CHAPTER 13

EYE DISEASES

STYE (HORDEOLUM EXTERNUM)

Acute suppurative inflammation of lash follicle and its associated glands of Zeis or Moll caused by *Staphylococcus aureus* presenting as painful swelling at the base of cilia.

Treatment

Nonpharmacological

Hot fomentation and epilation of infected cilia 2-3 on either side.

Surgical treatment

Nick the pustule using sharp tip of a needle and blade and express the purulent material. Do not attempt squeezing.

Pharmacological

1. Topical antibiotics:
   Gentamicin 0.3% eyedrops 1 drop 6 hourly.
   Or
   Ciprofloxacin 0.3% eyedrops 6 hourly.
   Or
   Ciprofloxacin eye ointment 2 times a day.
2. Systemic antibiotics, if excessive oedema or cellulitis.
   Tab. Roxithromycin 150 mg 2 times a day for 5-7 days.
   Or
   Cap. Amoxycillin 250-500 mg every 8 hours for 5-7 days.
3. Tab. Ibuprofen 400 mg 3 times a day after meals.
   Exclude refractive error and diabetes mellitus and chronic blepharitis in recurrent cases.

Patient education

- Avoid rubbing of eyelids with dirty hands.
- Use glasses for refractive errors.
- Maintain proper ocular hygiene to prevent recurrence.

Reference

1. Lid Inflammations. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 625-635.

CHALAZION

It is a chronic inflammatory lipogranuloma of Meibomian glands presenting as solitary or multiple nodular swelling of tarsal plate.

Treatment

Nonpharmacological

Warm compresses for 4 weeks may relieve small chalazia of short duration.

Pharmacological

Tiny chalazia may be ignored.

Topical antibiotic as above.

Surgical treatment

For small chalazia, intralesional Triamcinolone (40 mg/ml)–inject 0.05 to 0.2 ml from the conjunctival side after local anaesthesia or from skin side. Repeated after 2-4 weeks, if no resolution.

For large chalazia (>6 mm) or those who present for more than 3-4 months duration, incision and curettage.

Recurrent and hard chalazia in elderly—excisional biopsy.

Patient education

- The condition may recur at the same site or different site, involving any eyelid.
- Some of the common causes of recurrences are uncorrected refractive error, blepharitis and diabetes. Recurrence of chalazia at the same site may be harbouring malignant disease.
- Intralesional triamcinolone can cause steroid-induced glaucoma and hypopigmentation of skin.

Reference

1. Lid Inflammations. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 625-635.

VITAMIN A DEFICIENCY (XEROPHTHALMIA)

Xerophthalmia is characterized by night blindness, epithelial conjunctival xerosis, Bitot's spots and, keratomalacia and fundus changes in severe cases.

Treatment

Pharmacological

1. (a) Cap of Vitamin A (Vitamin A) should be administered immediately on diagnosis as mentioned below:
   - <6 months of age: Three doses of oral Vitamin A 50,000 IU each immediately on diagnosis, the next day and at least 2 weeks later.
   - 6-12 months of age: Three doses of oral Vitamin A 100,000 IU immediately on diagnosis, the next day and at least two weeks later.
   - >12 months of age: Three doses of oral Vitamin A 200,000 IU each immediately on diagnosis, the next day and at least 2 weeks later.
   - Women of reproductive age with night blindness or Bitot's spots: <10,000 IU Vitamin A daily or weekly dose of <25,000 IU.
   - Women of reproductive age whether or not pregnant with severe signs of active xerophthalmia (acute corneal lesions): Three doses of oral Vitamin A 200,000 IU each immediately on diagnosis, the next day and at least 2 weeks later.

   (b) Water miscible Vitamin A preparation (dose is half of oral dose) is given IM for children suffering from persistent vomiting, severe diarrhoea and intestinal parasites. If there is gross purulent discharge due to bacterial superinfection in keratomalacia.
2. Gentamicin/Tobramycin eyedrops 14 mg/ml drops hourly.
3. Cefazolin 50 mg/ml eyedrops 1 hourly till infection resolves. If corneal ulcer present (see section on Corneal Ulcer).

Patient education

- Regular consumption of Vitamin A rich foods particularly fresh dark green leafy vegetables which constitute very rich and cheap sources of Vitamin A.
- Pregnant women and lactating mothers should also consume Vitamin A rich diet regularly.
- Breastfeeding including feeding of newborn with rich colostrum.
- High dose universal distribution schedule for prevention of Vitamin A deficiency.
  - Infants <6 months of age.
  - Non-breastfed infants—50,000 IU orally.
  - Breastfed infants whose mothers did not receive supplemental Vitamin A–50,000 IU orally.
  - Infants 6-12 months of age—100,000 IU orally.
  - Children >12 months—200,000 IU orally every 4-6 months till 5 years of age.
  - Mothers—200,000 IU orally within 8 weeks of delivery.
- Excessive consumption of Vitamin A can cause hypervitaminosis A.

Reference

1. Nutritional Blindness. In: Principles and Practice of Ophthalmology Vol 1-6, 3rd Edition, WB Saunders Co., 2008; pp. 4579-4585.

RED EYE

This is a common condition. It is divided into non-painful and painful red eye.

NON-PAINFUL RED EYE

Non-painful red eye is caused by conjunctivitis, lid abnormalities, e.g. trichiasis, entropion, blepharitis, meibomitis, ectropion, lagophthalmos, molluscum contagiosum, episcleritis, subconjunctival haemorrhage, inflamed pinguecula and pterygium. Painful red eye is caused by acute attack of primary angle closure glaucoma, phacomorphic glaucoma, corneal ulcer/keratitis, acute anterior uveitis, scleritis and endophthalmitis; may be associated with circumcorneal congestion (ciliary injection).

Conjunctivitis may be classified into:

I. Infective conjunctivitis caused by bacterial, chlamydial or viral microorganisms.
II. Allergic conjunctivitis.

I. Infective Conjunctivitis

A. Bacterial conjunctivitis

Bacterial conjunctivitis manifests as acute mucopurulent, purulent, angular and membranous conjunctivitis.

Acute mucopurulent conjunctivitis

Common aetiological microorganisms are *Staphylococcus aureus*, *Haemophilus aegyptius* (Koch-Week's bacillus), *Streptococcus pneumoniae*, *Streptococcus viridans* and *pyogenes*.

SALIENT FEATURES

- Unilateral or bilateral red eye, conjunctival congestion, mucopurulent or purulent discharge, stickiness of eyelids, matting of cilia; no photophobia in uncomplicated cases.
- Cornea, pupil and visual acuity are normal, however, in case of corneal involvement—pain, photophobia and circumcorneal congestion.

Nonpharmacological treatment

Do not patch or bandage the eye; use dark glasses to prevent photophobia; maintain good personal and ocular hygiene. Clean the eye with plain water 3-4 times a day or irrigate conjunctiva with sterile normal saline twice a day. Patient's towel, handkerchief or other fomites should not be shared.

Pharmacological

1. Eyedrops Gentamicin 0.3% eyedrops or Ciprofloxacin 0.3% or Chloramphenicol 0.5 to 1% eyedrops 1 drop every 2-3 hourly during day time and Gentamicin or Ciprofloxacin eye ointment instilled in inferior fornix at bedtime for 5-7 days.

2. If there is evidence of cellulitis or fever, treat accordingly (see section on Cellulitis and Orbital Cellulitis).
   (**Caution**: Corticosteroid drops are contraindicated.)

If there is no response to empirical therapy after 7 days, stop all antibiotics and conjunctival scrapping should be obtained for Gram's stain and culture and sensitivity studies. Appropriate antibiotic should be selected based on culture sensitivity reports.

Acute purulent bacterial conjunctivitis

Acute purulent conjunctivitis can affect newborn babies, adolescents and adults. The most fulminant form of purulent conjunctivitis occurs due to *N. gonorrhoeae*. It is characterized by severe lid oedema, erythema, chemosis, thick purulent discharge, preauricular lymphadenopathy and frequent corneal involvement.

Ophthalmia Neonatorum

It is also called conjunctivitis of the newborn, neonatal conjunctivitis and occurs during the first 28 days of life. It may be due to gonococcal or nongonococcal bacteria. In the later type, Herpes simplex II is the aetiological agent in 80% of the cases. The infection is acquired from the maternal birth canal.

SALIENT FEATURES

- Complications like corneal blindness, cataract, nystagmus, endophthalmitis or panophthalmitis and metastatic stomatitis and arthritis can occur.

Treatment

Nonpharmacological

Irrigate conjunctival sac with warm normal saline before antibiotic instillation, wipe away the discharge with moistened cotton wool.

Pharmacological (gonococcal ophthalmia neonatorum)

1. Crystalline Benzyl penicillin aqueous solution 10,000 to 20,000 U/ml (mix 5-10 ml of distilled water in a vial containing 5 lacs units of Penicillin G) instilled 1 drop every hour for 6 to 12 days and then 1 drop every 2-3 hours till the infection is resolved.
   Or
   Tobramycin 0.3% eyedrops every two hourly for 10 days.
   Or
   Gentamicin 0.3% eyedrops at every one hour interval.
   Or
   Ciprofloxacin 0.3% eyedrops every hour and 0.3% eye ointment at night.
2. If corneal involvement (see section on Corneal Ulcer).

3. Systemic treatment in full term babies with normal birth weight after sensitivity testing.
   Inj. Procaine Penicillin G 4.8 million units in 2 divided doses IM for 7 days. In preterm low birth weight babies,
   Inj. Procaine Penicillin G 20,000 units/kg/day 2-3 divided doses IM or IV for 3 days.
   Or
   Inj. Ceftriaxone 125 mg as a single IM dose (for penicillin allergic patients).
   Or
   Inj. Cefotaxime 100 mg/kg IM as a single injection.
4. Also treat mother with systemic therapy.
5. Treat chlamydial infection simultaneously as it may also coexist.

Pharmacological (non-gonococcal neonatorum)

This is a milder disease occurring within 5-14 days after birth. It is caused by chlamydial, bacterial or herpetic infection.

1. Ciprofloxacin 0.3% eyedrops 1 drop every 2-4 hours and 0.3% eye ointment at night for 2 weeks.
   Or
   Gentamicin 0.3% eyedrops every 1 drop 2-4 hours and eye ointment at night for 2 weeks.
2. If evidence of systemic involvement:
   Syr. Erythromycin 50 mg/kg/day in 4 divided doses for 14 days.
   If extensive conjunctival or corneal involvement, also treat the parents, primarily mother. If no response after 1 week of therapy, refer for an appropriate culture and sensitivity testing to a tertiary care level.

Antenatal care

Prophylaxis. Screening of high-risk pregnant women (pregnant women with vaginal discharge, dysuria, STI such as syphilis, genital herpes, etc.; multiple sexual partners, sexual contact with a partner with an unspecified STI) and treatment of maternal urogenital infections during pregnancy and sexual partner.

Pharmacological treatment (gonorrhoea in pregnant women)

1. Inj. Procaine penicillin 4.8 million IV/IM with 1 g oral probenecid.
2. In Penicillin-resistant cases, Inj. Spectinomycin 4 g in 2 divided doses IM single injection in gluteal region.

Pharmacological treatment (chlamydial urogenital infection in pregnant women)

Tab. Roxithromycin 150 mg 2 times a day orally for 2 weeks (esteolate salt is contraindicated).
   Or

Cap. Amoxycillin 500 mg orally 3 times a day for 7 days (in late pregnancy Erythromycin is preferred).

Intranatal care. Meticulous aseptic precautions during delivery.

Postnatal care. Careful cleaning of closed eyelids immediately after birth.

Povidone - Iodine 2.5% in both eyes 1 drop within 20 minutes of birth.

Or

Tetracycline hydrochloride 1% eye ointment Or Silver nitrate 1% solution Or Gentamicin 0.3% eyedrops and ointment Or Norfloxacin 0.3% eyedrops and eye ointment Or Ciprofloxacin 0.3% eyedrops and ointment application after cleaning the eye. Suspect ophthalmia neonatorum, if there is any mucopurulent discharge from the eyes during first week.

References

1. Bacterial Chlamydial and Mycobacterial Infections. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 705-713.
2. Ophthalmic Drug Facts. Facts and Comparisons: A Wolters Kliewer Company, St. Louis, Missouri, 2005; pp. 343-346.

B. Chlamydial Conjunctivitis - Trachoma

Trachoma is a chronic bilateral cicatrizing follicular keratoconjunctivitis caused by *Chlamydia trachomatis* and is the leading cause of preventable blindness worldwide.

SALIENT FEATURES

- Presence of at least two of the following signs: superior tarsal follicles, limbal follicles (Herbert's pits), typical conjunctival scarring and vascular pannus. Diagnosis is confirmed by conjunctival cytology.

Treatment

Pharmacological

Key to treatment is SAFE (Surgery for entropion/trichiasis, antibiotics, facial cleanliness, and environment change such as control of disease-spreading flies and access to clean water) strategy developed by the WHO.

1. Cap Azithromycin 1 g single dose in adults
   In children: 20 mg/kg single dose
   Alternatively following can be given:
   Tab. Roxithromycin 150 mg 2 times a day for 7 days.
   In children: 5.8 mg/kg in 2 divided doses.
   Or
   Cap. Doxycycline 100 mg 2 times a day for two weeks.
   (**Caution**: Contraindicated in children, pregnant women and nursing mothers).
   Or

Tab. Sulfamethoxazole 400 mg + Trimethoprim 80 mg 2 tablets twice daily for 3 weeks.
In children 6-12 years: half the above dosage for 3 weeks.
And/Or
Tetracycline 1% eye ointment at night for 6 weeks.
Or
Sulfacetamide 10-20% eyedrops 3-4 times for 6 weeks.
Or
Ciprofloxacin 0.3% ophthalmic solution 4 times a day and Ciprofloxacin 0.3% eye ointment at night for 8 weeks.

Surgical treatment

Eyelid surgery for correction of trichiasis and entropion to prevent corneal blindness.

Patient education

- Treat the whole family even if only one child has active trachoma.
- Improve ocular hygiene—facial cleanliness in children.
- Environmental improvement—eliminate flies, provision of adequate running water supply and latrines, etc.

References

1. Bacterial Chlamydial and Mycobacterial Infections. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 705-713.
2. The SAFE Strategy for Trachoma Control: using Operational Research for Policy and Implementation. WHO Bulletin. 2006; 84: 589-684.

C. Viral Conjunctivitis

Viral conjunctivitis often occurs in epidemics. It includes following entities: epidemic keratoconjunctivitis, pharyngoconjunctival fever, acute haemorrhagic conjunctivitis and Newcastle conjunctivitis.

SALIENT FEATURES

- Conjunctival congestion, chemosis, watery discharge, conjunctival haemorrhages, preauricular lymphadenopathy and swollen lids; vision is unaffected; photophobia is uncommon.

Treatment

Nonpharmacological

Avoid patching, use dark goggles; avoid close contact with other persons and swimming for 2 weeks. The doctor must wash his hands after examination of such patient and tonometer should be disinfected after each use.

Pharmacological

It is usually a self-limiting illness. Antiviral agents are not effective. Corticosteroids are contraindicated; however, these are used, if vision is threatened.

1. Antibiotic eyedrops (as in mucopurulent conjunctivitis) prevent secondary infection.
2. Naphazoline 0.05% eyedrops 1 drop 4 times a day or Zinc sulphate 0.125% eye, drops 1 drop 4 times a day. Patient should be referred to an ophthalmologist, if there is no response in 7 to 10 days.

Patient education

- Not to share towels, handkerchief and other objects with other persons.

References

1. Ophthalmic Drug Facts. Facts and Comparisons: A Wolters Kliewer Company, St. Louis, Missouri, 2005; pp. 57-86.
2. Drugs used in Bacterial Infections: WHO Model Prescribing Information. World Health Organization, 2001.
3. Conjunctival and Corneal Pathology. In: Principles and Practice of Ophthalmology, 2nd Edition, Vol 1-6 WB Saunders Co. 2000; pp. 3609-3634.
4. Viral Disease of the Cornea and External Eye. In: Principles and Practice of Ophthalmology, 3rd Edition. Vol. 1-6 WB, Saunders Co. 2008; pp. 637-704.

II. Conjunctival Allergic Disorders

Conjunctival allergic disorders include acute allergic conjunctivitis (Hay fever conjunctivitis—seasonal allergic conjunctivitis, perennial allergic conjunctivitis), atopic keratoconjunctivitis, vernal keratoconjunctivitis, giant papillary conjunctivitis, phlyctenular keratoconjunctivitis, conjunctivitis medicamentosa, etc.

A. Acute allergic conjunctivitis (hay fever conjunctivitis)

It is a recurrent, bilateral type I, IgE mediated hypersensitivity to a variety of exogenous air-borne allergens such as pollens, animal dander, dust, moulds, etc. and may be seasonal, perennial, (chronic) or acute type.

Nonpharmacological treatment

Avoid allergen or minimize exposure to allergen, if possible dilution of allergen and washing away by instillation of tear substitutes and cold compresses to the eye.

Pharmacological

1. Topical combination of antihistamine (Antazoline 0.5% or Pheniramine) and vasoconstrictor (Naphazoline hydrochloride 0.05%) eyedrops 4 times a day till the resolution of symptoms.

2. Disodium cromoglycate 4% eyedrops 2 times a day or 2% eyedrops 4 times a day till resolution of symptoms.
   Or
   Ketorolac tromethamine 0.5% eyedrops 4 times a day till resolution of symptoms.
   (**Caution**: Topical corticosteroids are contraindicated as a first line therapy. If required should only be prescribed by an ophthalmologist, in low concentrations.
3. If severe, systemic antihistaminic should be administered. Tab. Cetirizine hydrochloride 10 mg once a day for duration of acute symptoms. In children, 5 mg once a day.

Patient education

- Symptomatic therapy and avoidance of allergen as far as possible is the mainstay of the therapy.
- Minimum use of topical eyedrops should be advocated.

B. Phlyctenular keratoconjunctivitis

It is characterized by presence of red nodule at bulbar conjunctiva, most often at nasal limbus of one eye. It is a cell mediated type (type IV) conjunctival hypersensitivity to tubercular protein, the commonest endogenous allergen and others include staphylococcal antigens, worm infestations, fungal antigens and idiopathic.

Topical treatment

1. Dexamethasone 0.1% eyedrops or Betamethasone 0.1% eyedrops combined with antibiotic Neomycin 0.5%, or Chloromycetin 0.5% eyedrops 4 times a day for 7 days.
2. If cornea is involved (see section on Corneal Ulcer).
3. Rule out any systemic cause and treat accordingly, especially if recurrent or bilateral keratoconjunctivitis.

Spring catarrh (vernal keratoconjunctivitis)

It is a bilateral, recurrent papillary conjunctivitis occurring in a warm climate due to hypersensitivity to exogenous allergens.

SALIENT FEATURES

- Itching, ropy discharge, gelatinous thickening at limbus and papillae (cobblestones) in upper palpebral conjunctiva.

Nonpharmacological treatment

Avoidance of allergen, wind, and rubbing of eye; tear substitutes (barrier function, dilute allergen, wash away allergen); wear glasses or goggles; air conditioning with appropriate filters.

Pharmacological

In mild cases;

1. Topical antihistamine + vasoconstrictor combinations. Boric acid 1.25%; Naphazoline 0.05%; Zinc sulphate 0.12%; Antazoline hydrochloride 0.5%, Chlorpheniramine 0.01% 4 times a day.
2. Disodium cromoglycate 4% eyedrops 2 times a day or 2% eyedrops 4 times a day.
   Or
   Ketorolac tromethamine 0.5% Or Ketotifen eyedrops 4 times a day.
   Or
   Olopatadine eyedrops 0.1% twice a day, or 0.2% once daily

In acute attacks and severe cases not resolving with above treatment, refer to an ophthalmologist for treatment with following:

Prednisolone sodium phosphate 1% eyedrops Or Dexamethasone 0.1% or Betamethasone 0.1% four times a day for 2 days, twice daily for 4 days, once daily for next 3 days and then discontinue.

Or diluted steroids, dexamethasone eyedrops 0.01% or Loteprednol eyedrops 0.2% four times a day till acute symptoms subside and then tapered.

(**Caution**: Treatment should be given under the close supervision of an ophthalmologist).

Patient education

- Long-term use of a steroid may cause glaucoma and cataract.

References

1. Antiallergic and Decongestants. Ophthalmic Drug Facts. A Wolters Kliever Company, St. Louis, Missouri, 2000; pp. 52-86.
2. Clinical Ophthalmology, 4th edition. Butterworth Heinemann, Oxford, 1999.
3. Manual of Ocular Infection and Therapy, 4th edition, Little Brown Co. 1996.
4. Allergic and toxic reactions. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; 611-624.

PAINFUL RED EYE

All painful red eye or visual loss should be referred immediately to a tertiary care level.

Glaucoma

Glaucoma is an optic neuropathy which manifests as typical visual field defects (nerve fibre bundle defects), the aetiology of which is in some way related to intraocular pressure (IOP).

SALIENT FEATURES

- The classical triads of increased IOP, optic nerve head cupping and visual field changes are always present and are sign of progress of the disease and are the bench mark for assessing the response to therapy.
- The width of the angle of anterior chamber further differentiates the glaucoma into open and closed angle varieties.
- Treatment modalities differ according to the type of glaucoma.

Congenital glaucoma/ buphthalmos

SALIENT FEATURES

- IOP is usually normal as sclera in children distends leading to increased corneal diameter.
- Excessive tearing and photophobia.

Pharmacological treatment

Aim is to control IOP till definitive treatment, i.e. surgery is performed.

1. Timolol drops 0.25% eyedrops; one drop instilled at 12 hourly interval.
   Or
   Betaxolol 0.25% eyedrops one drop instilled at 12 hourly interval.
2. Tab. Acetazolamide 12 mg/kg in 3-4 divided doses.

Surgical treatment at a tertiary care centre includes goniotomy and trabeculotomy or trabeculotomy with trabeculectomy. Monitor corneal diameter, IOP, disc changes and refraction periodically.

Secondary childhood glaucoma

It is secondary to certain developmental anomalies, which need to be treated along with the glaucoma.

Patient education

- It is a slowly progressive disease, usually amenable to surgery. Regular follow-up lifelong is must for early detection of any failure/complications.

- Eye is vulnerable to trauma and thus contact sports may be restricted in these children.
- Screening of any child particularly the siblings who have a large cornea, photophobia or excessive watering of the eyes should be done.

Angle closure glaucoma – acute

SALIENT FEATURES

- Acute pain and blurring of vision along with headache and vomiting, in some cases.
- Chronic angle closure glaucoma ensues when repeated subacute attack lead to peripheral synechiae, zipping up of the angle, and persistent rise of IOP with subsequent optic atrophy.
- The intraocular pressure is raised due to pupillary block.

Pharmacological treatment

1. Inj. Mannitol 20%, 1.5-2 g/kg, IV infusion over half an hour.
   Or
   Glycerol 50%, 1 to 1.5 g/kg in 50% solution orally, mixed with cold lemon or orange juice in 3-4 divided doses.
   (**Caution**: It can cause hyperglycaemia in diabetic patients. Do not drink water for 1 hour after ingesting tablet; contraindications include dehydration or cardiac decompensation).
2. Pilocarpine 2% eyedrops every 15 min for 1 hour and thereafter 6 hourly started after IOP has been lowered by hyperosmotics as above.
3. Tab. Acetazolamide 500 mg stat followed by 250 mg every 6 hours and maintained till the definitive treatment of laser peripheral iridotomy relieves the pupillary block.
4. Timolol 0.5% eyedrops 2 times a day (if pressure is still high) to be continued till surgery.
   Or
   Betaxolol 0.5% eyedrops 2 times a day (Preferred in asthmatics and patients with cardiac conduction defects).
   (**Caution**: All mydriatics/cycloplegic drugs which dilate pupils are contraindicated)

Once the IOP falls to early 20's by the treatment listed above—usually in a day or so, evaluated by gonioscopy, disc cupping and visual field charting. Definitive treatment is iridotomy by laser or surgery depending on the facilities available. Prophylactic laser peripheral iridotomy should be performed on the fellow eyes as soon as possible.

IOP is the most significant and titrable response. The disease can recur after a successful iridotomy so the patient should be under follow-up at 6 monthly intervals at least.

Patient education

- Do not ignore headache and chronic ache in the eyes and report to the eye specialist, if coloured halos appear around light.
- Pilocarpine can induce myopia, increase inflammation and cause accommodative spasm in the young patient and miosis in an older patient who has concomitant cataract leading to diminished vision.
- Topical beta-blockers need to be used with caution in chronic obstructive pulmonary disease, myasthenia gravis, cardiac arrhythmias, diabetes mellitus, etc.

Angle closure glaucoma - chronic

IOP is raised due to progressive angle closure or by repeated intermittent subacute attacks secondary to pupillary block. Commonly asymptomatic until significant visual loss has occurred. The presentation is thus more akin to open angle glaucoma.

Pharmacological treatment

1. Timolol 0.5% or Betaxolol 0.5% eyedrops 2 times a day usually required life-long.
2. Pilocarpine 2-4% eyedrops 4 times a day usually required for life. Laser or surgical iridotomy is done to eliminate any element of pupillary block in affected as well as fellow eye. If the glaucoma is still uncontrolled on maximal tolerable medical therapy (i.e. 2 topical antiglaucoma medications), then glaucoma filtering surgery or trabeculectomy should be performed.

Patient education

- Since the disease is asymptomatic, patients who complain of nonspecific headache or eye ache should not be ignored.

Primary open angle glaucoma

SALIENT FEATURES

- The IOP is usually above 21 mmHg with associated nerve head cupping and visual fields defects.
- Usually asymptomatic, however, some complain of frequent change in spectacles and mild ache of the eyes.
- Gonioscopically the angle of anterior chamber (AC) is widely open.

Pharmacological treatment

1. Timolol 0.5% or Betaxolol 0.5% eyedrops 1 drop 12 hourly and the morning dose should be as early upon waking as possible.
   Or
   Latanoprost 0.005% eyedrops given only once at bedtime.

(**Caution**: Maintain constant cold chain)
Or
Bimatoprost 0.03% eyedrops once at bedtime.
Or
Travoprost 0.004% eyedrops once at bedtime.
(both do not require cold chain)
If initial therapy fails, refer to a higher centre and substitute with another agent preferably belonging to a different group.

2. Dorzolamide 2% eyedrops 2 to 3 times a day.
Or
Brimonidine tartarate 0.2% twice daily (also increases uveoscleral outflow and confers neuroprotection).
Or
Pilocarpine 1-4% eyedrops 3 times a day or 4% gel once at bedtime.

If patient is not controlled on 2 topical drugs, then consider alternative treatment with either laser trabeculoplasty or glaucoma filtering surgery.

Ideally all parameters—IOP, optic nerve head and visual field assessment should be checked at 3-6 monthly intervals.

Patient education

- Pilocarpine can cause accommodative spasm and induce myopia leading to brow ache and a need to readjust reading spectacles of patient.
- Avoid instillation of more than one drop of the drug or double doses in case morning dose is missed.
- Most drugs especially beta-blockers cause burning and stinging sensation on instillation. Chronic use can lead to dry eyes and tear supplements may be required.
- Punctual occlusion, i.e. pressing medial end of lower lid to increase drug and cornea contact time should be explained to patients.
- In diabetics, use of Timolol eyedrops can mask the warning symptoms of hypoglycaemia.
- Avoid sedentary lifestyle.
- High-risk individuals, i.e. high myopia, large cups more than 0.5:1 or asymmetry in cups of more than 0.2 or any person with a positive family history of glaucoma, or aged >35 years should routinely get his intraocular pressures and fundus evaluated on an annual basis.

Lens-induced glaucoma

Lens-induced glaucoma occurs secondary to the cataractous lens either by leakage of lens protein or by lens intumescence. In addition to medically lowering the IOP, the cataractous lens needs to be removed, under steroid cover to suppress the inflammatory element.

Reference

1. In: Shield's Textbook of Glaucoma. Allingham, Ramji, Fredman, Moroi, Shafranov and Shields (eds). V Edition, Lippincott William & Wilkins, 2005.

Corneal ulcer (ulcerative keratitis)

Corneal ulcer may be classified as: (i) bacterial corneal ulcer, (ii) fungal corneal ulcer (mycotic keratitis), (iii) viral corneal ulcer (herpetic keratitis), (iv) acanthamoeba keratitis. Corneal ulcers frequently occur in the eyes with some predisposing factors.

SALIENT FEATURES

- Pain, redness, excessive tearing, photophobia, sticky discharge, swollen lids and blurred vision, blepharospasm, ciliary congestion, corneal hazziness, infiltration of cornea, ulcer/abscess in the cornea.
- Decreased corneal sensitivity, hypopyon, iritis, secondary glaucoma and superficial corneal vascularization. Corneal ulcer is stained green with fluorescein 2%.
- Complications: corneal thinning, ectasia, descematocoele, secondary glaucoma, perforation and its sequelae including endophthalmitis or panophthalmitis and loss of eye.

Treatment (to be managed by an ophthalmologist)

Perform corneal scrapings from the base and edges of the ulcer to make smears for Gram and Giemsa stains and culture and sensitivity testing. Initiate therapy based on clinical picture and findings obtained on smears of corneal scrapings. As a first line therapy, broad-spectrum antibiotics are started in all cases. Antifungal agents are given, if confirmed by scrapings or in case of strong clinical suspicion. The treatment is modified according to the clinical response and result of culture and sensitivity of microorganisms.

A. Bacterial corneal ulcer

Nonpharmacological treatment

- Avoid patching.
- Maintain proper ocular hygiene by regular cleaning of discharge twice a day.
- Removal of contributory factors, e.g. trichiasis, foreign body, entropion, dacryocystitis, etc.
- Removal of necrotic tissue increases efficacy of antibiotics.
- Prevention and treatment of complications—secondary glaucoma should be detected and treated adequately.

Pharmacological

Start empirical therapy and refer to an ophthalmologist

1. Cefazolin 5% eyedrops (50 mg/ml) [mix 5 ml of distilled water in 250 mg of Cefazolin] solution instilled 1 drop every 30 minutes or 1 hourly round the clock for at least 24 hours.
2. Topical fortified Gentamicin [mix 2 ml 80 mg injectable solution of Gentamicin in one vial of commercially available 0.3% 4 ml Gentamicin eyedrop solution (prepared fresh)] or Tobramycin 14 mg/ml (1.4%), instill 1 drop every 1/2- 1 hour for first 24 hours.
3. Ciprofloxacin or Ofloxacin 0.3% eyedrops every 2 hours.
   Frequency of administration is reduced according to the response and continued for 2-3 weeks. If compliance with frequency of topical instillation as above is not possible:
   a. Cefazolin 100 mg subconjunctival injection after anaesthetizing the conjunctiva (if required).
   b. Subconjunctival Gentamicin 20 mg, if compliance to topical drops is unreliable.
      Or
      Fortified Tobramycin 14 mg/ml solution may be used in place of Gentamicin.

   Definitive therapy is started based on the culture and sensitivity of microorganisms.
4. Atropine sulphate 1% eye ointment to be applied 2 or 3 times per day.
5. Parenteral antibiotics are indicated in perforated corneal ulcer, impending perforation, corneal ulcer following perforating injury and infections caused by *Neisseria* or *Haemophilus* microorganism.

(**Caution**: Corticosteroids are contraindicated. If associated with secondary glaucoma, see section on Glaucoma).

B. Fungal corneal ulcer (mycotic keratitis)

Mycotic keratitis usually develops 2-3 weeks following corneal injury with an organic or vegetative matter. The common fungi causing fungal keratitis in order of frequency are *Fusarium*, *Aspergillus*, *Candida* and *Curvularia*.

SALIENT FEATURES

- Severe signs, less symptoms, dry, rough or cheesy appearance with feathery margins, satellite lesions, immune ring, endothelial plaque, thick immobile infected hypopyon.

Treatment

1. Regular debridement of the necrotic tissue.

2. Cauterization of the edges with Trichloroacetic acid/povidone iodine under topical anaesthesia (preferably under the supervision of an ophthalmologist).
3. Natamycin 5% suspension 1 to 2 hourly.
   And/or
4. Fluconazole 1% eyedrops 1 hourly round the clock.
   In case of no response within 48 hours, substitute fluconazole with Amphotericin B.
5. Amphotericin B 0.15 to 0.25% formulation prepared in distilled water, every 15 to 30 minutes for 24-48 hours then 1-2 hourly continued for 2-3 weeks or till resolution of keratitis.
6. In case of immunocompromized patients, spreading ulcer, perforation or impending perforation
   Cap. Ketoconazole 200-400 mg 2 times a day for 2-3 weeks.
   Or
   Cap. Fluconazole 200 mg 2 times a day for 2-3 weeks.
7. Since superadded bacterial infection is common, add Ciprofloxacin or Tobramycin eyedrops (see section on Bacterial Conjunctivitis).

C. Viral corneal ulcer (Herpes simplex keratitis)

It is characterized by unilateral or bilateral recurrent attacks of keratitis in the form of infections, epithelial keratitis, stromal keratitis, or endothelialitis, etc. The attack is often precipitated by trivial trauma, fever, cold, emotional stress, menstruation, etc.

Treatment (epithelial keratitis)

1. Acyclovir eye ointment 3% five times a day for 2-3 weeks.
   Or
   In refractory cases, Ganciclovir ophthalmic gel 0.15% five times a day till healing of ulcer, followed by three times a day for 7 days.
2. Topical Cycloplegics–Homatropine 2% eyedrops 2 times a day.
3. Broad-spectrum antibiotic as in the treatment of mucopurulent conjunctivitis till ulcer heals.
4. Artificial tear substitutes 3-4 times a day.

Refer to an ophthalmologist, if more than two recurrences occur, Tab. Acyclovir 400 mg 2 times a day for 3-6 months for prevention of recurrence.

References

1. Ophthalmic Drug Facts. Facts and Comparisons. A Wolters Kliewer Company, St Louis, Missouri, 2000.
2. Clinical Ophthalmology, 4th Edition. Butterwoth Heinemann, 1999; pp. 183-260.
3. Manual of Ocular Infection and Therapy. 4th Edition. Little Brown Co, 1996; pp. 781-803.

Treatment (stromal keratitis)

Nonpharmacological.

Dark glasses with UV filter.

Pharmacological.

1. Moderate to severe disease
   Dexamethasone 0.1% or Prednisolone 1% eyedrops every 3 hours, tapered gradually on the basis of clinical response. For milder disease, lower concentration of 0.12% Prednisolone or 1: 10 dilution Dexamethasone 0.1% eyedrops 4 times a day, tapered slowly to once daily or once a week before stopping.
2. Prophylactic Acyclovir eye ointment 2 times a day.
3. Homatropine 2% eyedrops 1 drop 2 times a day.
   (**Caution**: Avoid corticosteroids in presence of epithelial ulceration; 1% Medroxyprogesterone may be used)
4. Artificial tears 3-4 times a day.

Patient education

- To report to an ophthalmologist in every case of eye redness, pain or diminution of vision.
- Regular follow-up at 6 monthly intervals since viral keratitis is known to recur.

Reference

1. Viral Diseases of the Cornea and External Eye. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 637-704.

SENILE CATARACT

While cataract refers to the age-related opacification of crystalline lens, the exact cause of senile cataract is not known.

SALIENT FEATURES

- Gradual painless progressive diminution of vision in one or both eyes.
- Excessive glare, monocular diplopia or polyopia, coloured halos around lights, diurnal variation in vision, change in colour values and fixed black spots before eyes.
- Ocular examination reveals greyish white or whitish lenticular opacity on torch light examinations depending on the stage of cataractogenesis, i.e. immature, mature or hypermature. Detailed evaluation of cataract changes and fundus examination is done after dilating the pupils using distant direct ophthalmoscopy, slit-lamp examination, direct ophthalmoscopy, etc.

Treatment

Pharmacological

Till date no proven drug treatment exists to delay, prevent or reverse the development of senile cataract. Definitive treatment of senile cataract is lens extraction. Indications

of lens extraction are visual handicap, interference in patient activities due to poor vision or glare disability even if cataract is immature. In mature, hypermature cataract, urgent lens extraction is done to prevent further complications such as glaucoma, iritis, or displacement of lens.

Optical treatment

In early cataract, decreased vision may be improved by accurate refraction and prescribing corrective spectacles.

Pupillary dilatation by instillation of 2.5% Phenylephrine eyedrops, or Tropicamide 0.5% eyedrops or Cyclopentolate 1% eyedrops in the morning may provide visual improvement in patient with minimal lenticular opacities in the axial area.

(**Caution:** Dilatation of pupil is contraindicated in patients with shallow anterior chamber).

The choice of the procedure depends on the patient, the type of cataract, the availability of proper instruments and equipments and the degree to which the surgeon is comfortable and proficient in performing standard extracapsular cataract extraction (ECCE), phacoemulsification or nonphaco small incision surgery. Posterior chamber intraocular lens placed inside the capsular bag is the preferred modality.

Patient education

- Do not wait for maturation of cataract for undergoing cataract operation.
- Secondary glaucoma and other complications may develop if total cataract remains unoperated for a long time.
- Visual rehabilitation in the early postoperative period is faster in small incision cataract surgery.
- Laser is not used for cataract surgery as such, however, Nd: YAG laser is used for posterior capsulotomy which is required in a large percent of intraocular lens patients.

References

1. Preoperative Evaluation of the Cataract Patient. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 1415-1420.
2. Extracapsular Cataract Extraction. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 1431-1439.
3. Phacoemulsification. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 1441-1463.

DRY EYES SYNDROME

It represents a diverse group of conditions characterized by symptoms of ocular discomfort and is associated with decreased tear production and/or abnormally rapid tear film evaporation. Abnormality in preocular tear film results in ocular surface damage and dry eyes and affects 15% in elderly, especially females and 20-30% in contact lens wearers.

Common causes for dry eyes syndrome

Environmental: Excessive heat and air-conditioning.

Systemic: Ageing and menopause, side effect of antihistamines, birth control pills, diuretics, psychotropic drugs, etc. Diseases like Sjogren's syndrome, rheumatoid arthritis, collagen vascular diseases, etc.

Local: Abnormality of lacrimal gland, eyelids, ocular surface and lacrimal drainage system; topical medications and contact lens use.

SALIENT FEATURES

- Symptoms usually precede signs. Symptoms are ocular irritation and pain, dryness, grittiness, foreign body sensation, itching, burning, photophobia, redness, excessive tearing and blurring of vision.
- Signs: Conjunctival congestion, decreased tear, meniscus, irregular corneal surface and debris in the tear film.
- Also presents as corneal epithelial keratitis, fine or coarse, fluorescein/Rose Bengal staining and inflammation of ocular surface in advanced cases. In severe cases, mucous plaques, corneal filaments, epithelial defects, secondary infections, thinning and perforation of cornea can occur. There may be associated blepharitis, meibominitis and eyelid abnormality.
- Various tests for dry eyes include Schirmer's test, break up time, conjunctival cytology, tears osmolarity.
- In severe cases, complications like persistent epitheliopathy, sterile corneal ulcerations and secondary microbial infections can occur.

Treatment

Lack of correlation between signs and symptoms makes it difficult to diagnose mild to moderate forms of dry eyes.

Nonpharmacological

Hot compresses, eyelid massage

Pharmacological

Mild dry eyes

Artificial tear substitutes with preservatives up to four times a day [methylcellulose 0.5-1%, hydroxypropyl methylcellulose (HPMC), polyvinyl alcohol (1.4%), polyvinyl pyrrolidone (3-5%)].

Moderate dry eyes

1. Artificial tears without preservatives 4 times to 1 hourly a day (carboxymethyl cellulose 0.05 and 0.1%).

2. Lubricating eye ointment at bedtime.
3. 10% acetyl cysteine eyedrops 1-2 drops into the affected eye 3-4 times daily for excessive mucin secretions.
4. Topical anti-inflammatory treatment with cyclosporine-A 0.05% twice a day.

Severe dry eyes

Same as in moderate cases, along with temporary/permanent occlusion of all four puncta, moist environment (humidifier, moisture shields), and hydrophilic bandage contact lenses.

Surgical treatment

Reversible inferior punctual occlusion (punctual plugs)

Tarsorraphy (lateral and medial), conjunctival/mucous membrane grafting, parotid duct transplantation, amniotic membrane transplant, stem cell transplant.

References

1. Basic and Clinical Science Course, Section 8, External Diseases and Cornea. American Academy of Ophthalmology 2007-08, pp. 61-80.
2. Ocular Surface Disease, Section 6. In: Smolin and Throft's The Cornea, Scientific Foundations and Clinical Practice. Foster SC, Azar DT, Dohlman CH (eds). 4th edition 2005; pp. 573-646.

REFRACTIVE ERRORS

Refractive errors (ametropia) are the optical defects of eye in which the parallel rays of light entering the eye do not come to focus on the fovea centralis. Ametropia includes myopia, hypermetropia and astigmatism. Astigmatism may be combined with myopia or hypermetropia.

SALIENT FEATURES

- Refractive errors are characterized by blurred vision, subnormal vision, eye strain or asthenopia, headache, tearing, latent or manifest strabismus, etc.

Treatment

Pharmacological

No pharmacological treatment is available for ametropia.

Surgical

- Accurate retinoscopy and corrective spectacles or contact lenses.
- Keratorefractive surgery.

Patient education

- Young patients opting for laser correction should wait till the refraction is stable for at least one year.

Reference

1. Prescription of Spectacles. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 5269-5274.

STRABISMUS (SQUINT)

Any child presenting with strabismus should have the following conditions ruled out:

- Refractive error—refraction should be done under full cycloplegia, i.e. Atropine ointment 1% 3 times a day for 3 days prior to performing retinoscopy. If any refractive error is present, that should be fully corrected by spectacles for at least 3-6 months, before performing definitive surgical therapy for strabismus.
- Any opacity in the media, e.g. cataract, corneal opacity, retinoblastoma, etc.
- Amblyopia element whether induced by strabismus or vice versa should be treated with occlusion therapy or other modality before treating strabismus.

Treatment

Nonpharmacological

Correct the refractive error or associated cataract, corneal opacity, etc. Fusion exercises for intermittent exotropia and other orthoptic exercises.

Surgical

Definitive therapy is surgical realignment of axis once other associated features have been treated.

Patient education

- Functional improvement in strabismus is best between 3-5 years of age.
- It is a misconception that squint is spontaneously corrected as the child grows; therefore, treatment of strabismus should not be delayed.

Reference

1. Concomitant Strabismus. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 4333-4343.

IRIDOCYCLITIS (ANTERIOR UVEITIS)

Uveitis is defined as inflammation of uveal tract, i.e. iris, ciliary body and choroid. Inflammation of iris and ciliary body constitutes iridocyclitis or anterior uveitis.

SALIENT FEATURES

- Acute anterior uveitis is characterized by painful red eye, diffuse periorbital pain, photophobia, blurred vision, excessive tearing. There is no purulent or mucopurulent discharge.

- Ocular examination reveals ciliary injection, normal or deep anterior chamber, small irregular pupil, posterior synechia, media opacities, tenderness of eyeball and variable decrease in vision.
- Slit-lamp biomicroscopy is essential for diagnosis and monitoring the treatment. Slit-lamp examination in active cases, reveals marked flare and cells in anterior chamber and fine keratic precipitates at the back of cornea. Posterior segment involvement and changes in intraocular pressure may occur in anterior uveitis.

Treatment (Refer immediately to an ophthalmologist)

Nonpharmacological

Dark glasses.

Pharmacological

1. Dexamethasone 0.1% eyedrops or Betamethasone 0.1% eyedrops or Prednisolone sodium phosphate 1% eyedrops or Prednisolone acetate 1% eyedrops. 1-2 hourly, tapered gradually on the basis of slit-lamp evidence of anterior chamber activity. If topical steroids are required for long term, switch over to Loteprednol 0.5% or fluoromethonol 0.1% to decrease chances of secondary glaucoma.
2. Homatropine hydrobromide 2% eyedrop solution.
   Or
   Atropine sulphate 1% eye ointment once or twice a day.
3. If no response (within 7 days), severe anterior uveitis, bilateral involvement and panuveitis.
   Tab. Prednisolone 1 mg/kg or 40-80 mg per day orally every morning at breakfast or on alternate days. Gradually taper depending upon satisfactory clinical response over 2 to 4 week period.
4. If no response within 1 week or non-compliant, posterior uveitis or severe uveitis.
   Periocular corticosteroids—subconjunctival or posterior subtenon injection (preferred).
   Methylprednisolone acetate—20, 40, 80 mg/ml or Triamcinolone acetonide (10, 40 mg/ml) 0.5-1.0 ml.
   (**Caution**: Contraindication—infectious uveitis, e.g. herpetic or toxoplasmosis, known steroid responder, patients with glaucoma or elevated intraocular pressure.)
5. Close monitoring of intraocular pressure and treat appropriately, if elevated—Timolol maleate 0.5% eyedrops 2 times a day and/or Acetazolamide 250 mg 4 times a day 6 hourly.
6. Tab. Ibuprofen 400 mg 3 times a day.
7. Identify the specific cause and give specific therapy (syphilis, tuberculosis, herpes simplex, herpes zoster, toxoplasmosis, etc.)

8. Surgical treatment—surgical treatment is required for various complications of anterior uveitis.

Patient education

- Recurrent/chronic nature of the disease, which may interfere with vision, should be explained.
- Patients with history of uveitis, juvenile rheumatic arthritis, ankylosing spondylitis should be instructed to report immediately to an ophthalmologist, even if there is mild diminution of vision.
- Recurrent episodes of anterior uveitis and subsequent therapy may lead to various complications particularly complicated cataract and steroid-induced glaucoma.
- Possible side effects or toxic effects of long-term topical periocular and systemic corticosteroid therapy should be explained.

Reference

1. The Cornea, Uveitis and Intraocular Neoplasms. In: Gowerbed Pub. London, 1992; pp. 3-38.

ORBITAL CELLULITIS

Suppurative inflammation of adipose and soft tissues of orbit is termed as orbital cellulitis. It occurs more frequently in children than adults. Spread of infection from paranasal sinuses, particularly ethmoid sinus is the commonest cause. Other causes include extension of infection from dental abscess, ear, face and lid infection, panophthalmitis, dacryocystitis, dacryoadenitis, postoperative to any facial or ocular surgery, perforating injury and haematogenous spread, etc.

SALIENT FEATURES

- Marked unilateral axial irreducible proptosis, restricted and painful ocular motility, lid oedema, chemosis of conjunctiva, constitutional symptoms such as fever, headache, nausea, vomiting, malaise, prostration.

Treatment (Refer immediately to an ophthalmologist)

Nonpharmacological

Warm compresses.

Pharmacological

Severe cases are to be treated in the hospital.

1. Cap Amoxycillin 500 mg plus Cloxacillin 500 mg in 3 divided doses for 10-14 days.
   Or
   Cap Amoxycillin 250 mg plus Clavulanic acid (125 mg) every 8 hours.

2. Inj. Gentamicin 5 mg/kg in 2 divided doses for 7-10 days.
   Or
   Inj. Cefotaxime 1-2 g in 10 ml sterile water for injection over a period of 3-5 min every 12 hours. In neonates—100-150 mg/kg in 2-3 divided doses. In infants and children—50-180 mg/kg/day in 4-6 divided doses. Antibiotics are changed according to the report of culture and sensitivity and continue till resolution occurs.
3. For anaerobic infections
   Inj. Metronidazole 500 mg IV infusion 8 hourly, shifted to oral dose of 400 mg 8 hourly based on the clinical response for 2 weeks.
4. Oxymetazoline 0.05% nasal drops 2-3 drops in each nostril 2 times a day, in children: 0.025%.
5. Symptomatic therapy for pain: antipyretics and analgesics in usual doses.
6. Lubricating eyedrops/artificial tears: 1-2 hourly or antibiotic eye ointment 5 times a day to prevent exposure keratopathy.

Surgical treatment

Surgical drainage is indicated, if orbital abscess forms, based on clinical features, USG and CT scan findings; poor response or no response to the IV antibiotic therapy, or if there is a threat to ocular function.

- Tarsorrhaphy or Frost suture to prevent exposure keratopathy.
- Sinusotomy/craniotomy for pus in paranasal sinus or brain abscess respectively.
- All the patients must be carefully monitored for vision, fundus, corneal exposure, ocular motility, pupillary reaction, corneal sensations, proptosis, systemic status including CNS function.

Patient education

- Any ear, sinus or dental infection especially in children should be treated promptly.
- Any child presenting with unexplained lid oedema or cellulitis should be immediately referred to an ophthalmologist.

Reference

1. Infectious Processes of the Orbit. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 2961-2975.

ENDOPHTHALMITIS

Endophthalmitis is of two types: (1) exogenous endophthalmitis caused by the direct inoculation of infecting agent through breach in the continuity of ocular coats, e.g. postoperative, post-traumatic, (2) endogenous endophthalmitis results due to haematogenous spread of infective agents. Depending upon the aetiology of infectious agents, both these categories may be bacterial or fungal.

SALIENT FEATURES

- History of eye surgery, penetrating injury, fever, infection or predisposing systemic diseases leading to metastatic endophthalmitis.
- Marked visual loss, ocular pain, headache, ocular discharge, photophobia, intense redness and lid swelling.
- Ocular examination reveals conjunctival and ciliary congestion, profound decrease in vision even up to perception of light with accurate or inaccurate projection of rays. Corneal oedema, hypopyon, signs of uveitis, reduction in intraocular pressure, exudation in vitreous leading to reduced or absent fundus reflex are the other associated features. The clinical picture is variable depending upon the route of entry, infectious process and duration of disease.

Treatment (Refer immediately to an ophthalmologist)

Postoperative bacterial endophthalmitis

Pharmacological

1. Intravitreal injection of antibiotics—Inj. Vancomycin hydrochloride 1 mg in 0.1 ml plus Inj. Ceftazidime 2 mg in 0.1 ml or Inj. Amikacin sulphate 0.4 mg in 0.1 ml.
2. Subconjunctival injection Vancomycin 25 mg/0.5 ml plus Ceftazidime 100 mg/0.5 ml plus Dexamethasone 0.25 mg/0.5 ml.
3. Vancomycin eyedrops 50 mg/ml plus Amikacin eyedrops 15 mg/ml 1 drop every 6 hours.
4. Homatropine 2% eyedrops 3 times a day or Atropine 1% eye ointment 2 times a day.
5. Prednisolone acetate 1% eyedrops or Dexamethasone or Betamethasone 0.1% eyedrops every 6 hours.
6. Tab. Prednisolone 1 mg/kg/day in a single morning dose after 24 hours of antibiotic use and continue for 10-14 days.
7. Parenteral antibiotics are given as a supportive therapy.
8. Change the antibiotic according to vitreous culture and sensitivity, if required.

Surgical treatment

Vitrectomy—pars plana vitrectomy is indicated, if visual acuity is limited to light perception or if there is poor response to above treatment in 30-36 hours. Vitrectomy may also be required in the resolved phase of endophthalmitis for vitreous opacification/membranes.

Treatment for traumatic endophthalmitis

Pharmacological

1. Hospitalize the patient and give immunization for tetanus.
2. Inj. Vancomycin 1 g IV infused over 1 hour every 12 hour.

3. Inj. Gentamicin 2 mg/kg every 12 hour.
   Or
   Inj. Ceftazidime 2 g IV every 12 hour.
   Or
   Inj. Ceftriaxone 2 g IV/day.
4. Clindamycin should be considered in all cases until *B. cereus* infection has been excluded
   Inj. Clindamycin 600-900 mg IV every 8 hour.
   In children 20-40 mg/kg/day IV 6-8 hourly.
   Continue antibiotics for 7-10 days.
5. Topical fortified eyedrops, subconjunctival injection and intravitreal injection and cycloplegic drops as in cases of postoperative bacterial, endophthalmitis.

Surgical treatment

- Repair the ruptured eyeball at the earliest.
- Pars plana vitrectomy—indications are similar to that of postoperative bacterial endophthalmitis.

Treatment for fungal endophthalmitis

Exogenous fungal infections may occur postoperatively or secondary to trauma. Endogenous fungal endophthalmitis should be treated as an emergency treatment.

Pharmacological

1. Vitrectomy to debulk the vitreous of fungi.
2. Intravitreal Amphotericin B 5-10 mcg/0.1 ml or Fluconazole 25 mcg/0.1 ml.
3. Inj. Amphotericin B 0.5-1.5 mg/kg/day slow infusion over 2-6 hours. (50 mg vial in powder form and is dissolved in 5% dextrose) for 10-14 days.
   Or
   Tab. Fluconazole 400 mg loading dose followed by 200 mg daily, total dose should not exceed 600 mg/day.
   In children 12 mg/kg loading dose followed by 6 mg/kg/day.
   Or
   Tab. Ketoconazole 200 mg orally 2 times a day or daily. In children above 2 years of age, 3.3-6.6 mg/kg/day.
4. Homatropine 2% eyedrops 4 times a day or Atropine 1% eye ointment 2 times a day.

Patient education

- All patients with open globe injury must contact an ophthalmologist after getting initial treatment.
- Cataract-operated cases should never ignore pain, tearing and photophobia and decrease in vision in the operated eye and must consult the ophthalmologist at the earliest.

References

1. Endophthalmitis Vitrectomy Study Group: Results of the endophthalmitis vitrectomy. Arch Ophthalmol 1995; 113:1479-1496.
2. Fungal Infections and the Eye. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 4717-4749.

OPTIC NEURITIS

Optic neuritis includes papillitis (inflammation of optic disc), retrobulbar neuritis (inflammation of retro-ocular portion of optic nerve) and neuroretinitis when both optic disc and retina are inflamed. The chief causes of optic neuritis are: demyelinating diseases (usually multiple sclerosis), systemic viral/bacterial infections, autoimmune diseases and secondary to ocular inflammations, e.g. uveitis, endophthalmitis, orbital cellulitis, etc. MRI of the brain to detect multiple white matter lesions should be done for diagnostic and therapeutic purposes.

SALIENT FEATURES

- Unilateral or bilateral, sudden severe visual loss, ipsilateral eye pain; markedly impaired colour vision, visual obscurations in bright light and episodic transient visual obscuration on physical exertion, hot bath, hot weather, fatigue, etc.
- Profound decrease in visual acuity, dyschromatopsia, central or paracentral scotoma, tenderness of the globe near superior rectus insertion and reduced visually evoked response.
- Marked abnormality in pupillary response to light reflex (sluggish or afferent pupil defect).
- Fundus examination reveals optic disc oedema with or without flame-shaped retinal haemorrhages in papillitis and neuroretinitis and a normal fundus in retrobulbar neuritis.

Treatment (Refer immediately to an ophthalmologist)

Usually does not respond to pharmacological therapy; very often some recovery of vision occurs spontaneously after weeks or months. However, proven case of multiple sclerosis may benefit with following:

Inj. Methylprednisolone 1 g/day (or 15 mg/kg/day) IV in 2-4 divided doses, or single dose for 3 days followed by Tab. Prednisolone 1 mg/kg/day orally for 11 days, taper by 20 mg on day 12 and then 10 mg/day on day 13 and 15.

In case of proven infective aetiology, administer appropriate systemic antibiotic to eliminate the focus of infection.

(**Caution**: Oral prednisolone alone is not recommended).

Patient education

- Explain recurrent nature of disease and permanent visual loss can occur.

- Risk of developing multiple sclerosis.
- Avoid factors provoking transient visual obscurations like physical exertion, hot bath, hot weather, stress, anxiety, anger, etc.

References

1. Ophthalmic Drug Facts. Facts and Comparisons. A Wolters Kliever Company, St Louis, Missouri, 2005.
2. Optics neuritis. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 3871-3885.

DIABETIC RETINOPATHY

Diabetic retinopathy (DR) is the microangiopathy of retinal vasculature occurring in long-standing diabetes mellitus. It is classified into nonproliferative DR and proliferative DR; diabetic macular oedema may be present at any of these stages.

Treatment

Nonpharmacological

Early diagnosis, proper diabetic control, careful follow-up, fundus photography, fluoroscein angiography and timely laser photocoagulation or vitrectomy surgery or both.

Pharmacological

No time tested and proven pharmacological treatment exists which can delay, prevent or cure diabetic retinopathy.

Patient education

- Explain the importance of yearly fundus examination.
- Laser treatment can prevent deterioration of vision but cannot correct existing visual deficit.

(For details and prevention of complications of diabetes see section on Diabetes Mellitus).

Reference

1. Diagnosis, Management and Treatment of Nonproliferative Diabetic Retinopathy. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 1775-1791.

RETINAL DETACHMENT (RD)

Retinal detachment is defined as separation of the sensory retina from retinal pigment epithelium. It may be localized or entire retina may be involved. Retinal detachment involving macula results in profound visual loss. Retinal detachments are of three types: (i) rhegmatogenous RD, (ii) exudative RD and (iii) tractional RD.

SALIENT FEATURES

- Rhegmatogenous RD is caused by formation of a hole/tear in the retina. Clinical features include symptoms of flashes of light, sudden shower of black spots and veiled visions, loss of central vision, if macula also detached. The diagnosis is made by examination of fundus by distant direct ophthalmoscopy, direct and indirect ophthalmoscopy. The detached retina appears grey with oscillating folds.
- Tractional RD is caused by gliotic bands on retina.
- Exudative RD is caused by collection of serous fluid between neurosensory retina and retinal pigment epithelium.

Treatment (To be treated by an ophthalmologist)

Pharmacological

There is no pharmacological therapy, which can prevent delay or cure rhegmatogenous (RD). Exudative RD due to inflammatory conditions such as panuveitis (VKH syndrome, sympathetic ophthalmitis) or posterior scleritis is treated with systemic corticosteroid and/or pulsed methyl prednisolone therapy as described in the treatment of uveitis and optic neuritis. The cases which are refractory to corticosteroids or if serious steroid-induced complications develop, refer patient for treatment with immunosuppressive drugs to a tertiary care hospital.

Surgical treatment for rhegmatogenous RD

Treatment of choice is reattachment surgery involving:

Sealing of retinal break by creating aseptic chorioretinitis using cryotherapy or laser photocoagulation,

And/or

Scleral buckling.

Or

Vitreoretinal surgery with internal tamponade using gases or silicone oil.

Patient education

- Patients with high myopia, family history of RD, post-cataract surgery, past episodes of chorioretinal inflammation should be warned of the premonitory signs of impending RD (sudden onset of floaters, flashes of light and sudden obscuration of one field of vision). In such cases, they should immediately undergo a dilated fundus examination by indirect ophthalmoscopy by an ophthalmologist.
- Explain these patients not to indulge in contact sports.

Reference

1. Retinal Detachment. In: Principles and Practice of Ophthalmology. Albert and Jakobiec Azar Blodi (eds), 3rd edition, WB Saunders Co, 2008; pp. 2305-2313.