

Candidiasis Begins its Growth in the Gastrointestinal System

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Abstract

Candidiasis refers to a fungal infection that occurs due to an excess of the Candida albicans fungus, a microorganism typically present in the human body. It can affect multiple areas, including the mouth, skin, nails, and genital regions, leading to irritating symptoms such as itching, burning sensations, redness, and the appearance of white patches. Various elements contribute to its onset, including weakened immune defenses, prolonged antibiotic usage, diabetes, pregnancy, and insufficient hygiene practices.

Keywords: Candida, Candidiasis, Signs, Examination, Health

Introduction

Candidiasis is a fungal infection that affects mucosal surfaces and/or skin, primarily caused by the Candida albicans organism [1]. It is commonly seen in women, children, and older adults. The excess growth of C. albicans tends to occur when the skin or mucous membranes are exposed to increased moisture, warmth, and disruptions in the membrane barrier integrity.

Predispositions

- A. Impaired immune system [1].
- B. Antibiotic administration.
- C. Elevated blood sugar.
- D. Long-term steroid use.
- E. Regular douching practices in individuals with a uterus.
- F. Adults utilizing dentures.

Candida

Candida species are becoming a more prominent cause of bloodstream infections acquired in healthcare settings, associated with significant rates of illness and death [2]. Patients who are more susceptible to bloodstream infections from candidiasis include those suffering from severe burns, individuals with long-term venous catheters, exposure to broad-spectrum antibiotics, weakened immune systems (especially those with low neutrophil counts), serious mucosal inflammation, prior surgical interventions (notably gastrointestinal surgeries), total parenteral nutrition, other concurrent infections, and colonization of the mucosa by

Candida species. The mortality rate linked to candidemia is elevated in patients with severe underlying conditions, high APACHE II scores, and ongoing infections despite effective antifungal treatments.

Clinical signs of Candida can range from mild skin infections to severe invasive infections impacting various organs [3]. Also referred to as moniliasis or thrush, this prevalent organism normally resides in the oral cavity, mucosa, vulvovaginal regions, and other delicate body areas. Significant local risk factors include improper oral hygiene, the use of removable dental prosthetics, orthodontic devices, dry mouth conditions, smoking, the use of steroid inhalers, high carbohydrate diets, and oral mucosal disorders. Systemic factors that increase susceptibility to candidiasis include age (both older adults and newborns are at greater risk), pregnancy, treatment with systemic corticosteroids, antibiotic use, chronic health issues and their treatments, digestive disorders, nutritional deficiencies (such as iron, folic acid, and other vitamins), endocrine disorders (like diabetes, hypothyroidism, and autoimmune conditions), HIV, and primary immunodeficiency disorders.

Candida Auris

This pathogenic yeast, which is found globally, can induce invasive forms of candidiasis affecting the bloodstream, eyes, central nervous system, heart, bones, and internal organs [4]. Invasive candidiasis represents a serious infection typically seen in healthcare settings, particularly threatening

those with compromised immune systems and critically ill patients, such as individuals with cancer or those who have received bone marrow or organ transplants. Reported mortality rates for invasive candidiasis caused by *C. auris* range from 29% to 53%. According to information from the CDC, *C. auris*, a newly emerging and largely drug-resistant yeast species, poses a significant threat due to its ability to cause severe infections and spread easily within health care environments, especially in hospitals and nursing facilities.

Candida Albicans

This fungus can be viewed as a component of the human microbiome that is beneficial; however, it can also lead to infections in mucous membranes or invasive candidiasis [4]. It is estimated that over 250,000 individuals around the globe are affected by invasive candidiasis annually, resulting in more than 50,000 fatalities. Studies conducted on populations show that the occurrence rates of candidemia range from 2 to 14 cases for every 100,000 people.

C. albicans, along with some other species of *Candida*, is typically present in the mouths of up to 75% of people. In those who are generally healthy, this presence is usually non-threatening. Nevertheless, individuals with minor immune system weaknesses are at an increased risk of ongoing oral infections. These infections linked to *Candida* species are termed "oral candidiasis" (OC). *C. albicans* is the primary cause of OC and can impact the oropharynx and/or the esophagus among individuals with compromised adaptive immune responses. Importantly, being infected with HIV significantly heightens the risk of developing OC. Moreover, factors such as wearing dentures and being of advanced age are also identified as risks for developing OC.

Yeast Infections

Candidiasis, which is commonly referred to as "yeast infection" in everyday language, includes a variety of infections affecting the skin, nails, and mucosal surfaces [5]. Oral candidiasis, or thrush, manifests in various forms: pseudomembranous, erythematous, and hyperplastic candidiasis; denture-associated stomatitis (where *Candida* species are involved in about 90% of instances), angular stomatitis (often involving *Candida* species, combined with *S. aureus* in around 80% of cases), and median rhomboid glossitis.

Candida bloodstream infections, known as candidemia, are often seen in primary care settings as sepsis linked to devices used for vascular access, particularly in patients who are receiving hyperalimentation. The removal of the access device should be accompanied by antifungal treatment. The most frequently isolated organism is *Candida albicans*, which is nearly always sensitive to fluconazole, though other *Candida* species may also be involved. *Candida krusei* shows inherent resistance to fluconazole and should be considered when a patient who has recently taken fluconazole has a positive blood culture for *Candida* species. Up to 25% of isolates of *Candida glabrata* have now developed resistance to fluconazole. Complications arising from invasive candidiasis

can include endophthalmitis, which may lead to irreversible vision loss, osteomyelitis, and septic arthritis. Infection of a peritoneal dialysis catheter leads to *Candida* peritonitis but can also occur in patients with intra-abdominal infections or severe pancreatitis. *Candida* endocarditis typically occurs in individuals with artificial heart valves; blood cultures can sometimes return sterile results, even in cases with large vegetations that may cause embolism to significant arteries.

Signs

Oral candidiasis, also known as thrush, typically manifests as white, cheese-like patches on the oral mucosa, including the surface of the tongue [6]. The underlying area of these patches appears red and may be eroded, and painful ulcerations can also be present. Often, the infection extends to the corners of the mouth (referred to as angular cheilitis or perleche), leading to the maceration and cracking of the oral commissures.

Candidiasis frequently occurs in areas where skin rubs against skin, such as the groin, between the buttocks, underneath drooping abdominal folds or heavy breasts, and in the navel. In these places, pustules form but can easily burst due to friction from adjacent surfaces, leaving a bright red base encircled by a moist layer of scale. The merging of distinct lesions can lead to a broader area of redness, accompanied by satellite pustules around the periphery. Symptoms such as intense itching, irritation, and a burning sensation are often reported.

Oral candidiasis has the potential to extend to the esophagus or lungs. Candidal proctitis can occur either with or without accompanying perianal infections. Systemic candidiasis is an opportunistic infection that primarily affects patients with HIV/AIDS (though infrequently), blood cancers, long-term intravenous catheters, or poor nutrition. Extensive spread of the infection can lead to fever and muscle tenderness, affecting any organ in the body. Skin manifestations occur in approximately 10% of individuals with candidal sepsis, presenting as acne-like pustules or petechiae that may evolve into necrotic ulcerative lesions on the trunk and limbs. An ophthalmic examination may aid in detecting candidal endophthalmitis. Superficial candidiasis may not always be present, and its absence does not significantly contribute to diagnosing systemic infection.

Although superficial candidiasis typically has distinct characteristics, it can sometimes be mistaken for eczematous rashes, dermatophyte infections, and bacterial skin infections that produce pus (such as pyoderma). It is crucial to differentiate systemic candidiasis from other septic conditions.

Examination

Esophagitis presenting with difficulty swallowing, painful swallowing, and discomfort in the chest may be attributed to *Candida albicans*, cytomegalovirus, or herpes simplex virus [7]. Candidal esophagitis, recognized as an AIDS-defining illness, is the most prevalent form. For patients who also

have oral candidiasis, empirical treatment with fluconazole or ketoconazole should be commenced. If the patient lacks oral candidiasis or does not have a previous diagnosis of AIDS, conducting an esophagoscopy along with biopsies and cultures is recommended to confirm the diagnosis and guide treatment. CMV esophagitis can typically be treated effectively with ganciclovir or foscarnet, while herpes esophagitis responds well to acyclovir.

Immunosuppressed individuals may experience chronic diarrhea accompanied by weight loss. It is essential to carry out bacterial cultures and tests for parasites to detect treatable infections such as those caused by *Shigella*, *Salmonella*, *Campylobacter*, or *Cryptosporidium* and other parasitic infestations. Testing for *Clostridium difficile* should also be conducted.

Perianal disease, often resulting from herpes simplex virus infections, necessitates extended treatment with oral acyclovir. In cases of severe perianal disease, intravenous treatment is required.

Liver disorders can result from drug-induced damage, hepatitis, or various infections and cancers. Individuals displaying lab results indicative of a mainly obstructive issue (such as high alkaline phosphatase) ought to have an ultrasound to eliminate the possibility of liver tumors or bile duct obstruction. An AIDS-related cholangiopathy characterized by strictures and papillary narrowing can be diagnosed with upper endoscopy complemented by retrograde cholangiography. Sphincterotomy can provide symptom relief in cases of bile duct blockage. If the ultrasound results are clear, conditions such as MAC disease, tuberculosis, fungal infections, or other infiltrative liver conditions should be investigated.

A thorough inspection of the oral cavity is crucial, searching for indicators like oral hairy leukoplakia, thrush, mucosal petechiae, stomatitis, gingivitis, and Kaposi's sarcoma [8]. Thrush is a significant marker of the progression of the disease. The most typical type is pseudomembranous candidiasis, which presents as removable white patches on any mucosal area of the mouth. Atrophic oral candidiasis appears as smooth, red spots on the hard or soft palate, buccal mucosa, or the upper surface of the tongue, which can easily go unnoticed without meticulous examination. In rare instances, candidiasis might manifest in a leukoplakia-like appearance with white lesions that cannot be wiped away but may diminish with extended antifungal treatment. This variant of *Candida* infection can be mistaken for oral hairy leukoplakia and is primarily differentiated by its treatment response (biopsy is rarely needed). Angular cheilitis due to *Candida* can manifest as redness, cracks, and splits at the corners of the mouth, which might necessitate the addition of a topical antifungal cream for adequate management. Mucosal petechiae could be the only sign of HIV-associated thrombocytopenia. Kaposi's sarcoma frequently leads to oral lesions on both the hard and soft palate as well as the gums.

Aphthous stomatitis can be easily mistaken for stomatitis related to herpes simplex or CMV infections, requiring biopsy for proper differentiation. Lymphoma might present as a mass or ulcerations, most commonly identified in the peritonsillar area.

Oral Candidiasis

Oral candidiasis, known as thrush, is typically painful and appears as creamy-white, curd-like spots on inflamed mucosa [9]. These white patches can be easily wiped away (for instance, with a tongue depressor), unlike leukoplakia or lichen planus, revealing only the underlying irregular redness. Oral candidiasis is often linked to several risk factors including: (1) wearing dentures, (2) having a weakened constitution with insufficient oral hygiene, (3) suffering from diabetes mellitus, (4) experiencing anemia, (5) undergoing chemotherapy or localized radiation, (6) using corticosteroids (either orally or systemically), or (7) taking broad-spectrum antibiotics. Another form of candidiasis is angular cheilitis.

Vulvovaginal Candidiasis

This infection is usually linked to *C. albicans*, though other types may sometimes be found [10]. Over 75% of women experience at least one occurrence in their lives. The main symptom is a thick, white discharge that is odorless, accompanied by notable itching of both the external and internal genital areas. Upon examination, the vaginal region may appear swollen and reddened. The discharge typically has a pH level ranging from 4.0 to 5.0. Diagnosis is validated by a wet mount or KOH test that reveals budding yeast or pseudohyphae. Although fungal cultures are not essential for verifying the diagnosis, they can be beneficial in cases of recurrence or lack of response to treatment. There are many available treatment methods for women suffering from vulvovaginal candidiasis, including both over-the-counter and prescription options. Uncomplicated cases can be effectively managed using short-term intravaginal treatments (such as creams or suppositories) or a single oral dose (fluconazole 150 mg). For complicated or frequent infections, an intense treatment course spanning 10 to 14 days should be followed by a maintenance phase lasting 6 months to decrease the chances of reoccurrence. Treatment for sexual partners is not necessary unless they show symptoms (for instance, male partners experiencing balanitis).

Opioids

A history focused on symptoms and thorough investigation may uncover various pain sources [11]. Oral thrush, pressure sores, constipation, and infected injuries each have their unique treatments. Most individuals suffering from cancer-related pain (as well as many dealing with non-cancerous issues) require opioid pain relief. Opioids are commonly the safest available painkillers, typically resulting in just temporary drowsiness and a heightened requirement for laxatives. Opioid overdose can present as involuntary muscle spasms or vivid dreams; the patient may show sudden jerking

movements or retract their hand when touched, which might be mistakenly viewed by others, causing hesitation to make contact with the patient. Morphine taken orally effectively alleviates cancer pain but may lead to some undesirable effects, primarily constipation and nausea.

In cases of intense pain, high opioid doses may be required to achieve effective initial relief. Psychological addiction is seldom an issue for patients given suitable opioid amounts for ongoing severe cancer pain. If medication is taken before pain re-emerges, cravings for drugs are usually absent. Regular use results in physical dependence, but withdrawal symptoms can be averted by tapering a dose by no more than 20% in any two-day span.

Fears regarding addiction, respiratory distress, and tolerance are generally unfounded for patients experiencing severe pain. With careful dose adjustments, effective pain management can often be achieved. Patients may remain alert and mentally clear even when consuming substantial amounts of oral morphine every four hours.

Numerous effective formulations for oral opioids exist. Begin with an oral morphine solution at a dose of 2 mg hourly as required for discomfort. If four or more doses are administered within a 24-hour period, take the cumulative milligrams and split them into doses every four hours for the next day. Administer breakthrough doses hourly as necessary in between scheduled doses. Continue this approach for each following day. Increase the morphine dosage progressively until pain relief extends for the entire four hours, regardless of whether large doses are needed. Hydromorphone serves as a viable alternative.

The specific medication chosen is not as crucial as the means of delivery. To alleviate pain and interrupt the cycle of uncontrolled discomfort followed by oversedation, an oral narcotic must be provided consistently throughout the day. "Breakthrough" doses, approximately half the standard four-hour dosage, can be utilized for pain that occurs unexpectedly.

Conclusion

Candidiasis, or Candida infection, has become a more prevalent issue for both women and men, particularly recently. This situation stems from the overpopulation of the fungus *Candida albicans*, a normal component of gut flora carried by 90% of individuals. Its growth is generally restrained by the beneficial bacteria present in the body and a robust immune system. Issues arise when the body's regulation of this growth fails, often due to excessive antibiotic or corticosteroid use, oral contraceptives, a carbohydrate-heavy diet, or prolonged stress exposure. An excessive proliferation of *Candida* within the body can lead to many health complications. While not the root of every ailment, it presents a significant enough health concern to warrant serious attention. The signs of *Candida* overgrowth differ based on the affected body region. The fungus initially proliferates in the gastrointestinal tract, with early

symptoms including bloating, constipation or diarrhea, trouble digesting food, and cravings for carbohydrate-rich and fermented items. Increased consumption of these foods facilitates further *Candida* growth, releasing toxins and metabolic byproducts that exacerbate pre-existing symptoms and introduce new ones, such as acne, cysts, eczema and other skin alterations, foul breath, bleeding gums, a metallic sensation in the mouth, ongoing cough, sore throat, flu-like symptoms, sinusitis, ear ringing or infections, eye discomfort or itching, headaches, heart palpitations, persistent joint or muscle pain, fluid retention, and weight issues.

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