Serious Ocular Infections

Endophthalmitis
Orbital Cellulitis
Preseptal Cellulitis
Endophthalmitis
Endophthalmitis

- Inflammation of one or more coats of the eye and adjacent intraocular spaces.
- Clinically used to describe potentially destructive inflammation in the retina, choroid and adjacent intraocular spaces.
Based on the clinical setting in which the disease occurs, infectious endophthalmitis can be classified into four categories: (1) postoperative--recent and late, (2) related to penetrating ocular trauma, (3) bleb-associated, and (4) endogenous.
ENDOPHTHALMITIS RESULTING FROM PENETRATING OCULAR TRAUMA

- In penetrating ocular trauma an infectious organism, and sometimes multiple microbial species, gain access to the eye at the time of injury. Certain organisms, such as Bacillus species, can be rapidly destructive to the eye, and associated ocular injuries such as retinal tears or detachment result in a generally poor prognosis for endophthalmitis in this clinical setting.
Endophthalmitis in a series of 30,002 intraocular surgical procedures

- Kattan and associates19 reviewed the incidence of hospital-linked postoperative endophthalmitis in a series of 30,002 intraocular surgical procedures between 1984 and 1989. The following incidence of culture-proven endophthalmitis was observed:
  - Extracapsular cataract extraction, with or without intraocular lens implantation--0.072% (17 of 23,625 cases)
  - Pars plana vitrectomy--0.051% (1 of 1974 cases)
  - Penetrating keratoplasty--0.11% (2 of 1783 cases)
  - Secondary intraocular lens--0.30% (3 of 988 cases)
  - Glaucoma-filtering surgery--0.061% (1 of 1632 cases)
Patients with surgically produced filtering blebs for glaucoma, or blebs resulting inadvertently after intraocular surgery, are susceptible to the development of endophthalmitis months or years after surgery.

Although sometimes ruptured, the bleb often appears intact, and presumably the infecting organism enters the eye through the bleb. The potential sources for infection include the normal conjunctival flora, episodes of bacterial conjunctivitis or blepharitis, the use of contact lenses, and possibly contaminated drops or bottle tips.

The diagnosis may be delayed since the ophthalmologist may not suspect an infectious endophthalmitis in patients who have not recently undergone an intraocular procedure.
Bleb-associated endophthalmitis

- Bleb-associated endophthalmitis develops without warning in most patients, with a sudden onset of ocular pain and redness. Although purulent material is often visible within the bleb, the conjunctiva over most blebs appears intact. In a series of 36 cases of late-onset, bleb-associated endophthalmitis, only three blebs were noted to be ruptured, and two additional blebs were not biomicroscopically ruptured but were Seidel positive. Five patients recalled symptoms compatible with a recent episode of conjunctivitis that could be temporally separated from the endophthalmitis; four of these had been empirically treated with topical antibiotics and had symptomatically improved before the development of endophthalmitis. Two patients had upper respiratory tract infections days to weeks before presentation; both subsequently grew Hemophilus influenzae from the intraocular contents. Four patients were wearing contact lenses at the time endophthalmitis developed; three had worn lenses.
Signs and symptoms

- **Symptoms**
  - pain
  - decreased acuity
  - discharge
  - headache
  - red eye
  - photophobia

- Symptoms may include pain, loss of vision, swelling or redness of the eye and discharge following surgery, but some cases may be asymptomatic.
Time Course

- Postoperative endophthalmitis typically presents 2 to 7 days after surgery. Ocular discomfort or pain and reduced vision are the prominent symptoms in most patients. The eye usually shows evidence of eyelid edema, conjunctival hyperemia with chemosis and exudate, a hazy cornea with epithelial and stromal edema, anterior chamber reaction with fibrin exudates and often a hypopyon, and vitreitis. Clinical signs may be delayed or less intense owing to the use of postoperative antibiotics and corticosteroids. When caused by more virulent bacteria the presentation may be explosive. Endophthalmitis caused by less virulent bacteria such as coagulase-negative staphylococci may not manifest for a week or more after surgery.
Signs

- Lid edema
- red eye
- conjunctival chemosis
- cells(AC)
- fibrin
- hypopion
- retrolenticular cells
- diminished red reflex
- vitreous clouding
- "puff balls"

Signs may include injection or chemosis, corneal oedema, flare and cells or frank hypopyon, or fibrin clot in the anterior chamber. A relative afferent defect may be found. Vitreous cells or abscess may be seen but often no view of the posterior segment is possible; sheathing of retinal vessels may occasionally be seen. When the signs are pronounced, the diagnosis is not in doubt, but sometimes only a relatively low-grade inflammation is observed. If these signs cannot be explained, or if there is any doubt, the eye should be treated as if it were infected.
Hypopion
Investigation and Media

- **Management.**
- conjunctival swabs
- AC tap 1/3 positive
- vitreous tap 2/3 - 3/4 positive
- Gram / Giemsa stain - URGENT
- Blood agar (CO2 incubated)
- Chocolate agar
- Sabouraud's, Brain Heart
- Robertson's cooked meat
- Thioglycollate broth
Prophylaxis

- Skin and conjunctival sac preparation with 5% aqueous povidone iodine, at least five minutes before surgery, is safe and effective in significantly reducing ocular surface flora. Instillation of this material into the sac at the end of the procedure may be additionally effective.

- The use of antibiotics in irrigating solutions has been widely condemned and the choice of vancomycin can be especially criticised from a public health stance because resistance to vancomycin has been encountered in MRSA.
Risk factors

- diabetes
- alcoholism
- previous surgery, implants
- sickle cell disease
- yag capsulotomy (propionebacter)
Causes

- Causes
  - Gram positives (90%)
  - Staphs
  - Epidermitis
  - aureus
  - streps
  - pneumoniea
  - viridans
  - pyogenes

- choroinebacterium
- peptostreptococcus
- propionebacterium
- clostridium

- Gram Negatives (7%)
  - Pseudomonas
  - Proteus
  - haemophilus
  - klebsiella
  - E coli
  - enterobacter
Fungi, Opportunists

- *Fungi (3%)*
- Candida
- Aspergillus
- cephalosporium
- penicillium
- paecillomyces

- **Special Cases:**
  - candida 80% of all endogenous endophthalmitis, streptococci
  - 50% of endophthalmitis following filtration surgery (haemophilus and staph also common)

Other causes of endogenous endophthalmitis - neisseria, aspergillus bacilluscereus nocardia. HIV candida and CMV (usually retinitis)
Candida Vitritis
CMV Retinitis

- HIV infection candida and CMV (usually retinitis)
Post Surgical Organisms

- Gram-positive bacteria accounted for 76%. The single most common isolate was Staphylococcus epidermidis (24 cases), accounting for 38% of all isolates, and one of every two gram-positive infections. Staphylococcus aureus was the second most common isolate, cultured from 13 eyes (21%) and Streptococcus species were cultured from 7 eyes. Coagulase-negative staphylococci, including predominantly S. epidermidis, have been found to be the most common organism isolated in other series of postoperative endophthalmitis as well.
During the past decade a syndrome of chronic, indolent intraocular inflammation after extracapsular cataract extraction and posterior chamber lens implantation has been characterized by a smoldering presentation of 1 to 12 months or more, with chronic iridocyclitis, granulomatous-appearing keratic precipitates, hypopyon, and a white plaque on the posterior capsule or intraocular lens due to Propionibacterium
Single-port vitreous biopsy

- In all cases, where the acuity is better than light perception, a single-port vitreous biopsy via the pars plana should be performed using a vitreous cutting-suction device. (Disposable devices are now available which allow the procedure to be done outside the operating theatre if necessary with even less delay. This can be useful in outreach clinics). The specimens are directly smeared, for Gram stain etc, and plated for culture.
Intravitreal injection of antibiotics

- The space created by the biopsy is sufficient for direct intravitreal injection of antibiotics. In the EVS, amikacin and vancomycin were used. Gentamicin and cefuroxime would have supplied virtually the same degree of broad spectrum cover. The study showed that there was no advantage in the concurrent administration of intravenous antibiotics.
Intravitreal Antibiotics

- gentamicin 0.1 - 0.2 mg in 0.1 ml
- dexamethasone 0.4 mg
- amphotericin 0.01 mg
- methicillin 2mg
- chloramphenicol sodium succinate 2mg
- cephazolin 2mg
- miconazole 0.01mg
- carbenicillin 2mg
Intravitreal Drugs

The intravitreal dose is given in 0.1ml except when combination therapy is used and 0.2ml are given. In emergencies it may be necessary to prepare drugs for intravitreal injection without the assistance of the pharmacist. Avoid solutions or preparations containing preservatives.

The quantities for intravitreal injection may be drawn up in 1ml syringes, and injected with a 25 or 27 gauge needle. Make sure to fill the dead space with antibiotic solution.
The Endophthalmitis Vitrectomy Study (EVS)

- To date, there has only been one large prospective randomised study on the management of endophthalmitis. The Endophthalmitis Vitrectomy Study (EVS), recently completed in the USA, has greatly simplified our approach to treatment, which should begin immediately diagnosis is made.

Vitrectomy

- Only when the visual acuity is perception of light is there an advantage in performing a formal three port vitrectomy, from the point of view of both final acuity and media clarity. Intensive topical antibiotics are not required, unless there are specific wound-related problems or co-existing microbial keratitis.
Vitrectomy

- Vitrectomy in those patients who present with an advanced stage of the disease and in most patients who have bleb-associated or trauma-related endophthalmitis. For patients with less advanced inflammation, treat with intraocular, systemic, periocular, and topical antibiotics.

- If improvement is not apparent within 36 to 48 hours, or if highly virulent organisms are isolated, then therapeutic vitrectomy is performed. At the completion of the vitrectomy procedure, intraocular antibiotics are injected.
Steroids, Repeat Biopsy

- The EVS did not address the specific question of intravitreal steroids and to date their use remains unsubstantiated. In general terms, high dose systemic prednisolone may be given eg 60-80mgs daily, rapidly reducing to zero over a week to 10 days. Steroids are contraindicated if there is a fungal infection. If the clinical course warrants it, the biopsy and intravitreal antibiotic injection may be repeated after 48 to 72 hours. This may allow review of the choice of antibiotic in light of the culture results as well as the clinical progress.
Gentamicin

- 200µg in 0.1ml
  1. Take 0.5ml from a vial of gentamicin containing 40mg/ml
  2. Make up to 10mls with normal saline or balanced salt solution (BSS) in a syringe.
  3. 0.1ml of this solution = 200µg

- NB Minims of gentamicin are unpreserved and contain 3000µg per ml. These may be used.
Cefuroxime or Vancomycin

1000µg in 0.1ml

1. Reconstitute a 250mg vial with 8mls of saline or BSS
2. Withdraw entire contents and make up to 10mls with saline or BSS
3. Inject 2mls back into vial and make up to 5mls in the vial with saline or BSS
4. 0.1ml of this solution - 1mg (1000µg)
Amikacin

- 0.4mg in 0.1ml
  1. Reconstitute one vial - 500mg - and make up to 10ml with BSS
  2. Withdraw 0.8ml (using 1ml syringe) and make up to 10ml with BSS
  3. Withdraw 0.1ml of this - 0.4mg
No study to date has effectively looked at the question of antibiotic prophylaxis. Proper pre-assessment of the patient, identifying and treating risk factors such as blepharitis, mucocoele of the lacrimal sac, or conjunctivitis is probably more useful than blunderbuss prophylaxis.
Trauma

- Active prophylaxis by intravitreal injection of antibiotics after repair of penetrating trauma is probably beneficial. The EVS did not consider the management of endophthalmitis developing other than post-operatively. It may be reasonable, however, to adopt a similar approach to management in these other cases but no firm guidelines can be given.
Orbital Cellulitis
Infection of the orbit

- Orbital and periorbital infections are the most common causes of acute orbital inflammation and are distinguished clinically by anatomic location. Preseptal cellulitis and periorbital cellulitis are synonymous terms that refer to superficial spreading cellulitis without associated spread to the postseptal tissues. Orbital cellulitis, in contrast, is an infection of the postseptal orbital tissues sometimes associated with superficial spreading cellulitis.
Orbital cellulitis

- Usually arises from spread of infection from the paranasal sinuses. Orbital involvement occurs in 0.5% to 3% of patients with acute sinusitis. In a large series of patients with orbital cellulitis, sinusitis was responsible for orbital infection in 75% to 85% of cases.

- The ethmoidal sinus is believed to be the most commonly implicated sinus in infection that spreads to the orbit in children; the frontal and sphenoidal sinuses do not develop until age. In adults, pansinusitis is often associated with orbital cellulitis and spread is believed to occur through the ethmoidal or frontal sinuses.
Preseptal cellulitis

- Preseptal cellulitis can occur in two separate clinical settings. It usually presents in a child younger than the age of 36 months with a history of antecedent upper respiratory tract infection, otitis media, and bacteremia and is usually due to infection with Hemophilus influenzae type B.

- Alternatively, preseptal cellulitis can arise from spread of a contiguous anterior eyelid infection such as a chalazion, from local trauma resulting in infection such as an insect bite, or from a foreign body.
Causes

- All orbital cellulitis resulting from sinus disease, however, is not secondary to acute sinusitis. Orbital fracture can spread existing chronic sinus infection into the orbit. Mucoceles, slowly enlarging mucus-filled cysts within the sinuses that enlarge by pressure erosion of adjacent orbital and intracranial structures, can become infected and result in mucopyocele that cause both cellulitis and abscess formation.
CAUSES

- LOCAL SPREAD
- Sinusitis (ethmoidal, maxillary, frontal), preseptal cellulitis, endophthalmitis, dental sepsis
- POST TRAUMA, SURGERY
- HAEMATOGENOUS
Common in children and young adults.

- In Schramm's series of 303 cases of orbital cellulitis, 68% of patients were younger than age 9 years and only 17% were older than age 15 years.
- Interestingly, there seems to be an unexplained preponderance of left-sided orbital infections as compared with right-sided infections.
In the preantibiotic era, Gamble reported a mortality rate of 17% in patients with orbital cellulitis. An additional 20% of survivors had loss of vision. Even now, with the ubiquitous use of modern imaging techniques and new antibiotics, the relative ease and rapidity of spread of contiguous infection to the cavernous sinus and the brain renders complications associated with misdiagnosis or inappropriate therapy life threatening.
Anatomical Considerations

- In addition to anatomic proximity, several other factors predispose the orbit to the spread of contiguous sinus infection. Dehiscences are often present in the orbital walls, particularly in the thin-walled lamina papyracea. As a consequence, pus or transudate may rupture through the thin-walled lamina into the orbit and result in subperiosteal abscess formation. This theoretical mechanism is consistent with the observation that most abscesses occur in the medial orbit, adjacent to the ethmoidal sinuses. Posteriorly, the optic nerve within the optic canal is adjacent to the lateral wall of the sphenoidal sinus. Dehiscences can also be present in the lateral wall of the sphenoidal sinus along the optic canal, in approximately 6% of cases.
Another factor predisposing the orbit to spread of sinus infection is the free vascular communication between the orbit and the sinuses. The orbital veins are valveless, and flow occurs in either direction through the anterior and posterior ethmoidal foramina. Increased pressure within the sinuses caused by obstruction to mucus outflow in sinusitis may hamper venous drainage and manifest as the eyelid edema that accompanies acute sinus inflammation. Septic thrombophlebitis can also occur within these vessels and thus allows bacterial spread into the orbit.
Optic neuropathy-

- Optic neuropathy, with the associated pupillary finding of a relative afferent pupillary defect and optic nerve head findings such as optic disc edema, may be observed. As orbital pressure increases, patients can show signs of retinal and choroidal arterial and venous stasis with congestion and a picture resembling chronic vein occlusion or central retinal artery occlusion.
COMMON PATHOGENIC ORGANISMS

- Staphylococcus aureus
- Streptococcus pneumoniae
- Haemophilus influenzae
- Streptococcus pyogenes
CLINICAL SIGNS

- Headache, fever, rhinorrhea
- Proptosis, chemosis, ophthalmoplegia
- Increased IOP, decreased VA
Presentation

- Orbital cellulitis presents as pain, proptosis, globe displacement, double vision, and/or vision loss. Patients will often have accompanying headache and malaise. In children fever occurs with equal incidence as in preseptal cellulitis (62%), while in adults it may be absent 66% of the time.
DIFFERENTIAL DIAGNOSIS

- BoneSinus/ orbital mucoceleEosinophilic granuloma (multifocal)?
- VesselsCapillary hemangiomaVarixTraumatic hematomaLymphangioma
- Immune / lymphoproliferativeInflammatory pseudotumorPosterior scleritisLeukaemia
- DevelopmentalDermoid cystMeningoencephaloceleMicrophthalmos with cyst
- TumoursNeuroblastomaOptic nerve gliomaMeningiomaBurkitt’s lymphomaTeratomaNeurofibromaRhabdomyosarcomaRetinoblastomaJuvenile xanthogranuloma
TREATMENT

- Admission, paediatricians
- ENT, ORBITAL SURGEON-may need decompression or drainage of sinuses
- IVI ceftriaxone etc.
- Control IOP, nasal decongestant, humidification
Complications of Orbital Cellulitis

- Subperiosteal abscess / orbital abscess
- Loss of vision (exposure keratitis, neurotrophic keratitis, glaucoma, vascular occlusion, optic neuritis, compressive optic neuropathy)
- Septicaemia
- Meningitis
- Cavernous sinus thrombosis causes increasing pain and proptosis, III, IV, VI palsies.
- May cause permanent brain damage
Subperiosteal abscess formation

- Subperiosteal abscess formation is most often diagnosed on neuroimaging and is indistinguishable clinically from orbital cellulitis. Signs of an abscess include displacement of the globe away from the affected sinus and limitation of abduction and adduction
Cavernous sinus thrombosis

- If infection spreads posteriorly through the superior orbital fissure to involve the cavernous sinus, additional signs may supervene. Signs of cavernous sinus thrombosis include headache, ipsilateral hypesthesia from involvement of the ophthalmic and maxillary division of the trigeminal nerve; third, fourth, and sixth cranial nerve palsies; and mental status changes from confusion to obtundation. The contralateral side may develop cranial nerve signs, periorbital edema, or cellulitis
LABORATORY AND IMAGING STUDIES

- Computed tomography (CT), in all patients who present with orbital infections.
- Obtain at least two sets of blood cultures.
- Culture the nasopharynx, although this may not yield significant information unless a predominant organism is present. Cultures of the conjunctiva and sinuses are performed in selected cases; cultures of the leading edge of the cellulitis are performed if there is an obvious sign of an entry wound responsible for the cellulitis. Cerebrospinal fluid culture is obtained if the patient shows central nervous system signs or bilateral disease. FBC.
INVESTIGATION

- CT orbits and paranasal sinuses
- Culture nasal discharge
- Culture blood
Ultrasound

- Ultrasound has higher resolution (0.1 mm) when compared with CT (0.8 mm) but adds little clinically significant information because ultrasound misses the posterior third of the orbit and does not image the bone and sinuses. Ultrasound in orbital cellulitis, however, may be useful in ruling out orbital myositis, in determining the location of orbital foreign bodies or abscesses, and in following patients with drained orbital abscesses to rule out reaccumulation.

- Ultrasound findings in subperiosteal abscess can include a signal of low or medium reflectivity adjacent to the involved orbital wall. If the abscess is intraconal, a low reflective signal will be encountered within the cone, the muscles may be thinned as they are placed on stretch, the sclera may be thickened, or a T sign, usually associated with orbital pseudotumor, may be seen. Ultrasound is not helpful in distinguishing inflammatory transudate from infectious exudate or hemorrhage.
NEURORADIOGRAPHIC STUDIES

- CT should be performed using thin-section (2-4 mm) high-resolution scanning with multiple views of both bone and soft tissue detail. Intravenous contrast material is not advocated at all centers since there is intrinsically high contrast between infectious changes and orbital fat. Some authors believe, however, that it is essential to the diagnosis, and it thus remains the option of the neuroradiologist, as well as the treating clinician.
NEURORADIOGRAPHIC STUDIES

- CT allows the clinician to differentiate a preseptal cellulitis from an orbital cellulitis. If orbital cellulitis has resulted from adjacent intercurrent sinus infection, the diagnosis can be made and the extent of the sinus disease estimated. Sinuses may show changes of osteomyelitis with blurring of the osseous margins of the sinuses, air-fluid levels, or inflammatory tissue within the normally aerated sinus. Central nervous system complications can be assessed by neuroimaging, and progression of disease can also be monitored.
CT can demonstrate intracranial involvement such as epidural or cerebral abscess, which is better appreciated on coronal imaging.

The importance of coronal sections on CT of abscesses has been emphasized; in one series, one third of abscesses were seen only on coronal sections.
Magnetic resonance imaging (MRI)

- Magnetic resonance imaging (MRI) is said to be more useful than CT in the diagnosis of preseptal cellulitis but less reliable at diagnosing the subtle signs of muscle enlargement and periscleritis. On MRI with gadolinium, orbital cellulitis may show a smearing or linear streaking of the normal fat shadows on T2-weighted images. MRI is excellent for demonstrating localized fluid collections such as abscesses. It is not helpful in distinguishing a transudate from an exudate, since both will appear liquid and will be of low intensity on T1-weighted images and bright on T2-weighted images.
MRI in the diagnosis of cavernous sinus thrombosis

- MRI is superior to CT in the diagnosis of cavernous sinus thrombosis. T2- and proton-weighted images will show high signal luminal narrowing as well as absent flow or localized parenchymal infarcts.

- Absent flow can be demonstrated as well in the superior ophthalmic vein in cases of carotid thrombosis. MRI with gadolinium can also define these abnormalities and can detect dural invasion.
Microbiology- Children

- In children with preseptal cellulitis younger than age 4, the most common organism observed is H. influenzae. In children older than age 4 with preseptal infections, Streptococcus pneumoniae, Staphylococcus aureus, S. epidermidis, and mixed anaerobic and aerobic flora predominate. Anaerobic organisms include Peptostreptococcus, Fusobacterium nucleatum, and Bacteroides species.

- In children with orbital cellulitis, the preponderant organisms isolated by sinus aspiration are S. aureus, Streptococcus species, and anaerobic species.
Microbiology adults

- In adults, S. aureus, Escherichia coli, S. pneumoniae, and mixed flora including anaerobes are the most common organisms responsible for orbital cellulitis.

- It must be noted, however, that sino-orbital infections do not always respect these guidelines and orbital cellulitis with a potpourri of organisms has been described in case reports and series including Enterococcus, Echinococcus granulosus, Pseudomonas aeruginosa, Klebsiella species, E. coli., Treponema pallidum, Eikenella corrodens, Actinomyces, Mycobacterium tuberculosis, and M. avium.
Bacteremia tends to occur in a younger age group.

- Bacteremia tends to occur in a younger age group and in patients who have not yet had antibiotic treatment at the time of blood culture. In one series, bacteremia was present in 5% of adult patients with orbital cellulitis and in 33% of children younger than the age of 4. Other studies show an increased incidence of sepsis in children younger than age 2. As expected, H. influenzae is most commonly seen in children younger than age 4 and is rare after that age. Children younger than age 4 have impaired humoral immunity to bacteria with polysaccharide capsules such as H. influenzae and Streptococcus species, and thus disseminated infections with these organisms may be seen more commonly in this age group.

- Concern about infection with Hemophilus may have diminished because of the Hemophilus b Conjugate Vaccine.
Antibiotics

- The appropriate antibiotic choice should be made in consultation with the internist or pediatrician, whose help will also be invaluable in determining the presence or absence of other systemic findings, in guiding fluid and electrolyte therapy, and in the management of any other concomitant medical problems. The duration of treatment depends on response: patients should be treated with parenteral antibiotics until they show clear evidence of clinical improvement as manifested by a decrease in orbital congestive signs such as proptosis, gaze limitation, cellulitis, and edema. Intravenous therapy should continue for a minimum of 3 days. Oral antibiotic therapy may then be instituted for a total course of 10 days to 3 weeks, depending on the severity of infection. Associated bacteremia, however, should be treated with 7 to 10 days of intravenous therapy.
Cefuroxime

- Cefuroxime, a second-generation cephalosporin, covers most staphylococci and H. influenzae. Certain strains of Enterococcus faecalis, Serratia, Proteus vulgaris, C. difficile, and Bacteroides fragilis are not susceptible to the drug. The dosage in children is 75 to 150 mg/kg/day in three divided doses.
Cefotaxime

- Cefotaxime, a third-generation cephalosporin that covers all the most common sinus pathogens with the exception of Clostridium difficile, can be given in a dosage of 80 to 120 mg/kg/day in four divided doses.
Ceftriaxone,

- Alternatively, ceftriaxone, 1 to 2 g/day, can be given and is effective against penicillinase-producing S. aureus, most gram-positive organisms, and most gram-negative organisms except for Pseudomonas. Ceftriaxone also crosses the blood-brain barrier and is therefore an excellent choice if there is suspicion of intracurrent intracranial infection.
Cefuroxime

- In adults who present with orbital cellulitis, cefuroxime in the dose of 750 mg to 1.5 g every 8 hours. It is effective against most gram-positive and gram-negative organisms except Pseudomonas.
Suspected MRSA

In patients who are frequently hospitalized, in whom an infection with methicillin-resistant staphylococci is a possibility, vancomycin, in a dose of 500 mg given intravenously every 6 hours, and cefuroxime can be employed. This combination of antibiotics will effectively cover most organisms, including methicillin-resistant Staphylococcus as well as H. influenzae.
Follow-up

- Careful follow-up is indicated in all patients. This should include twice-daily examinations with attention to visual acuity, confrontation visual fields, exophthalmometry, motility, and pupillary examinations. Patients may not respond to the antibiotic regimen chosen for them because they have an abscess or a foreign body, because they are infected with a resistant organism, because they have an infection with an atypical organism such as Mycobacterium tuberculosis or fungus, or if they have an inflammatory tumor rather than an infection.
Surgical Intervention

- The indications for surgery in orbital cellulitis include suspicion of orbital abscess or foreign body, progression of visual loss, and extraocular motility deficit, or worsening proptosis despite appropriate medical therapy after a 24- to 48-hour period. The orbit should be explored to obtain Gram stains and acid-fast stains and anaerobic, aerobic, and fungal cultures. Both fresh and formalinized tissue should also be obtained if an inflammatory orbital tumor is part of the differential diagnosis or if fungal invasion must be ruled out.
Timing for surgical intervention is critical!

- Timing for surgical intervention is critical. In cases of orbital cellulitis without abscess formation, in which visual acuity is 6/15 or less, or declines with appropriate medical management, orbital exploration should be emergent. In cases in which the acuity is better than 6/18, the patient should be followed serially, expectantly, and frequently while more conservative management is initiated.
Subperiosteal abscess

- Most frequently a subperiosteal abscess can be approached and drained extraperiosteally without entering the orbit directly, usually in conjunction with an external procedure on the involved sinus, such as an external ethmoidectomy, antral lavage, or frontal sinusotomy, depending on the sinus thought to be responsible for the orbital infection. A nasal sinusotomy can be performed to facilitate drainage of the sinus. A drain may be placed to drain the involved sinus and/or the orbit and can be brought out either through the surgical wound or the nose and can be left in place and advanced on a daily basis. It may not always be necessary, however, to drain a subperiosteal abscess externally: restoration of drainage of the infected sinus can be accomplished endoscopically, and often this drains the subperiosteal abscess.
Multiple complications of orbital cellulitis can occur despite a high incidence of clinical suspicion, improved imaging techniques, and improved intravenous antibiotics. Most commonly, inadequately treated orbital infections can progress (e.g., orbital cellulitis can proceed to abscess formation).

Loss of vision can occur and may be from optic neuritis, from thromboembolic lesions to the vascular supply of the optic nerve, retina, or choroid, from rapid and sustained intraocular pressure elevation, or, rarely, from massive proptosis, which may mechanically distort the optic nerve. If light perception is lost, blindness may be irreversible. However, vision has been restored in some cases with emergent surgical treatment, and thus these patients must be diagnosed and managed expediently.
FUNGAL INFECTIONS OF THE ORBIT

- ASPERGILLOSIS

- Aspergillus is a fungus of the Ascomycetes class that is an ubiquitous organism that colonizes both the respiratory and gastrointestinal tracts. It rarely causes infection except in the immunocompromised host.
Mucormycosis is a fungal infection with the organisms from the genera Mucor, Absidia, and Rhizopus that are normally present in air, soil, vegetable matter, skin body orifices, manure, and bread mold. Most patients who develop mucormycosis have a predisposing systemic disease: most typically the infection occurs in the diabetic patient with ketoacidosis, but it can occur in patients with renal failure, with gastroenteritis, or in those who are immunosuppressed.
Treatment for aspergillosis

- The treatment for aspergillosis in the immunosuppressed patient is both medical and surgical, with antifungal agents (usually amphotericin B) and radical debridement and sinus surgery. Flucytosine and rifampin with amphotericin B may be more effective than amphotericin alone.

- Conservative debridement, intravenous amphotericin, and local amphotericin irrigation have been described as an alternative to radical surgery.

- Five milliliters of amphotericin B is placed in sterile water, creating a concentration of 0.25 mg/ml. Irrigation is performed two times a day directly into the orbit through a site of entry into the orbit or the sinus.