

Candidiasis and the infections it causes

Definition

- 0. **Candidiasis**
 - 0. Opportunistic unicellular yeast organism
 - 0. Small, oval, thin-walled
 - 0. Reproduce by budding and fission
 - 0. Member of normal flora
 - 0. *Candida albicans* is the most common
 - 0. Mucosal and systemic fungal infections
 - 0. *C. glabrata*, *C. parapsilosis*, *C. tropicalis*, *C. krusei*, *C. dubilensis*
 - 0. Can vegetate almost anywhere on the body
 - 0. Skin, oral cavity, groin region, GI tract, mucous membrane
- 0. **Risk factors in connection with the following:**
 - 0. Use of broad spectrum of antibiotics and oral contraceptives
 - 0. Ingestion of diets rich in yeast-containing foods or sugars
 - 0. Pregnancy
 - 0. Immunocompromised patients
- 0. **Clinical manifestations**
 - 0. Vaginal – burning, abnormal discharge
 - 0. Gastrointestinal- heartburn, bloating, diarrhea or constipation
 - 0. Respiratory allergy- rhinitis, sneezing, wheezing
 - 0. CNS- anxiety, depression, memory loss, can't concentrate
 - 0. Other- fatigue, headache, irritability

Diagnostic Strategies

- 0. **Determining between colonization and infection is challenging**
 - 0. Asymptomatic colonization is a marker for infection in patients at risk
 - 0. Colonization: Oropharynx, stool, vagina, lower respiratory and urinary tracts, skin and wounds
- 0. **No Definite Lab Test capable of absolute diagnosis**
 - 0. Impossible to establish and identify patients affected with this supposed disease
- 0. **Growth from sterile specimen (blood, CSF) usually diagnostic**
- 0. **Stool exams**
 - 0. Gram stain for yeast and microscopic examination
- 0. **Serum or urine D- arabinitol levels**
 - 0. *Candida* carbohydrate metabolite and neurotoxin
- 0. **Serum IgG, IgM, IgA, IgE Ab levels**
 - 0. Difficult to interpret but may help in diagnosis
- 0. ***Candida albicans***
- 0. **Granulomatous lesions involving the hands**

Treatment

Two primary goals

- 0. Destruction of yeast proliferation in body
- 0. Reduce factors making environment favorable for growth
- 0. **Prescription antifungal drugs**
 - 0. Necessary part of treatment
 - 0. Older drugs caused liver toxicity, newer drugs have fewer side effects
 - 0. Lamisil, Diflucan (Fluconazole), Sporanox, Nystatin, Amphotericine Zetonazole, Caspofungin
- 0. **Reduce Complex Sugars, Carbohydrates and Alcohol**

- 0. Candida ferments and rapidly proliferates in presence of sugars
- 0. **Probiotics**
 - 0. Restoration of normal intestinal bacterial colonies
 - 0. Prevent recolonization of Candida (not a cure)
 - 0. Produce lactic acids, formic acid, acetic acid, and hydrogen peroxide
- 0. **Glucosamine**
 - 0. Derivative of chitin from fungal cells
 - 0. Prevent binding of Candida to epithelial mucosa cells
- 0. **Concanavolin A**
 - 0. Type of protein that reduces Candida adhesiveness
- 0. **Low Residue Diet**
- 0. **Digestive Enzyme Supplements**
- 0. **Candida allergy shots**

Epidemiology

- 0. **Found in soil, inanimate objects, food, and hospital environments**
- 0. **Rare *Candida* spp. contamination in laboratory settings.**
- 0. **Epidemiological dramatic changes**
 - 0. Chemotherapeutic agents
 - 0. Immunosuppressive drugs
 - 0. Organ Transplants
 - 0. Parenteral alimentation
 - 0. Broad-spectrum antibiotics
 - 0. Advanced surgical techniques
 - 0. HIV/AIDS

Case Report 1

- 0. Bacak *et al.*, *Journal of infection*. (2006) **53**: e11-e14.
- 0. In September 2003, a 22 year-old male with a history of intravenous drug use and hepatitis C infection was diagnosed with acute HIV infection and *Candida albicans* with endocarditis
- 0. **Treated at hospital for mixed Strep. Sanguis and Candidia albucans sepsis with tricuspid valve endocarditis**
- 0. ***Candida albicans* with endocarditis**
 - 0. Rare, high mortality rate
 - 0. Prevalence increased in last two decades
- 0. **Patient's condition further complicated by the following:**
 - 0. Pulmonary embolism
 - 0. Femoral thrombosis
 - 0. Bilateral pneumonia

Case Report 1 Treatment

- 0. **December 2003**
 - 0. Treated with liposomal amphotericin B for 3 weeks followed by oral fluconazole
 - 0. Blood CD4+ lymphocyte count of 455 cells/mm³
 - 0. Normal range 800-1500 cells/mm³
- 0. **Transthoracic echocardiography performed**
 - 0. Vegetation 20mm in diameter on tricuspid valve
 - 0. Thrombotic mass 5mm in diameter right ventricle
- 0. **Continued maintenance therapy**
 - 0. Oral fluconazole
 - 0. Methadone

- 0. Also receiving antiretroviral treatment
 - 0. Stavudine, Lamivudine, Lopinavir
- 0. **Condition continued to improve**
 - 0. Only occasional low grade fever
 - 0. *C. albicans* repeatedly cultured from blood despite amphotericin B treatments
- 0. **June 2004**
 - 0. Surgery was performed to remove vegetation from the tricuspid valve and right ventricle
- 0. **Amphotericin B**
 - 0. Previously associated with renal toxicity and local thrombosis in patient
- 0. **Intravenous Caspofungin**
 - 0. Given to patient before surgery
 - 0. Azole, less side effects
- 0. **Cultures grown from removed vegetation**
 - 0. Isolated were found to be sensitive to fluconazole and amphotericin B
- 0. **Intravenous caspofungin continued 4 weeks, followed by oral fluconazole for 5 months**
- 0. **No drug related adverse side effects**
- 0. **No vegetation observed on follow up echocardiogram 4 weeks after surgery**
- 0. **Fluconazole therapy stopped**
- 0. **All cultures following 9 months were negative**

Presentation of Disease: Case Report 2

- . Tajima et al., Digestive Diseases and Sciences. (2000) Vol. 45 Pages 1885-1888.
- 0. Deposition of Eosinophil Granule Proteins in Liver Associated with Allergic Bronchopulmonary Candidiasis
- 0. A 61year old male admitted after 10 days of right hypochondralgia and diarrhea
- 0. 14 day history of cough without shortness of breath or wheezing
- 0. No history of asthma, atopic disease, or chronic pulmonary disease
- 0. Allergic bronchopulmonary aspergilliosis(ABPA)
 - 0. hypersensitivity disease of the lung
 - 0. Caused by the inhalation of *Aspergillus*
- 0. This condition displays blood and pulmonary eosinophilia, increased immunoglobulin, wheezing and occasional expectoration of brown plugs
- 0. Patient exhibiting similar symptoms to ABPA from exposure to Candida species
 - 0. Name proposed for this clinical condition is allergic bronchopulmonary candidiasis (ABPC)
- 0. These patients show elevated levels of interleukin-4 and 5 in the BAL valve
- 0. In murine models, IL-4, IL-5, granulocytemacrophage and intercellular

adhesion have indicated blood and pulmonary eosinophilia and immunoglobulin production

Epidemiology and Ecology

- 0. ABPC is found to occur in patients with asthma involving hypersensitivity to *Candida* species
- 0. Worldwide distribution
- 0. First reported case of ABPC present with eosinophilia hepatitis
- 0. Animal models of this condition have shown T lymphocytes can induce eosinophil recruitment and activation

Laboratory Aspects

- 0. Patient develops hepatomegaly and eosinophilic hepatitis
- 0. Treated with H² antagonists for ulcers
- 0. Exam revealed: hepatomegaly as firm and tender measuring 8 cm, moderate epigastric tenderness, and clubbed fingers, no lesions
- 0. ECG and echocardiogram within normal range
- 0. Staining more prevalent in central vein region than in the portal tract (see arrows)
- 0. IL-4-positive mononuclear cell in portal tract

Histopathology

- 0. Biopsy showed small lesions with highly elevated numbers of eosinophils in the liver and large intestine
- 0. Abdominal ultrasonography showed hepatomegaly (or enlarged liver)
- 0. Intradermal skin test showed immediate reactivity to tick, soybean, and *Candida* antigens
- 0. No *Aspergillus* antigens reacted

Treatment

- 0. Patient diagnosed with ABPC associated with Hepatitis.
- 0. Diagnosis consistent with criteria for ABPC
- 0. Prednisolone treatment was initiated with a dose of 30mg/day.
- 0. Eosinophil counts turned to normal within 10 days
- 0. Patient was discharged after 35 days with 15mg/day treatment.
- 0. Total IgE levels declined and hepatomegaly slowly resolved.

Growth of *Candida*

Thrush

. In HIV/AIDS patients

- 0. Carriage depends on level of immunosuppression
- 0. If treated with fluconazole
 - 0. Carry non- albican strain resistant to azole agents

Oropharyngeal Candidiasis(OPC) Thrush

- . Candida spp.
 - 0. normal mouth flora in 25-50% of population
- . C. albicans most frequent
- 0. Influence factors-
Changes in:
 - 0. Salivary flow
 - 0. Salivary pH
 - 0. Glucose concentration
- 0. High occurrence rates in
 - 0. HIV/AIDS patients
 - 0. Denture wearers
 - 0. Diabetic patients
 - 0. Cancer patients
 - 0. Newborns
 - 0. Any hospital patient

MODE OF TRANSMISSION

- 0. Endogenous spread
- 0. By contact with excretions of mouth, skin, and feces from patients or carriers
- 0. From mother to infant during childbirth & breast feeding
- 0. Disseminated candidiasis may originate from mucosal lesions, unsterile narcotic injections, catheters

References

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