

FUNGAL INFECTIONS

ASPERGILLUS. Infections with aspergillus, a fungal organism, are seen in the ear canal where a common variety is aspergillus niger. Sinus infections are also caused by aspergillus and pulmonary infections by inhalation of the fungus. In the maxillary sinus there may be a ball of fungus called aspergilloma. If the infection invades blood vessels, any organ may become involved. Not all aspergillus infections are of the variety niger; others produce a brown or white colored mass in the ear canal, e.g. the spores of aspergillus are released into the air from saprophytic locations in water and soil and are inhaled or otherwise transferred to humans where they cause opportunistic fungal infections second in frequency only to candidiasis.

Microscopically, there are branching, septate hyphae (mycelia) that are prone to invade small blood vessels blocking them and causing necrosis.

Actinomyces, formerly considered to be fungi because of their filamentous appearance, are now regarded as gram-positive rods growing under conditions of low oxygen tension. They are normal in the oral cavity and, therefore, are commonly seen in tonsillar crypts (upper left). If introduced into the deeper tissue with anaerobic conditions, actinomyces israelii may cause "lumpy jaw," a condition often of dental origin. "Sulfur granules" appear in the abscess caused by this infection and the individual organism may be demonstrated by silver impregnation techniques.

MUCORMYCOSIS. This fungal infection is found throughout the world as the fungi, normally saprophytic and residing in decaying organic material, are inhaled by the human host. Different areas of the body may be infected but the rhinocranial form is of chief interest to the otolaryngologist since it causes destructive disease of the facial and cranial areas. Diabetics and immunocompromised patients are at particular risk.

Microscopically, there is extensive necrosis caused by vascular invasion by the large hyphae and consequent disruption of the blood supply.

Treatment is by surgical excision or the use of amphotericin B, but even then the prognosis is poor.

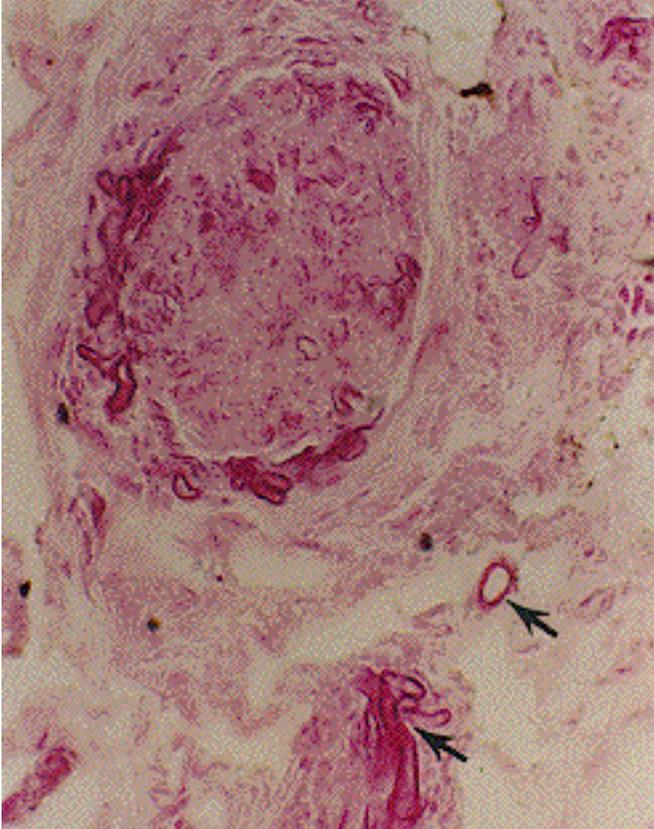
Histoplasmosis is the most common systemic fungal infection in the United States. It grows as a yeast in the human. Generally an infection with histoplasmosis produces no symptoms, or only very mild symptoms. Spores are inhaled and an influenza-like picture may develop. Oral lesions may be mistaken for carcinoma.

Microscopically, the organism, *Histoplasma capsulatum*, appears in H&E stains and also with PAS or Gomori silver stains. The organism is a small round body mixed into a granulomatous inflammation often with multinucleated giant cells. Disseminated histoplasmosis, untreated, is largely fatal but Amphotericin B therapy is effective in most cases. Candidiasis, or as it was formerly called, moniliasis, is by far the most common oral fungal infection. There are a variety of clinical patterns, the most common of which is pseudomembranous candidiasis, also known as "thrush." Another manifestation known as atrophic candidiasis causes a central papillary atrophy of the tongue, formerly called median rhomboid glossitis. Angular cheilitis of the mouth is frequently caused by candidiasis. In the immunocompromised patient the disease is particularly severe and may extend into the esophagus. Monilial infections are also common in the external auditory canal where they may grow asymptotically or invade the tissue causing great pain.

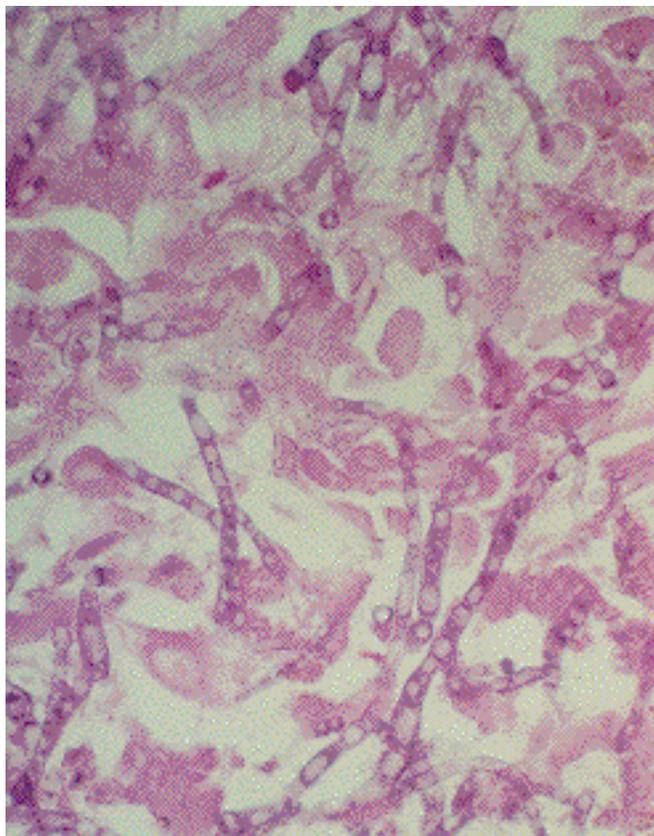
Treatment with Nystatin is generally effective. Microscopically, cytology studies show the hyphal phase of the organism that can be grown in culture for more definitive identification.

Actinomyces (now considered a bacterium) (arrows) growing in crypt of palatine tonsil. This organism contributes to formation of the plugs of debris that extrude from the palatine tonsils of certain patients whose tonsils have deep crypts.





Mucormycosis (zygomycosis; phycomycosis). Arrows show thickened fungal hyphae, one branching and without septation.

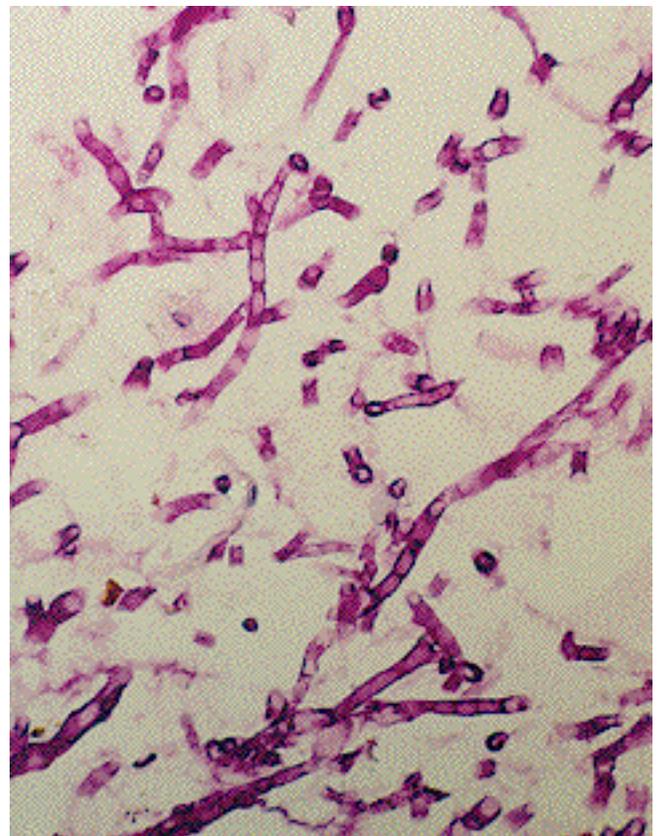


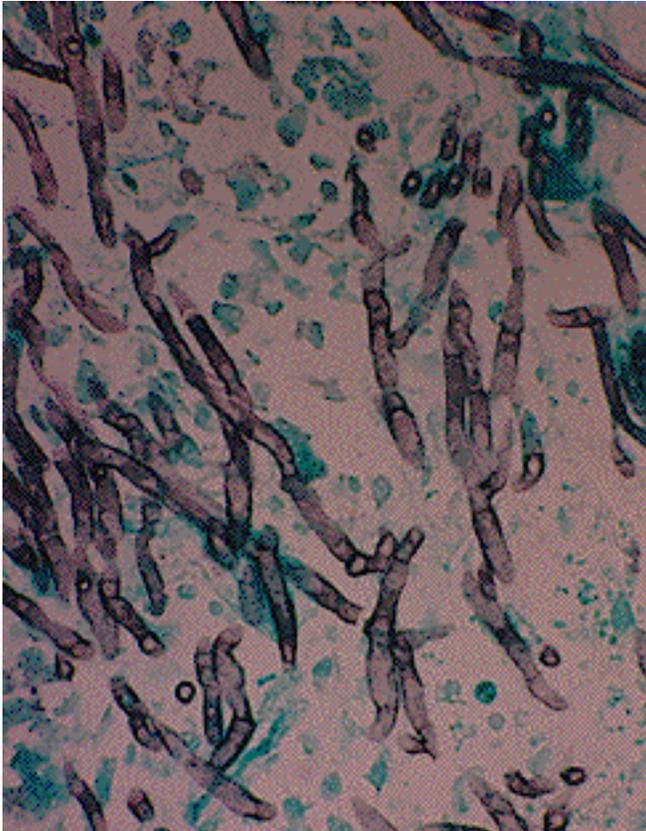
Aspergillus infection, maxillary sinus shows typical septate hyphae of aspergillus.

Aspergillus, ear canal. Gomori methenamine silver stain.



Aspergilli, as seen with PAS stain.





Aspergillus, larynx. Silver stain highlights the septation of three hyphae.

CLINICAL ASPECTS

Aspergillus and other fungi are commonly found in the ear canal and usually do not invade tissue. They grow as saprophytes on cerumen or epithelium and cause no symptoms. In cases in which the organisms do invade tissue there is extreme pain because of ulceration of the underlying epithelium, sometimes so deeply that bone is exposed. The infection forms occluding mats of fungi and epithelial debris that look like wet blotting paper. Under high magnification with the operating microscope, hyphae and conidiophores (the fruiting heads) are clearly visible in the ear canal. Occasionally, culture may be required to establish the diagnosis but magnification alone is generally sufficient.