EYE, EAR AND SINUS INFECTIONS

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EYE INFECTION

- Ocular infections can be divided into those that primarily involve the external structures—eyelids, conjunctiva, sclera, and cornea—and those that involve internal sites.
- The major defense mechanisms of the eye are the tears and the conjunctiva, as well as the mechanical cleansing that occurs with blinking of the eyelids.
- The tears contain secretory IgA and lysozyme, and the conjunctiva possesses numerous lymphocytes, plasma cells, neutrophils, and mast cells, which can respond quickly to infection by inflammation and production of antibody and cytokines.



Blepharitis is an acute or chronic inflammatory disease of the eyelid margin. It can take the form of a localized inflammation in the external margin or a granulomatous reaction to infection and plugging of a sebaceous gland of the eyelid.



 Dacryocystitis is an inflammation of the lacrimal sac. It usually results from partial or complete obstruction within the sac or nasolacrimal duct, where bacteria may be trapped and initiate either an acute or a chronic infection.



• Conjunctivitis is a term used to describe inflammation of the conjunctiva; it may extend to involve the eyelids, cornea (keratitis), or sclera (episcleritis). Extensive disease involving the conjunctiva and cornea is often called keratoconjunctivitis. Progressive keratitis can lead to ulceration, scarring, and blindness. Ophthalmia neonatorum is an acute, sometimes severe, conjunctivitis or keratoconjunctivitis of newborn infants.



• Endophthalmitis is rare, but often leads to blindness even when treated aggressively. The term refers to infection of the aqueous or vitreous humor, usually by bacteria or fungi.



- Uveitis consists of inflammation of the uveal tract—iris, ciliary body, and choroid. Although most inflammations of the iris and ciliary body (iridocyclitis) are not of infectious origin, some agents have been implicated.
- The acute disease may be associated with severe eye pain, redness, and photophobia; The most common infective involvement of the uveal tract is **chorioretinitis**, in which inflammatory infiltrates are seen in the retina; this infection can lead to destruction of the choroid and inflammation of the optic nerve (optic neuritis) and may extend into the vitreous humor to cause endophthalmitis. If the disease is not treated adequately, the end result can be blindness.

ETIOLOGICAL AGENTS

DIAGNOSTIC APPROACHES

- In external bacterial infections of the eye, etiologic diagnoses can usually be established by Gram stain and culture of surface material or, in the case of viral infections, by tissue culture.
- Conjunctival scrapings for *C* trachomatis can be prepared for immunofluorescent or cytologic examination and for appropriate culture.
- Infections of internal sites pose a more difficult problem require indirect methods of diagnosis, such as serologic tests for toxoplasmosis and deep mycoses, blood cultures to demonstrate evidence of disseminated disease (eg, *Candida* sepsis), and efforts to demonstrate infection in other sites (eg, chest radiography and sputum culture to diagnose tuberculosis).
- Careful ophthalmologic examination using slit lamps and retinoscopy often helps suggest specific etiologic agents based on the morphology of the lesions observed.

EAR INFECTIONS

- Most infections of the ear involve the external otic canal (otitis externa) or the middle ear cavity (otitis media), which contains the ossicles and is enclosed by bony structures and the tympanic membrane.
- Factors of importance in the pathogenesis of otitis externa include local trauma, furunculosis, foreign bodies, and excessive moisture, which can lead to maceration of the external ear epithelium (swimmer's ear).
- Occasionally, external otitis occurs as an extension of infection from the middle ear, with purulent drainage through a perforated tympanic membrane.

MANIFESTATIONS

- Otitis externa is characterized by inflammation of the ear canal, with purulent ear drainage. It can be quite painful, and cellulitis can extend into adjacent soft tissues. A common form is associated with swimming in water that may be contaminated with aerobic Gram-negative organisms such as *Pseudomonas* species.
- "Malignant" otitis externa is a considerably more severe form of external ear canal infection that can progress to invasion of cartilage and adjacent bone, sometimes leading to cranial nerve palsy and death. It is seen most frequently in elderly patients with diabetes mellitus and in immunocompromised hosts of any age. *Pseudomonas aeruginosa* is the most common causative pathogen.

MANIFESTATIONS

- Otitis media is arbitrarily classified as acute, chronic, or serous (secretory). Acute otitis media, nearly always caused by bacteria, is often a complication of acute viral upper respiratory illness.
- Fever, irritability, and acute pain are common, and otoscopic examination reveals bulging of the tympanic membrane, poor mobility, and obscuration of normal anatomic landmarks by fluid and inflammatory cells under pressure. In some cases, the tympanic membrane is also acutely inflamed, with blisters (bullae) on its external surface (myringitis). If treated inadequately, the infection can progress to involve adjacent structures such as the mastoid air cells (mastoiditis) or can lead to perforation with spontaneous drainage through the tympanic membrane. Potential acute, suppurative sequelae include extension into the central nervous system (CNS) and sepsis.

DIAGNOSTIC APPROACHES

- The specific cause of otitis externa can be determined by culture of the affected ear canal; however, one must keep in mind that surface contamination and normal skin flora may lead to mixed cultures, which can be confusing.
- In otitis media, the most precise diagnostic method is careful aspiration with a sterile needle through the tympanic membrane after decontamination of the external canal.
- Gram stain and culture of such aspirates are highly reliable; however, this procedure is generally reserved for cases in which etiologic possibilities are extremely varied, as in young infants, or when clinical response to the usual antimicrobial therapy has been inadequate. Respiratory tract cultures, such as those from the nasopharynx, cannot be relied on to provide an etiologic diagnosis.

SINUS INFECTIONS

- The paranasal sinuses (ethmoid, frontal, sphenoid, and maxillary) all communicate with the nasal cavity. In healthy persons, these sinuses are air-filled cavities lined with ciliated epithelium and are normally sterile.
- The pathogenesis of sinus infection can involve several factors, most of which act by producing obstruction or edema of the sinus opening, impeding normal drainage. Consequently, bacterial infection and inflammation of the mucosal lining tissues develop.
- Predisposing factors may be (I) local, such as upper respiratory infections producing edema of antral tissues, mucosal polyps, deviation of the nasal septum, enlarged adenoids, or a tumor or foreign body in the nasal cavity; or (2) systemic, such as allergy, cystic fibrosis, or immunodeficiency. Occasionally, maxillary sinusitis can result from extension of a maxillary dental infection.

MANIFESTATIONS

 Signs and symptoms of sinus infection vary according to which sinuses are affected and whether the illness is acute or chronic. Fever is sometimes present. In addition, nasal or postnasal discharge, daytime cough that may become worse at night, fetid breath, pain over the affected sinus, headache, and tenderness to percussion over the frontal or maxillary sinuses are all features that may appear in different combinations and suggest the diagnosis. Complications of sinusitis can include extension of infection to nearby soft tissues, such as the orbit, and occasionally spread, either directly or via vascular pathways, into the CNS.

DIAGNOSTIC APPROACHES

 If it becomes necessary to determine the specific infectious agent, fluid should be obtained directly from the affected sinus by needle puncture of the sinus wall or by catheterization of the sinus antrum after careful decontamination of the entry site. Gram smears and cultures are then made. Cultures of drainage from the antral orifices or nasal secretions are unreliable because of contaminating aerobic and anaerobic normal flora.