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. 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

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 (Flucozanole), 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. 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/mm$^3$
   0. Normal range 800-1500 cells/mm$^3$
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
Also receiving antiretroviral treatment
0. Stavudine, Lamivudine, Lopinavir

Condition continued to improve
0. Only occasional low grade fever

C. albicans repeatedly cultured from blood despite amphotericin B treatments

June 2004
0. Surgery was performed to remove vegetation from the tricuspid valve and right ventricle

Amphotericin B
0. Previously associated with renal toxicity and local thrombosis in patient

Intravenous Caspofungin
0. Given to patient before surgery
0. Azole, less side effects

Cultures grown from removed vegetation
0. Isolated were found to be sensitive to fluconazole and amphotericin B

Intravenous caspofungin continued 4 weeks, followed by oral fluconazole for 5 months

No drug related adverse side effects
No vegetation observed on follow up echocardiogram 4 weeks after surgery

Fluconazole therapy stopped
All cultures following 9 months were negative

Presentation of Disease: Case Report 2


Deposition of Eosinophil Granule Proteins in Liver Associated with Allergic Bronchopulmonary Candidiasis

A 61-year-old male admitted after 10 days of right hypochondralgia and diarrhea

14 day history of cough without shortness of breath or wheezing

No history of asthma, atopic disease, or chronic pulmonary disease

Allergic bronchopulmonary aspergillus(ABPA)
0. hypersensitivity disease of the lung
0. Caused by the inhalation of Aspergillus

This condition displays blood and pulmonary eosinophilia, increased immunoglobulin, wheezing and occasional expectoration of brown plugs

Patient exhibiting similar symptoms to ABPA from exposure to Candida species

Name proposed for this clinical condition is allergic bronchopulmonary candidiasis (ABPC)

These patients show elevated levels of interleukin-4 and 5 in the BAL valve

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 flucozanole
    0. Carry non-albican strain resistant to azole agents
Oropharyngeal Candidiasis (OPC) Thrush

- Candida spp.
  - normal mouth flora in 25-50% of population
  - C. albicans most frequent

Influence factors:
- Changes in:
  - Salivary flow
  - Salivary pH
  - Glucose concentration
- High occurrence rates in:
  - HIV/AIDS patients
  - Denture wearers
  - Diabetic patients
  - Cancer patients
  - Newborns
  - Any hospital patient

MODE OF TRANSMISSION

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

References

- www.doctorfungus.com (accessed on May 31, 2007)
- www.google.com (accessed on June 8, 2007)