointestinal tract when administered orally, thereby reducing the side effects.¹⁶ Administration of an appropriate antifungal regimen should at least consider the culture results, patient history, and socioeconomic factors. The goal is to provide

antifungal therapy without causing unnecessary drug-resistant organisms, limit adverse events, and reduce the interactions between drugs. The prescription of antifungal regimen should be carried out after diagnosis of oral candidiasis is established.¹⁷

The management of coated tongue in this patient was done by compressing his tongue using a gauze soaked in 3% hydrogen peroxide (H_2O_2) for 5 minutes, followed by scraping it using a tongue scraper and then rinsing by gargling with distilled water, 2-4 times until the white coating that was difficult to be removed can be scraped off. Hydrogen peroxide (H_2O_2) also known as dioxygenase or dioxygen, is a strong oxidizing compound, has an unpleasant odor, which decomposes into oxygen and water.¹⁸ H_2O_2 is widely used in the medical field as an antiseptic, antimicrobial and antibacterial agent.¹⁹ The pro-inflammatory activity of H_2O_2 solution (concentration 0.5% - 3%) is able to disinfect tissue.²⁰ The 3% H_2O_2 solution has broad spectrum bactericidal activity and sporicidal properties through its ability to damage DNA, oxidize proteins, membrane lipids in healthy cells, and microorganisms at the same time and reduce the biofilm production. H_2O_2 is also considered effective against bacteria resistant to chlorine. The use of H_2O_2 is not without risk, especially it can cause cytotoxicity in the host tissue²¹⁻²³ therefore, compressing H_2O_2 is not handed over to the patient himself nor his family considering the possibility of irritation of healthy mucosa caused by inappropriate use of H_2O_2 . A study done by Soutome et al., find out that brushing the tongue using 3% hydrogen peroxide is a very useful method for reducing coated tongue and reducing the number of bacteria by cleaning thick coated tongue only with water is considered to be more difficult if compared to brushing with hydrogen peroxide.²⁴

The tongue scraper has the right shape and hardness to remove food debris, dead cells and fungus on the tongue. Cleaning the tongue using a tongue scraper can help reducing the number of bacteria in the oral cavity, improving the ability of taste buds by opening the pores on the tongue, preventing toxins from being reabsorbed into the body so that the body becomes healthy and improving the immune system.²⁵ The patient was also provided 0.2% chlorhexidine gluconate mouthwash to be gargling for 1 minute then discarded, to be used for 14 days. Chlorhexidine gluconate (CHX) is used as a broad spectrum antiseptic which is also available in the form of mouthwash. CHX has a broad spectrum against various organisms including *Candida albicans*. CHX is able to inhibit *Candida* adhesion to

biological and inert surfaces. CHX can act as a fungicide and has a fungistatic function. CHX causes nucleoprotein coagulation which inhibits budding and cell wall changes, causing the release of cytoplasmic components through the plasmalemma. This morphological stage results in the death of some cells, while cells that previously had protruding buds still survive. This illustrates the fungicidal and fungistatic effects of CHX.²⁶

The diagnosis of this case was made based on the patient's complaints and clinical appearance. Clinically, the appearance of the patient's tongue resembles pseudomembranous oral candidiasis, but no complaints of soreness or a burning sensation on the tongue and did not leave an erythematous area when scraped off using a tongue scraper. Supporting examination for candidal infection using KOH could not be carried out due to the limitations of the KOH test equipment, therefore the diagnosis was suspect coated tongue with differential diagnosis of pseudomembranous oral candidiasis. The management was adjusted to the patient's condition while focusing on preventing Candida infections by improving his oral hygiene, especially the tongue. Dentist's knowledge regarding the stages of candida infection, predisposing factors and associated systemic diseases, as well as clinical manifestations of candida infection are needed in the diagnosis and management of cases of coated tongue that resemble oral candidiasis in order to differentiate between the two. Antifungal therapy can be given after the diagnosis of oral candidiasis is made to avoid drug-resistant microorganisms, therefore in coated tongue cases which resemble oral candidiasis can be treated with tongue scraping and the administration of antifungal-containing mouthwash. Thick coated tongue is difficult to distinguish from oral candidiasis due to the absence of supporting examinations. Fungal infections could be successfully treated with 3% H₂O₂ compresses, tongue scraping using a tongue scraper, and the administration of 0.2% CHX mouthwash. The author would like to thank drg. Nuke and drg. Arien Haryatin who has provided the opportunity to study while at RSAU Dr. M. Salamun, Bandung as well as to the patient who is willing to give permission to discuss his oral cavity disorder as a case report.

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