

# Morphological aspects and treatment of candida infections

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**Abstract.** The rate of candida infection has increased significantly in recent years, mainly because of consecutive treatments with corticosteroids, immunosuppressant (post-transplant), antibiotics, chemotherapy and/or radiation therapy, prolonged endotracheal intubation, dentures and not least the increasing incidence of HIV infection. Although there have been notable successes in development of new antifungal drugs and in new therapeutic strategies, there are frequent therapeutic failures and relapses post-treatment. The aim of this paper is to present an algorithm for morphological diagnosis and treatment of oral candidiasis.

**Key Words:** candida, morphological aspects, treatment.

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## Introduction

The pathology of oral candidosis or Candidiasis, one of the most common human opportunistic fungal infections of the oral cavity has a wide variety of treatment which has been studied until these days (De Repentigny et al 2004)

*C. albicans* is the most commonly species isolated from the oral cavity and is believed to be more virulent in humans, occurring in approximately 50% of the cases of candidiasis (Williams et al 2011).

Candida species are opportunistic pathogens, the installed disease is favoured by a number of endogenous and exogenous factors that either induce a state of immunosuppressant host either a quantitative change in the relationship between Candida and other microorganisms categories. The aim of this paper is to present an algorithm for morphological diagnosis and treatment of oral candidiasis.

## Material and method

The diagnosis of candidiasis is established based on anamnesis (specific symptoms), clinical examination (presence of lesions), complementary examinations (direct examination on the blade, fungal cultures), therapeutic sample (wound healing and disappearance of symptoms after antifungal therapy).

1) Identification of systemic risk factors:

- Age: infants / toddlers (the immunological immaturity of specific age), elderly;
- Pregnancy;
- Drug therapy: broad-spectrum antibiotics, corticosteroids, immunosuppressant, cytotoxic agents, etc;

- Xerostomia (consecutive administration of drugs, radiotherapy, associated Sjögren’s Syndrome, etc.);
- Systemic diseases: cancers, AIDS, malabsorption and malnutrition (iron deficiency, iron deficiency anemia, megaloblastic anemia), disendocrine disorders (diabetes, hyperparathyroidism), other immunodeficiency states, etc.

And / or local risk factors:

- Smoking;
- Removable dentures;
- Fixed orthodontic appliances
- Poor hygiene;
- Micro-traumatism (faulty dental restoration);
- Diet rich in carbohydrates, etc. (Rotaru & Delean 2015; Reichart et al 2000)

2) Identification of specific symptoms and clinical picture

Acute pseudomembranous candidiasis, thrush, ‘patient’s disease’

First stage

- anamnesis:
  - frequently at newborns (immaturity of the immune system);
  - at adults is often associated with malnutrition, systemic diseases (HIV, AIDS, etc.),
  - local immune deficits (using corticosteroid sprays, etc.);
  - xerostomia, parageusia, variables chewing disorders;
- clinical examination:
  - dry-looking mucosa, red (diffuse erythematous stomatitis);
  - ± depapilated tongue;

Phase status:

- anamnesis:
  - ± sensitivity, burning, dysphagia (severe);
  - ± bleeding and sensitive areas, persistent after removing

- the pseudo membranes;
- clinical examination:
    - white boards, soft, creamy (pseudomembranes) “curd”
    - like patches, which can be easily removed by wiping, leaving an erythematous area, red vines, evid or ulcerated, sometimes bleeding and sensitive;
    - injuries - are interested in any area of the oral mucosa (lining in the jugal mucosa frequently, oro-pharynx and dorsal areas of the face side of the tongue) (Rotaru & Delean 2015; Reichart et al 2000);
    - vary in extension (from small areas dotted to confluent plaques covering large areas);
    - ±associated angular cheilitis

Acute (antibiotic stomatitis, glossitis antibiotic) atrophic candidiasis (erythematous)

- anamnesis:
  - sensation of dryness of the oral mucosa, pain, parageusia, variables chewing disorders
  - less marked than in acute pseudomembranous candidiasis;
- clinical examination:
  - generalized rash / erythema areas (similar to those of acute pseudo membranous candidiasis, but without the presence of pseudo membranes) most commonly on the dorsal tongue but may extend to the entire oral mucosa ((Rotaru & Delean 2015; Reichart et al 2000; Gabler et al 2008; Dias et al 1995).

Angular cheilitis, Perleche

- anamnesis: nutritional deficiencies (iron deficiency, riboflavin, folic acid, vitamin B12); ± infection by *Staphylococcus aureus*; painful lesions;
- clinical examination: reducing the vertical dimension of occlusion;

Cracks in the corners of the mouth lesions, erythema (Rotaru & Delean 2015; Reichart et al 2000; Webb et al 1998).

Chronic atrophic candidiasis (prosthetic stomatitis)

- anamnesis: Patient prosthesis/ movable prostheses\*, often incorrectly adjusted the prosthetic field, and worn during the night and / or with poor hygiene; most often asymptomatic; Angular cheilitis if present pain associated;
  - clinical examination: chronic erythematous lesions – red, velvet - granular or multinodular corresponding the foundation surface of the prosthesis;
  - ± Injuries ‘in mirror’ of the dorsal part of the tongue;
- Angular cheilitis ± (Rotaru & Delean 2015; Reichart et al 2000; Radford et al 1999; Holmstrup et al 1983).

\* The denture surfaces are environments that favor adhesion and development of several types of candida because of relative hydrophobicity of acrylic and of the particularities of fungi. Moreover, the pellicle consists by *Candida albicans* on acrylic prosthetic surfaces can significantly increase their resistance to many antimicrobial agents.

Chronic hyperplastic candidiasis (candidal leukoplakia) \*\*

- anamnesis: at adult patients more frequently male, smokers; asymptomatic lesions;
- clinical examination:
  - white plaque, dense, compact, opaque, irregular thickness and density with rough or nodular surface that cannot be removed by wiping; Skin leukoplakia;
  - commonly bilateral lesions, most commonly the mucosa jugal, retrocomisural: white tiles, rough, triangular, pointing posterior, often bilateral;

- rarely localized lesions lingual or palatal (Rotaru & Delean 2015; Reichart et al 2000; Arendorf et al 1983; Eyerich et al 2010).

\*\* Chronic hyperplastic candidiasis is considered a pre-malignant lesion; epithelial dysplasia can be observed in about 50% of cases.

Erythematous candidiasis

- The term is used in HIV for positive patients;
- anamnesis: HIV - positive person;
- clinical examination: erythematous patches, well defined, localized on hard or soft palate and dorsal tongue (Rotaru & Delean 2015; Reichart et al 2000).

Rhomboid median glossitis, central papillary atrophy of tongue

- anamnesis : generally asymptomatic;
- clinical examination: depapilate areas, sometimes white plaque and/ or erythematous nodules, diamond shaped, situated in dorsal part of anterior papillae tongue being circumvalate (Rotaru & Delean 2015; Reichart et al 2000).

Chronic mucocutaneous candidiasis

- anamnesis: disease associated with severe immune status;
- clinical examination: superficial candida infections, persistent mucous membranes, nails and skin; oral lesions (present in almost all cases) similar to those seen in chronic hyperplastic candidiasis; can affect any area of the lining (Rotaru & Delean 2015; Reichart et al 2000; Liu & Hua 2007; McCullough et al 2005).

## Results and Discussion

Confirmation of the diagnosis

The confirmation of the diagnosis is based on obtained data by corroboration of anamnesis (symptoms), clinical examination (lesions), complementary examinations and sample treatment (wound heal and cure the symptoms after antifungal therapy).

Complementary examinations:

- Direct examination of white plaque allows highlighting the mycelia filaments;
- Fungal cultures : the culture identification; the quantitative fungal culture permit to quantify the fungus: Candida diagnosis is established from more than 30 colonies / culture medium, or 400 fungus / colony / ml of saliva;
- Histopathology test: particularly recommended in chronic hyperplastic candidiasis.

General principles of treatment

- Identification and correction of predisposing factors (immunodeficiency, anemia, treatment with immunosuppressant, etc.);
- Scaling, professional brushing, training for maintaining optimal oral hygiene;
- The denture wearers: overnight fast; rigorous hygiene of the denture and mouth (with recommendation to use the electric brush); patients are advised to use mouthwash which contains antifungal plant extracts (extracts of coriander 8%, 7-8% calendula, sage, rosemary, coriander and basil 8%, keeping the prosthesis in antifungal solutions over the night (solution 0.1% sodium hypochlorite for acrylic dentures or chlorhexidine mouthwash with 0.2% for prostheses that have metal frame); application of miconazole gel on mucosal surface of the denture in wearing time, during its every 8 hours, 7-14 days.
- Patients wearing fixed orthodontic appliances need to pay a special attention to their oral hygiene – they should clean their

teeth and the appliance every day in the morning and before bed at night, as well as after each meal, also floss at least once a day and use a fluoride toothpaste, with an additional use of interdental brushes, oral irrigators, antibacterial rinses, disclosing solutions or tablets

- The people who use corticosteroids in inhaled form – check the correctness of their use; rinsing the mouth with mouthwash after using the spray;

- Rinsing the mouth with water or chamomile tea with soda bicarbonate (oral environment alkalifying) (Rotaru & Delean 2015; Reichart et al 2000).

In acute pseudomembranous candidiasis is also recommended:

• Topical antifungal: Nystatin (nystatin, mycostatin, stamicin) - suspension 100,000 / day, 14 days; suspensions are kept as much as possible in the mouth;

• Systemic antifungal ketoconazole (Nizoral 200 mg/day, between meals, 14 days); Fluconazole (Diflucan 100 mg/day); Itraconazole (Sporanox 100 mg/day, 1-3 weeks).

In acute atrophic candidiasis are needed:

• Discontinuation of antibiotic causal/taking other antibiotics;

• Topical antifungal;

In angular cheilitis is also required:

• Identifying and treating other possible causes of angular cheilitis: reduced vertical dimension of occlusion (bruxism, incorrect dentures, etc.) anemia deficiency (recurrent injuries, refraction treatment); strep throat (*Streptococcus plicatilis*) staph infection (*Staphylococcus aureus*);

• In median rhomboid glossitis is important to establish the correct diagnosis

(particularly in severe nodular glossitis) - biopsy; it is recommended therapy in

symptomatic forms with systemic antifungal (Rotaru & Delean 2015; Reichart et al 2000; McCullough et al 2005).

In mucocutaneous candidiasis is required the identification and treatment of associated diseases.

## Conclusions

Therapeutic failures may be caused by three factors: factors related to fungal properties (primary or secondary resistance, type fungal cell, fungal population size); factors related to the host (immune status, location of the infection, the presence of prostheses, catheters, implants, presence of undrained abscess; poor compliance of the patient); factors related to properties of the antifungal agents (inadequate doses; fungistatic, no fungicidal; pharmacokinetics and pharmacodynamic failure, drug interactions, failure to comply with the safety profile). When it comes to immunocompromised patients or a more generalized candidiasis all these drugs are not efficient and we need to apply to systemic drugs.

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