**Diagnosis and Treatment of Angular Cheilitis**

Da-Ming Liao1，Chieh Chen 2

Dental Department, Puli Christian Hospital 1

Division of family medicine, Hualien Armed Forces General Hospital 2

Corresponding author: Chieh Chen

guppy5230@yahoo.com.tw

Address: No. 198, Minde 1st Street, Hualien city, Hualien County, Taiwan (R.O.C.)

Tel: 0928-698950

E-mail: guppy5230@yahoo.com.tw

**Running title: Angular Cheilitis**

**Abstract**

 Angular cheilitis is commonly seen on one or both corner(s) of the mouth. It is an inflammatory condition dominated with symptoms of skin peeling, ulcer and repeated scabbing at the junction of the lip edge. Clinically, it is the falling of epithelium cells that eventually cause crack, erosion, redness, or itching, and sometimes bleeding when opening the mouth for eating or talking. Severe case may even form suppurative infection, in which patient will suffer excruciating pain from the laceration that will ultimately affect the quality of life with discomfort and trouble. The disease is known to occur at any age and may involve infection by bacteria, virus or fungus, including common strains like Candida albicans and Staphylococcus aureus. For example, missing tooth, friction from rubbing or improper denture devise will put the mouth under constant moisture for germ proliferation. Localized suppuration, hemorrhage, leukoplakia, scabs, etc., also show as symptoms and can be further aggravated by malnutrition in vitamin B group (specifically B2), iron or folic acid.

**Keywords**: Angular Cheilitis;Plummer Vinson syndrome, ulcerative colitis, Crohn's disease.

**Introduction**

 Angular cheilitis is a common clinical inflammation of the skin around the mouth, which was first described in the 19th century. It is characterized by red and cracked skin around one or both side(s) of the lips, as repeated ulcers and scabs lead to bleeding and pain [1-3]. It can affect any age. Bleeding is common from opening mouth, which pulls on the wound. The skin around the lips will also fall off to form crack or erosion, exposing tissues to more inflammation or infection to develop suppuration. Clinically, the disease occurs in the mouth or on the mucosa at the corner of the mouth, typically characterized by redness, warm temperature and pain in the mouth. Chronic recurrent case shows frequent bleeding from laceration. Patient will experience discomfort and social distress from these symptoms[4-6]. Although there are many involving factors, the disease can be classified as infectious, malnutritional and contact angular cheilitis. It is a common clinical problem, where skin surface is inflamed, dry and desquamatous at the corner of the mouth. Pathologically, there are granulomatous cheilitis and actinic cheilitis. Actinic cheilitis is more common in the lower edge of lips, which is caused by excessive exposure to sunlight. Acute inflammation will produce symptoms such as redness, heat and pain. In addition, chronic inflammation makes lips dry and desquamate. Cheilitis is a term referring to the inflammation or cracking of the skin at the junction of the lips. Other descriptory terms may include perlèche, rhagades, stomatitis, etc. Studies have confirmed that topical ointment will inhibit or even kill the infection to treat the disease[7-12].

**Causes of Stomatitis**

 Infectious stomatitis usually involves microorganisms like fungi, bacteria or herpes simplex virus, of which the most common ones are Candida albicans, Staphylococcus aureus and Streptococcus. The etiology of the disease is highly diverse, but generally agreed to be a skin (oral mucosa) disease caused by infection. Thus, although many factors are involved, it is essential to control the microbe flora on site by removing humidity factor, such as stopping the habit of lip licking, malnutrition, or vitamin B group deficiency. Although most patients may only show simple symptoms like cracking and bleeding, it is still necessary to differentiate other diseases, such as Plummer Vinson syndrome, ulcerative colitis, Crohn's disease, and granuloma of mouth and face. Therefore, consultation with other departments may provide effective and appropriate diagnosis for effective treatment to alleviate patients' discomfort. In addition, patients with systemic diseases such as diabetes, iron deficiency anemia and immune dysfunction are also prone to malnutrition cheilitis. Traumatic stomatitis, as the name suggests, involves physical trauma, such as accidentally impacting on the corner of the mouth or constant friction from rubbing or lip licking to damage the skin for infection. Contact cheilitis is seen in people with allergy that when coming in contact with chemicals in lipstick, cosmetics, or foods, the irritation will result in the disease[13-18].

**Nutrition supplement and non-drug treatment**

 Angular cheilitis involves many factors, including deficiencies in vitamin B group, iron, folic acid and trace elements (such as zinc). B2 deficiency is by far the most common, especially it is the key element to energy metabolism and formation of red blood cells, as well as maintaining the nervous system and skin repair. Vitamin B2 is in animal foods such as dairy products, cheese, eggs, animal viscera, etc. For vegetarian patients, they can choose to eat more dark green vegetables, whole grains such as whole wheat and germ rice, and nuts such as sesame, walnut, yeast, soybean, etc., to supplement the nutrients. Malnutrition cheilitis is the result of unbalanced diet, lacking vitamin B group, iron, folic acid and trace elements like zinc. B2 is the most common deficiency seen in angular cheilitis. The supplement, in principle, will require the adult to orally take vitamin B2 (5-30mg) and the children (2.5-10mg) every day. During this period, the urine may turn yellow and orange[19-25].

**Drug Treatment of Angular Cheilitis**

 In addition, natural AMPs (Antimicrobial Peptides) have been mentioned as an alternative therapy for oral infection instead of fluorine or chlorhexidine. AMPs usually contain some specific amino acids, such as proline in apidaecin, which are mainly used for tooth decay, thrush and periodontitis. It will also inhibit the formation of bacterial cell wall and break down bacterial DNA or RNA that they can no longer perform protein synthesis. Angular cheilitis may also cause facial muscles to collapse due to excessive missing teeth or inappropriate dentures, that severely wear the mucosa and skin. The deterioration of facial muscles will shorten the distance between upper and lower jaws, which not only accumulates more saliva to immerse the mucosa but also promote bacterial growth in the wrinkled pouches of the mouth. This kind of infection also occurs in patients with low immune response, such as after radiation, chemotherapy or in patients of diabetes and taking immunosuppressants. They will show erosion and crack in the mouth, along with suppuration, bleeding and scab. If it involves Candida albicans (*Candida albicans*), apparent whiteness can be observed and often accompanied with mycotic cheilitis. The treatment relies on proper cleaning of the oral cavity, correcting the intermaxillary distance, reducing wrinkles at the corner of the mouth area and keeping the area dry. Before applying topical medication, the area should always be cleaned. Antimicrobial ointment or drug should be appropriately targeting species of bacteria under doctor’s order[25-30].

**Conclusion**

 Personal health care and prevention are crucial to the patients with angular cheilitis. Good habit and lifestyle will help to increase their immunity. Balanced diet and less intake of alcohol or smoking will reduce the stimulation to the skin. Chapstick should be applied to keep the lips moist. And avoiding sunlight exposure and lip licking, lip biting or picking the skin will help. For recurrence or poor treatment outcome, the patient should immediately seek medical assistance at hospital to check if there is the problem of low immunity or nutritional deficiency in vitamin B2/B12/B9, iron, folic acid, etc. Clinical treatment focuses on keeping the mouth clean, maintaining the correct intermaxillary distance of the jaws, and application of antimicrobial ointment or drug for severe recurrent infection under doctor’s order [30-37].

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