Classification and clinical manifestations of oral yeast infections

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By tradition oral candidosis has been classified into acute pseudomembranous (thrush), acute atrophic, chronic atrophic, and chronic hyperplastic types. However, pseudomembranous candidosis is not always acute but may last for many months. Furthermore, the value of using the term atrophic to describe an erythematous area is limited. Moreover, some of the various types have been associated with other clinical entities, which appear to have a combined bacterial/mycologic etiology. A revision of the classification should be based on the use of clinical terms, and in a previous study of multifocal oral candidosis, erythematous, plaque-like, and nodular forms were identified. A revised classification of oral candidosis which considers these aspects could be as follows: acute types: pseudomembranous and erythematous; chronic types: pseudomembranous, erythematous, plaque-like, and nodular; and *Candida*-associated lesions: denture stomatitis, angular cheilitis, and median rhomboid glossitis. □ *Angular cheilitis; candidosis; denture stomatitis; median rhomboid glossitis; oral*

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Oral fungal infections are in the overwhelming majority of cases caused by *Candida* spp. Thus, such infections, as a group of lesions, have been labeled accordingly. In previous terminology moniliasis, candidiasis, and candidosis have been applied. According to modern taxonomy, moniliasis should be used for fungal infections in plants (1). In the present article the term candidosis has been accepted, partly because of arguments in previous studies (2, 3) and partly because this term has been widely accepted for a long time.

In the oral cavity candidosis may appear in several clinical forms (4). Several attempts have been made to classify these forms. By tradition, the most frequently adopted classification has been the one by Lehner (3), who divided oral candidosis into acute pseudomembranous candidosis (thrush), acute atrophic candidosis, chronic hyperplastic candidosis, and chronic atrophic candidosis.

Chronic hyperplastic candidosis was further subdivided into four groups based on localization pattern and endocrine involvement as follows: 1) chronic oral candidosis (*Candida* leukoplakia); 2) endocrine candidosis syndrome; 3) chronic localized mucocutaneous candidosis; and 4) chronic diffuse candidosis.

Chronic atrophic candidosis embraced denture-sore mouth and angular cheilitis caused by *Candida*.

Cernéa et al. (5) described chronic oral multifocal candidosis as a clinical entity. This entity, embracing also median rhomboid glossitis, was included in a suggested revised classification by Jensen & Holst (6), and it has been further described by Holmstrup & Besserman (7). Jensen & Holst (6) thus suggested the following classification: candidosis acuta mucosae oris: pseudomembranacea and atrophica; and candidosis chronica mucosae oris: localisata and multifocalis.

The following diagnostic criteria of oral candidosis have been suggested by Lehner (3): 1) white plaques or diffuse erythematous areas; 2) culture of *Candida* from the saliva; 3) presence of the mycelium on direct examination of a smear from the lesion; 4) biopsy examination showing hyphae in the epithelium and characteristic histologic

changes; and 5) serum fluorescent antibody titer against *C. albicans* greater than 1:16 and a positive antibody test with neat saliva.

The methods in points 2, 3, and 5 have previously been discussed by Holmstrup & Besserman (7), who preferred the cytologic examination of a periodic acid-Schiff (PAS)-stained direct smear and the finding of hyphae and/or pseudohyphae as the diagnostic criterion. This method has also been described by Cawson & Lehner (8) as the most helpful single investigation. The diagnosis of candidosis should also rely on the presence of clinical changes as described below. Further, as indicated in the study by Holmstrup & Besserman (7), another characteristic of primary oral candidosis is alteration or disappearance of the lesion after sufficient treatment with antimycotics.

We suggest that the following arguments and subdivision should be considered in an attempt to reclassify oral candidosis.

Pseudomembranous candidosis (Fig. 1), also denominated thrush, is characterized by whitish, creamy patches, which can be scraped off, leaving an erythematous mucosal surface. The patches consist of desquamated epithelium, fibrin, necrotic tissue, food debris, inflammatory cells, and bacteria and are heavily infiltrated by hyphae (3, 4).

Pseudomembranous candidosis is classified as an acute type of infection. Acute means sharp or intense, but the word is most often used to designate diseases of short duration in contrast to chronic, long-standing conditions. However, pseudomembranous candidosis is not always of short duration; if not treated, it may last for many months or even years, as seen in patients using corticosteroid aerosols, in HIV-infected individuals, and in patients with other kinds of impaired resistance.

Furthermore, the value of using the term atrophic to describe a red area is limited. Redness may thus be caused not only by reduced epithelial thickness, atrophy, but also by increased vascularity. We therefore suggest the use of the term erythematous, which means red/reddened.

Erythematous candidosis appears as a red, sometimes fiery red, area, often with ill-defined borders. It has been mentioned (3) that one reason for the redness may be that a candidal pseudomembrane has been shed off. This is possibly the case for some acute erythematous candidoses — for example, the lesion termed antibiotic-sensitive tongue or antibiotic-sore tongue (Fig. 2), which is the only form of candidosis with consistent pain.

Erythematous candidosis may also appear in several chronic varieties. About one-third of the candidal infections seen in HIV-seropositive/AIDS patients give rise to chronic erythematous forms of lesions (Fig. 3) (9).

A revision of the classification of oral candidosis should be based entirely on the use of clinical terms. Thus, in a previous study of multifocal oral candidosis, in addition to the erythematous type, plaque-like and nodular types were identified (7).

Plaque-like and nodular types are both of chronic nature. The plaque-like lesion is characterized by the presence of patchy, whitish, often frayed plaques surrounded by erythema (Fig. 4), and the nodular lesion by the formation of whitish papules or nodules on an erythematous background (Fig. 5).

In previous classifications various types of oral candidosis have been associated with other clinical entities, many of which seem to have a combined bacterial and fungal etiology. Consequently, such lesions do not always respond to antimycotic treatment. As mentioned above, denture-sore mouth or denture stomatitis and angular cheilitis have been considered to be examples of chronic atrophic candidosis. However, it has been demonstrated that both conditions frequently show a mixed bacterial/fungal microflora (10–12). Median rhomboid glossitis has also been reported to harbor candidal infection (5, 13, 14), but also this clinical entity may show a mixed microflora and even gonococcal infection (15). However, since these lesions frequently show candidal infections, they may as a group of lesions be included in what could be termed *Candida*-associated lesions.

On the basis of the above arguments we suggest that a future revised clinical classification of oral candidosis should rather comprise the following types:

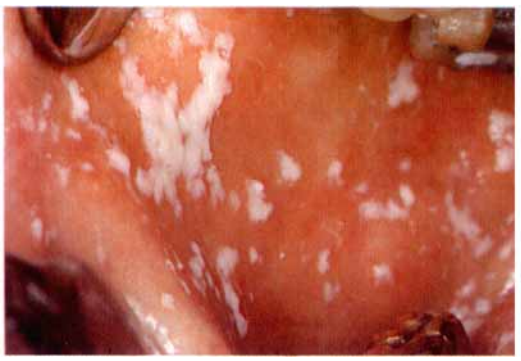

Fig. 1. Acute pseudomembranous candidosis of buccal mucosa.

Fig. 2. Acute erythematous candidosis of tongue.

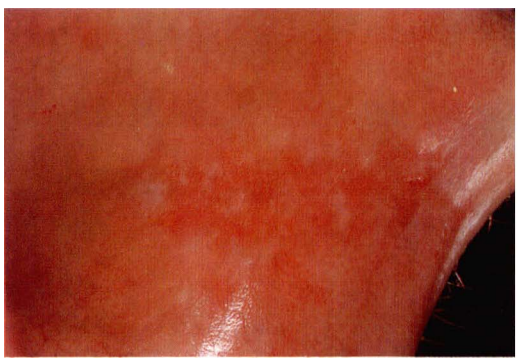

Fig. 3. Chronic erythematous candidosis of commissure.

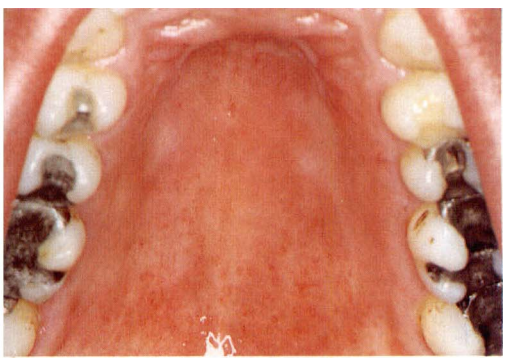

Fig. 4. Chronic erythematous candidosis of palate in HIV-seropositive patient.

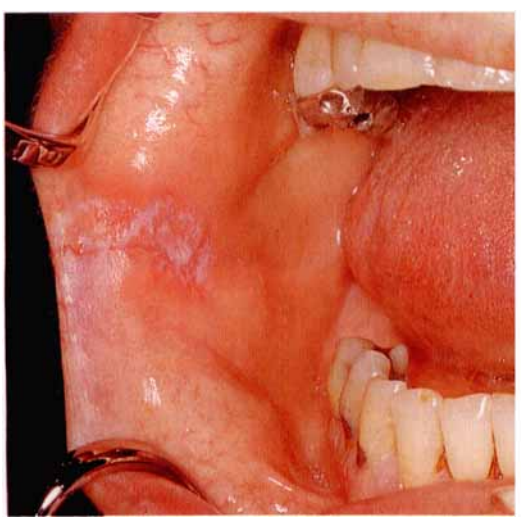

Fig. 5. Chronic plaque-like candidosis of commissure.

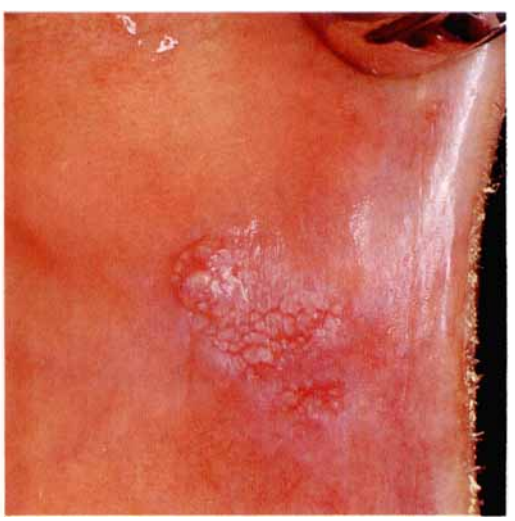

Fig. 6. Chronic nodular candidosis of commissure.

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Oral candidosis classification

Acute types:
Pseudomembranous
Erythematous

Chronic types:
Pseudomembranous
Erythematous
Plaque-like
Nodular

Candida-associated lesions:
Angular cheilitis
Denture stomatitis
Median rhomboid glossitis

In case of widespread chronic oral candidosis presenting with lesions of the above type(s), fulfilling the diagnostic criteria previously mentioned (7), the term chronic oral multifocal candidosis may be used as a supplementary description.

The various clinical types of oral candidosis show different responses to treatment: pseudomembranous and erythematous lesions usually leave a normal mucosal surface after sufficient antimycotic treatment. Such a reaction is not always found for plaque-like lesions, which in about half of the cases have shown residual lesions characterized by whitish plaques. Irreversible changes of the oral mucosa were also characteristic for nodular lesions, which in all cases demonstrated homogenous white plaques after antimycotic treatment (7).

The proposed listing of chronic types of oral candidosis thus appears to be characterized by progressive irreversibility of mucosal changes. Whether this reflects an effect on the epithelium of long-standing candidal infection is unknown.

There are obvious similarities between the plaque and nodular types of candidosis and various forms of leukoplakia (7, 16), and sometimes the described lesions are denoted candidal leukoplakia (17) (Fig. 6). Furthermore, it is unknown whether the yeasts are causally involved in the development of leukoplakia (18). The problem in distinguishing between some types of *Candida*-induced lesions and types of leukoplakias is further substantiated by the above fact that some leukoplakia-like chronic candidal infections disappear after antimycotic treatment, whereas others do not (7).

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