Ocular Tuberculosis

Department of Ophthalmology

Acknowledgement

Some clinical photographs in this presentation are courtesy Dr.Brad Bowling (Kanski's Clinical Ophthalmology, 8th Ed.)

Learning Objectives

- At the end of the class, students shall be able to
- Understand the pathophysiology of ocular tuberculosis.
- Recognize common manifestations of ocular tuberculosis.
- Understand the principles of managing the disease.

INTRODUCTION

- Tuberculosis is a systemic disease of protean manifestations.
- It is a chronic infection caused by mycobacterium tuberculosis that is characterized by formation of necrotizing granuloma
- Tuberculosis primary involves lung
- Secondary ocular TB is a common presenting form
- Incidence of Ocular TB ranges from 1.4 - 5.74%.

- Ocular tuberculosis is an extra pulmonary form.
- Primary infection of the eyes is rare.
- Secondary ocular tuberculosis is the ocular involvement as a result of
  -haematogenous spread from a distant site
  -a direct invasion from adjacent areas like skin, sinus or cranial cavity
  -as hypersensitivity response to distant infection.
- The disease is usually chronic and insidious with exacerbations & remissions.

PATHOPHYSIOLOGY

- Tuberculosis is caused by Mycobacterium tuberculosis
- An obligate aerobic ,slow growing ,nonspore forming ,nonmotile bacterium
- Humans are the only natural host
- End organs with high oxygen tension (apices of the lungs , kidneys, bones , meninges , eye) are typically infected
- In the eyes , Choroid and Ciliary body are mainly affected

TRANSMISSION OF INFECTION

- Primary airborne disease
- Spreads person to person : cough or sneezing
- Droplets measuring 1 to 5 micron suspended in air for several hours can harbour the bacteria
- Usually 5 to 200 inhaled bacteria : sufficient for infection
- About 90 % of infected patients : asymptomatic

- Epidemiology :
- Varying rates of prevalence have been reported
- World : USA – 0.5%, Italy – 6.31%, Japan -6.39%
- India :
- South India - 0.39%*
- North India - 9.86%**

*Biswas J, Narain S, Das D, Ganesh SK. Pattern of uveitis in a referral uveitis clinic in India. Int Ophthalmol 1996-97;20:223-228

**Singh R, Gupta V, Gupta A. Pattern of uveitis in a referral eye clinic in North India. Indian J Ophthalmol 2004;52:121–125.

- Pathogenesis :
- Haematogenous seeding
- Primary complex
- Post primary reactivation of lung lesion – most common
- Bacilli remain dormant for years before they are activated

CLINICAL PRESENTATIONS

A) Adnexal manifestations

B) Anterior segment manifestations

C) Posterior segment manifestations

D) Neuro ophthalmic manifestations

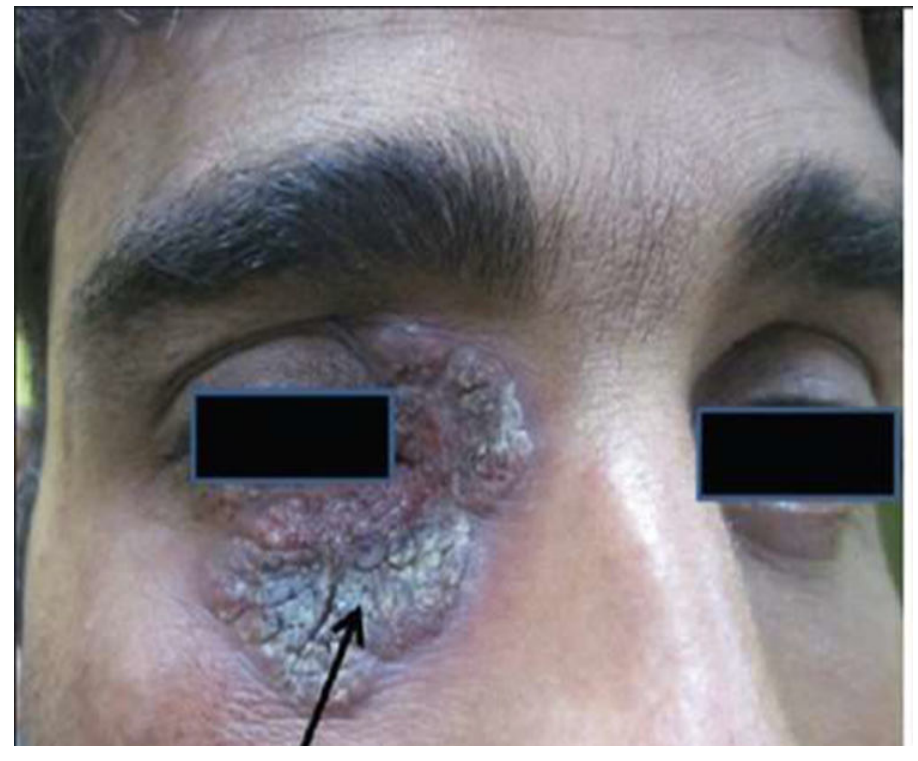
E) Drug related ocular toxicity

ADNEXAL MANIFESTATIONS

- 1) Lupus Vulgaris
- 2) Eyelid Tuberculous Granuloma

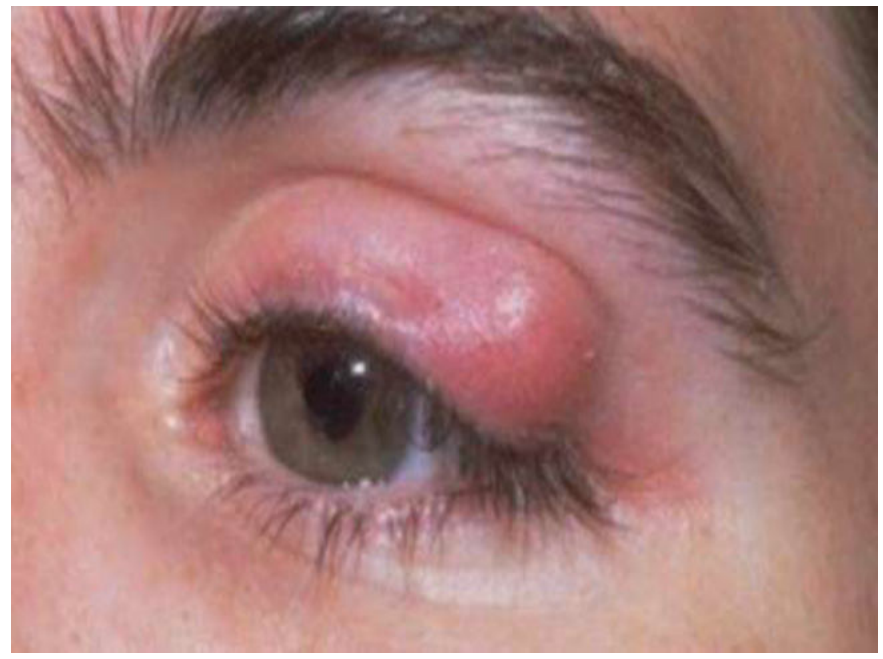
LUPUS VULGARIS

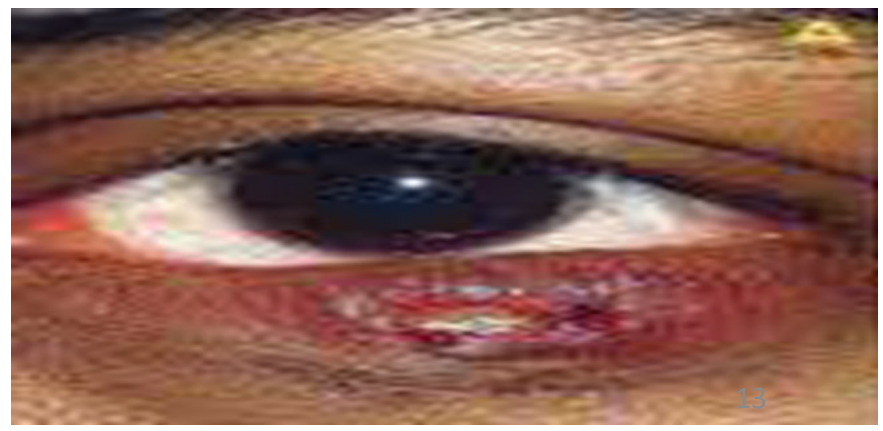
- Unilateral , insidious
- Begins as painless , soft , reddish-brown nodules which slowly enlarge to form irregularly shaped red plaque and later ulceration and scarring occur (painful).
- Often accompanied by lymphadenopathy.
- Complications - squamous cell carcinoma
- Treatment includes ATT.



EYELID TUBERCULOUS GRANULOMA

- Unilateral , insidious
- Manifests with a violet-brown , non-tender, mobile nodule.
- Often accompanied by lymphadenopathy.
- The nodule may ulcerate after some time and spread locally in an irregular fashion.
- Often accompanied by pain and discharge.
- Complications include trichiasis and entropion.





Anterior segment manifestations

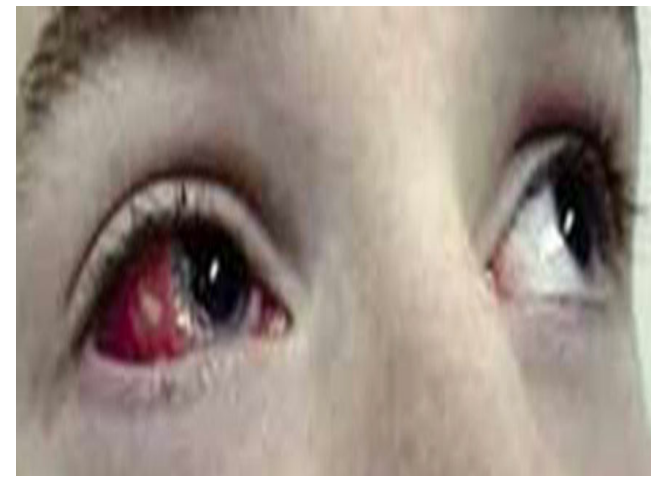
- 1) Tuberculous conjunctivitis.
- 2) Conjunctival granuloma.
- 3) Phlyctenular keratoconjunctivitis.
- 4) Tuberculous Scleritis
- 5) Interstitial keratitis
- 6) Iridocyclitis

TUBERCULOUS CONJUNCTIVITIS

- 1. Primary – Unilateral

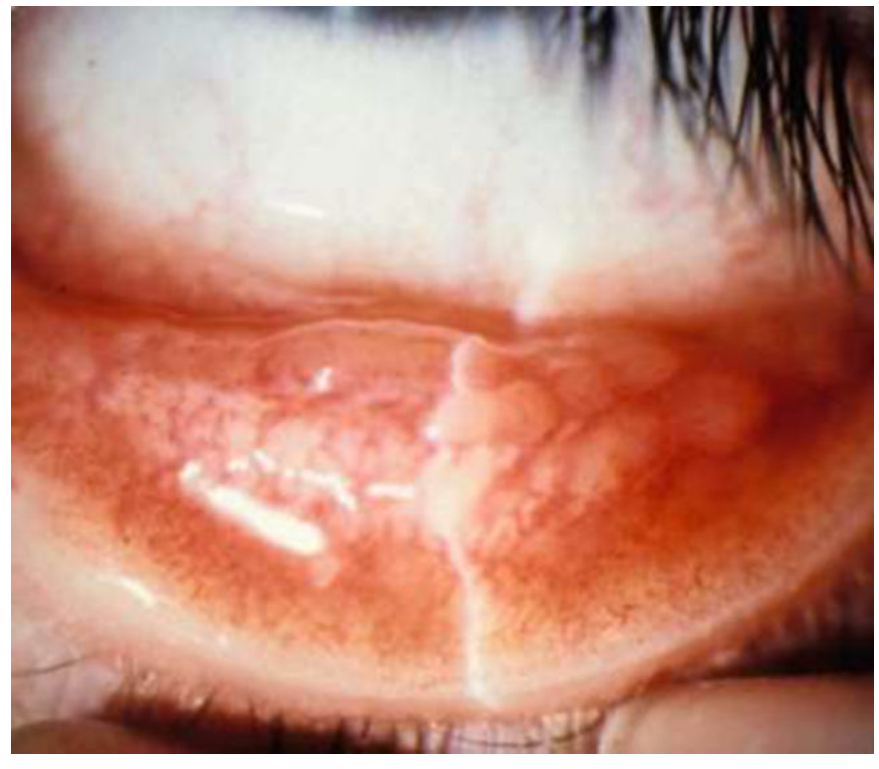
2. Secondary – Bilateral

- Mucoid discharge, edema of lids and chemosis
- Large follicles which ulcerate
- Small, painless, and indolent ulcer, nodule on the tarsal conjunctiva and fornix.
- Preauricular lymphadenopathy.



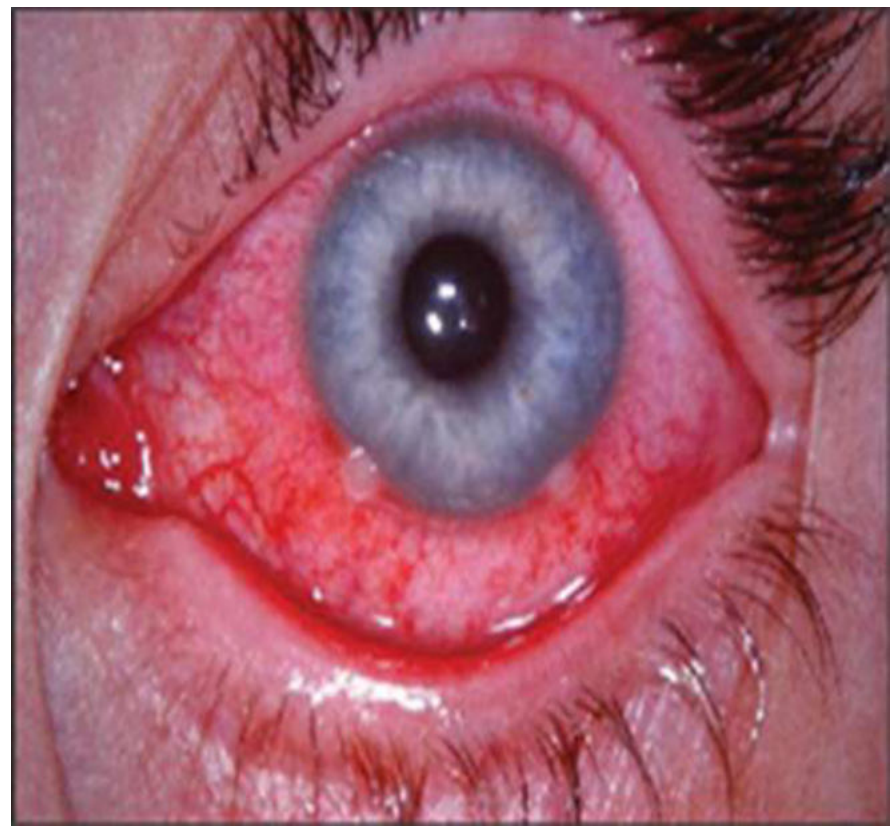
CONJUNCTIVAL GRANULOMAS

- A Type IV Hypersensitivity reaction.
- Presents as an inflammatory mass on the conjunctiva.
- It is usually occurs due to tuberculosis but can be associated with Staphylococcus aureus .



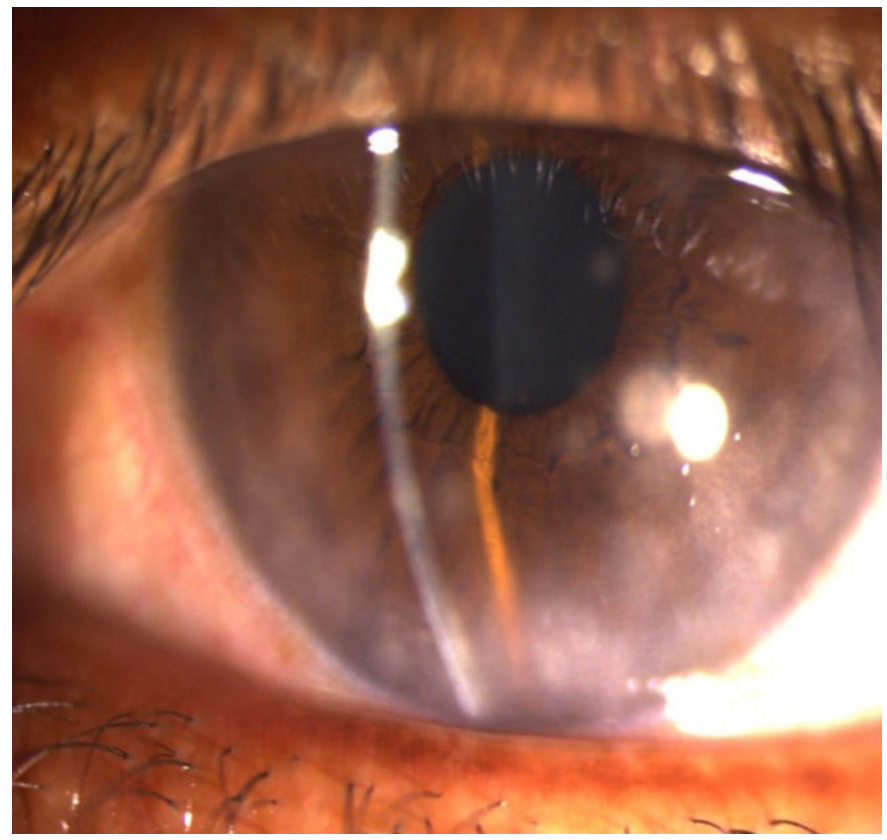
PHYLYCTENULAR KERATOCONJUNCTIVITIS

- Manifests as slightly raised, small, pinkish white or yellow nodule surrounded by dilated vessels on conjunctiva near the limbus
- Classically, there is no clear zone between the limbus and the lesion.
- Is a delayed hypersensitivity reaction to mycobacterial antigens



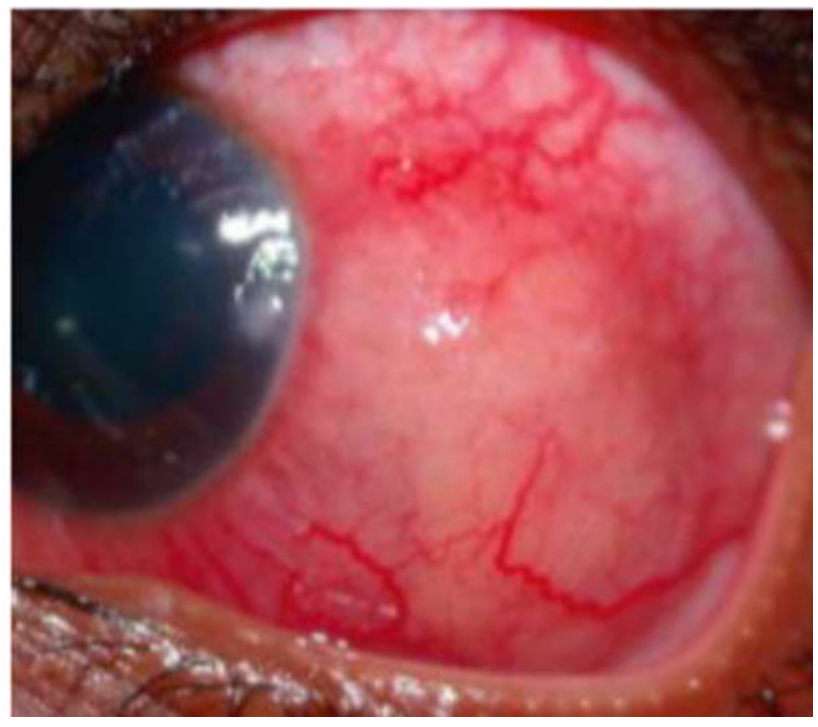
INTERSTITIAL KERATITIS

- An inflammation of the corneal stroma without primary involvement of the epithelium or endothelium.
- In most cases, the inflammation is an immune-mediated process triggered by an appropriate antigen.
- Treatment- systemic antitubercular drugs, topical steroids and cycloplegics



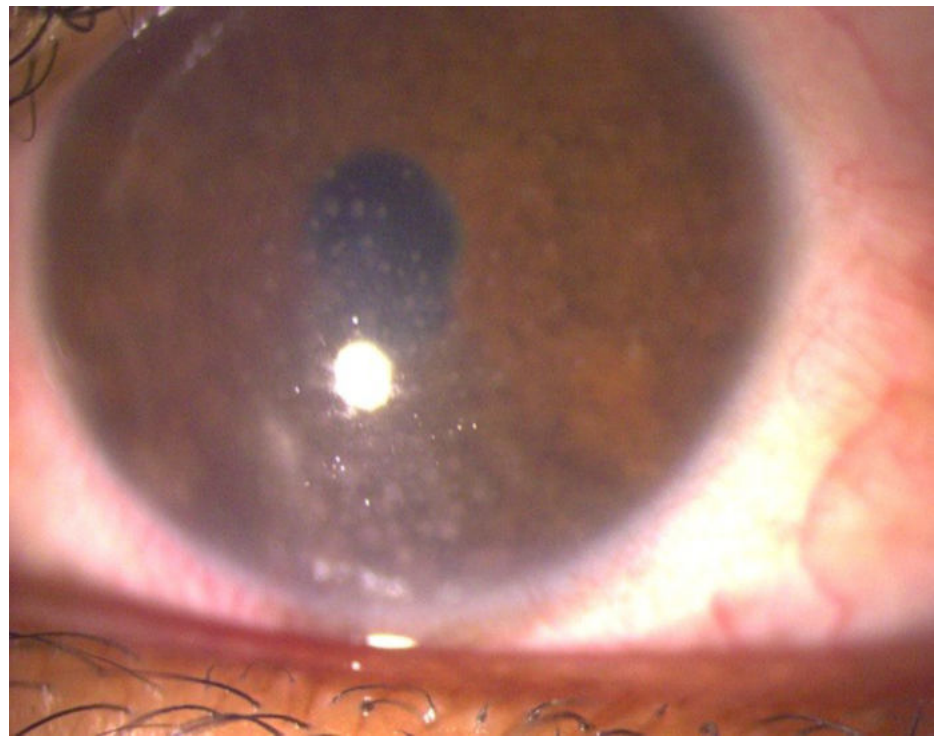
TUBERCULOUS SCLERITIS

- Mostly presents as anterior scleritis
  Posterior scleritis is rare .
- Localized focal elevated nodules
  or Necrotizing scleritis.
- The sclera may be infected by direct spread
  from a local conjunctival or choroidal lesion or
  more commonly by haematogenous spread.
- This may undergo necrosis and may lead to
  scleromalacia
- It does not respond to topical steroids and requires
  antituberculous therapy

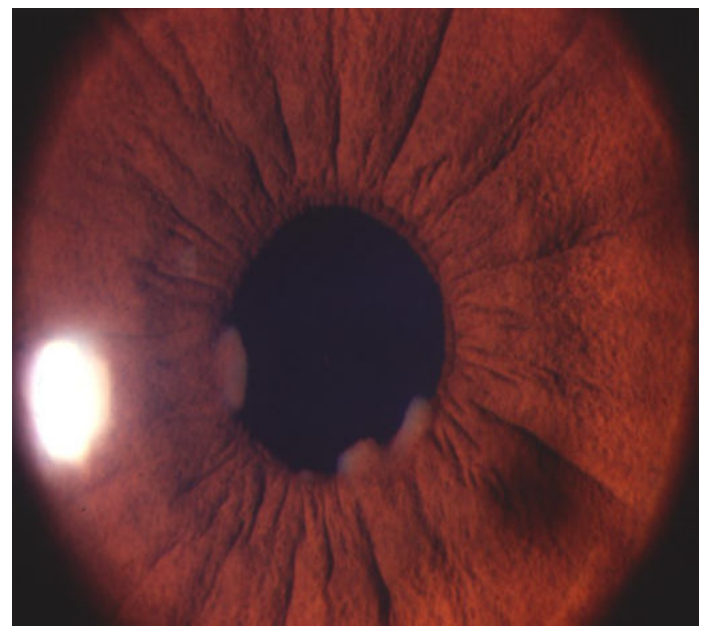


ANTERIOR UVEITIS

- Acute or Chronic granulomatous uveitis
- May be associated with iris or angle granuloma
- Mutton fat KPs
- Posterior synechiae –broad based

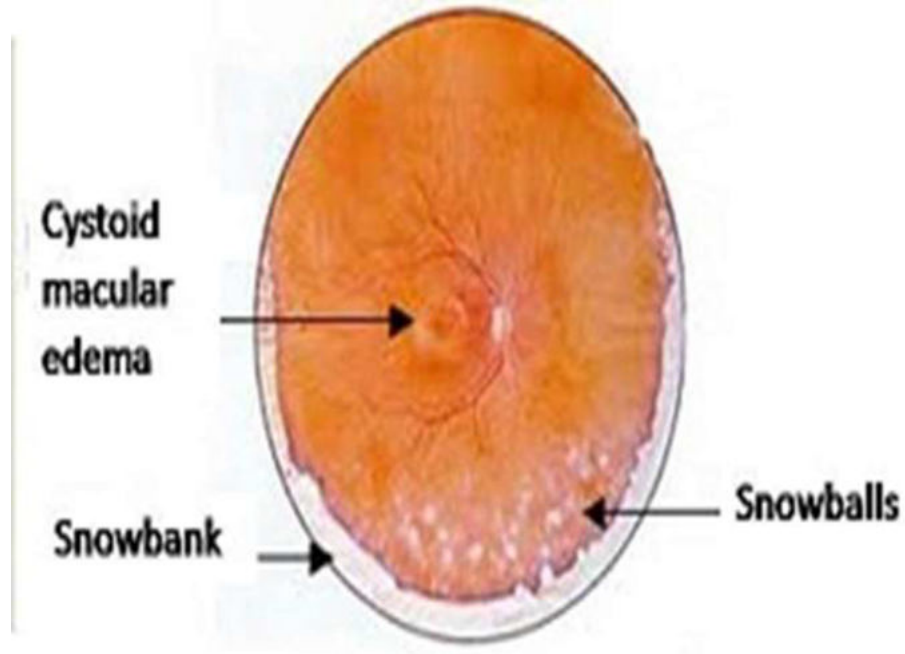


- Iris findings
- Nodules at pupillary margin(Koeppe nodule),
- Busacca nodules
- Small gray nodules at iris root –miliary TB
- Iris atrophy may be seen in some cases
- Severe cases, hypopyon may be seen
- Complications : cataract,glaucoma, vitritis



INTERMEDIATE UVEITIS

- Low-grade, chronic uveitis
- Vitritis with
- - snowball opacities
- - snow banking,
- - peripheral vascular sheathing,
- - peripheral granuloma.



Complications

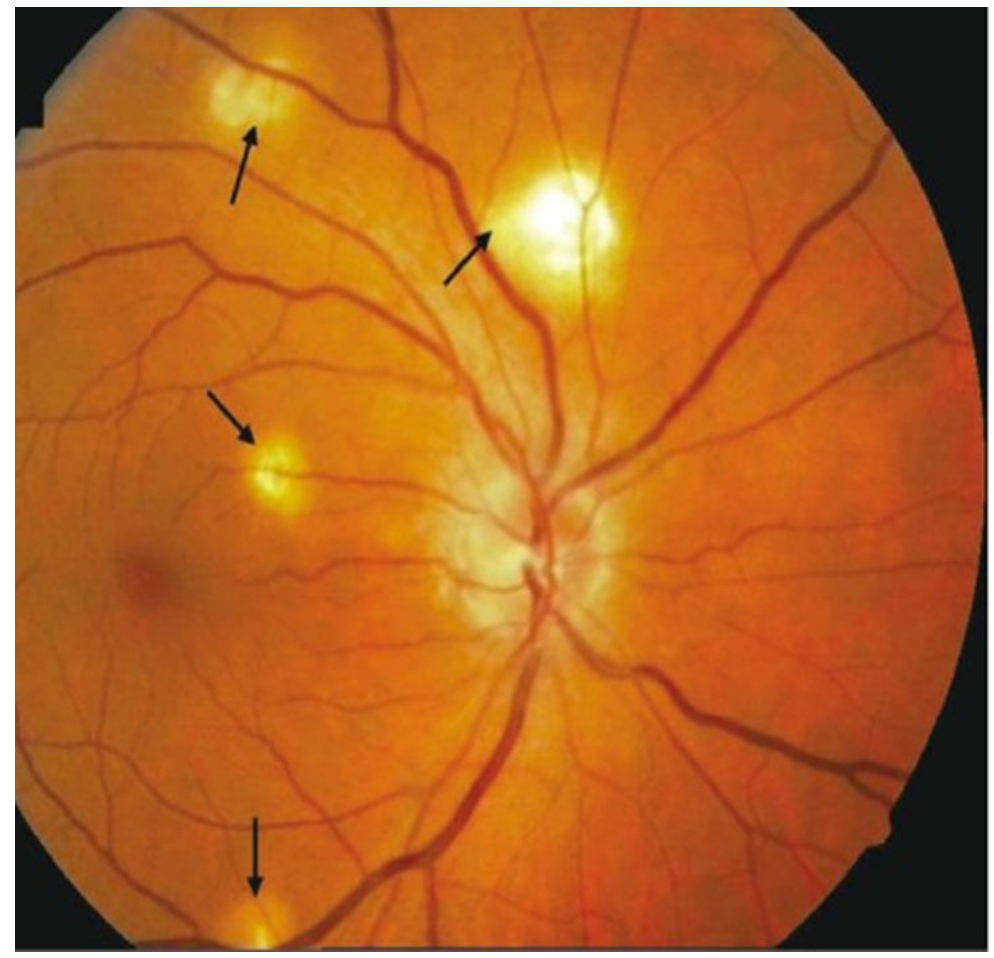
- Cystoid macular edema
- Cataract
- Raised intraocular pressure
- Peripheral neovascularization
- Retinal detachment
- Vitreous haemorrhage

POSTERIOR SEGMENT MANIFESTATIONS

- Choroidal tubercles
- Choroidal tuberculoma
- Serpiginous like choroiditis
- Subretinal abscess.

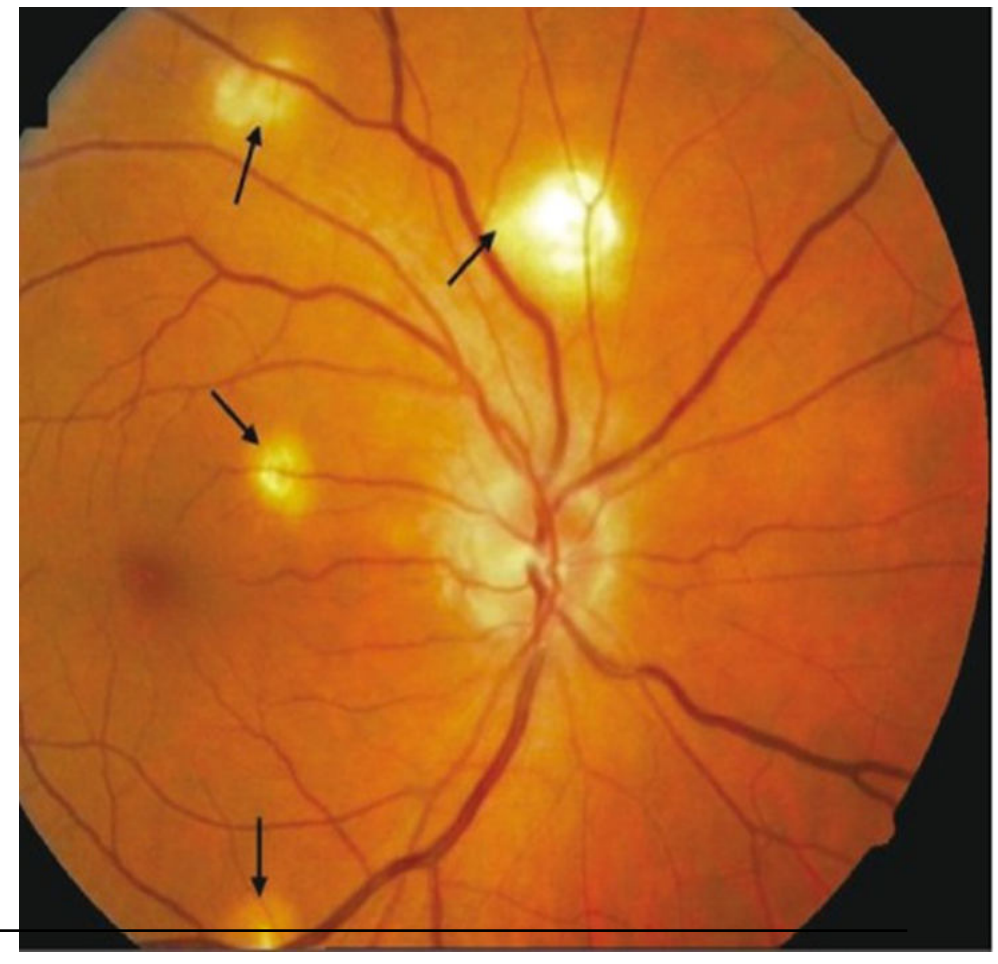
Choroidal tubercles

- Most common manifestation of intra-ocular tuberculosis
- Hematogenous spread
- Less than 5, upto 50 in number
- Unilateral or bilateral
- Grayish white to yellow in colour
- Indistinct borders
- Mostly in the posterior pole



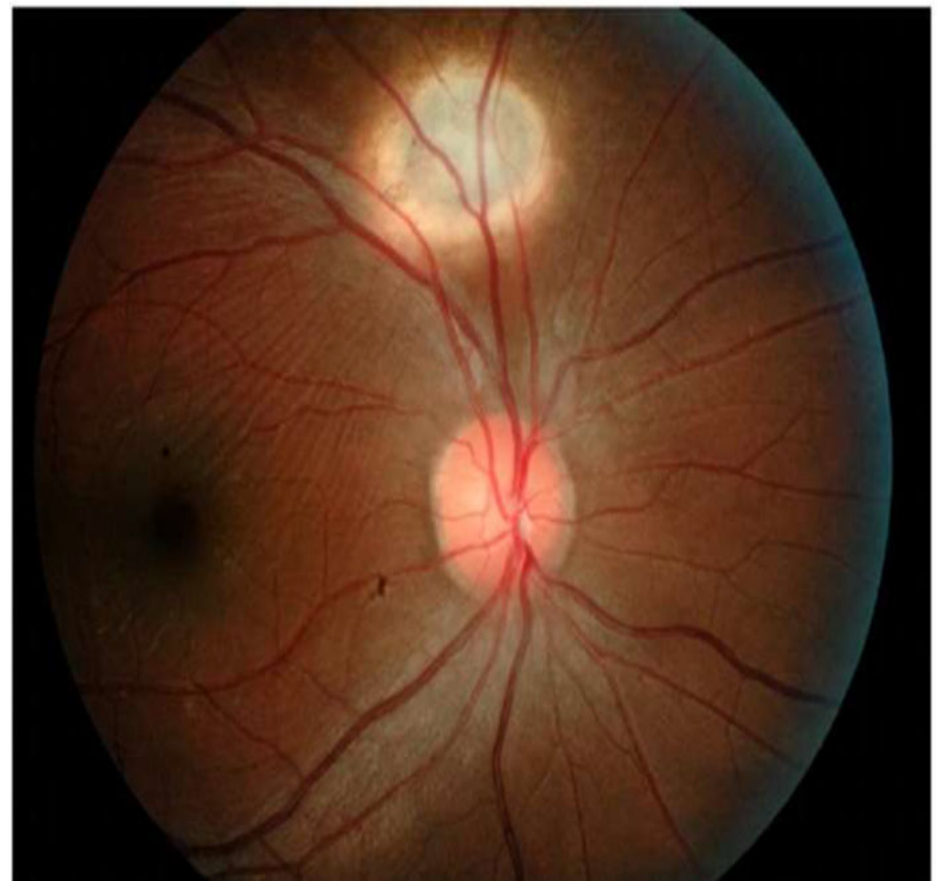
Choroidal tubercles

- Seen in miliary tuberculosis and central nervous system tuberculosis
- Active Choroidal tubercles usually respond well to ATT and generally take up to 3 to 4 months to heal.
- On healing,the tubercles result in pigmented and atrophic scars.



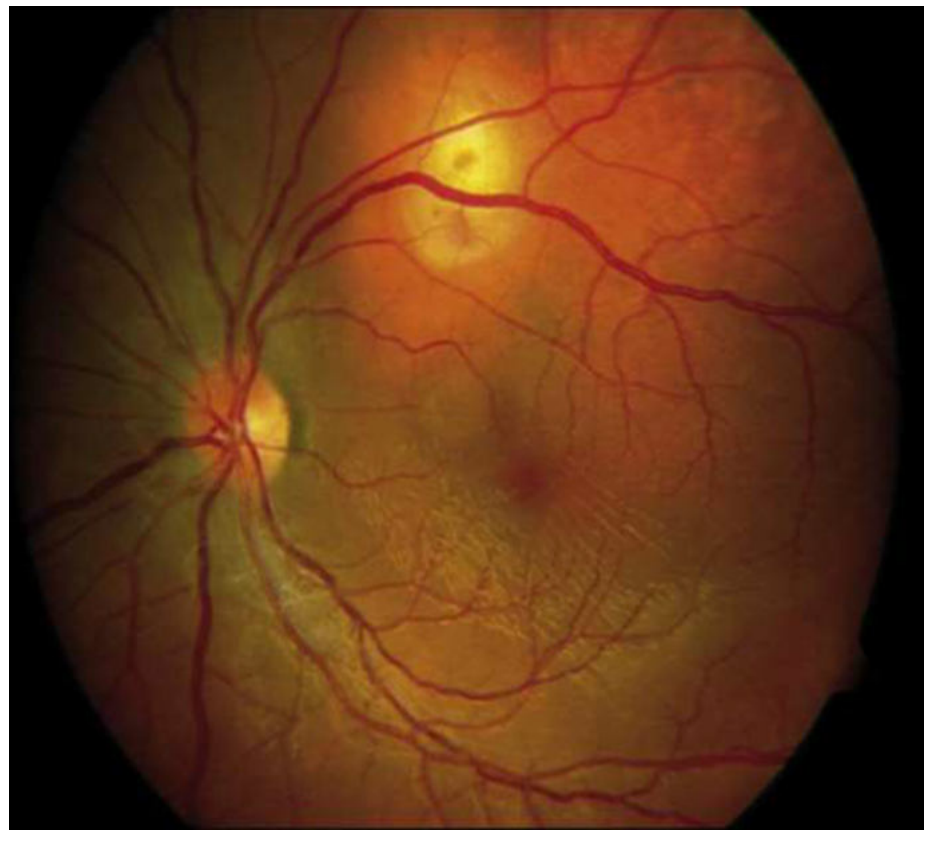
CHOROIDAL TUBERCULOMA

- Choroidal tubercle continues to grow, it forms a solitary mass known as tuberculoma.
- Present as a solitary, yellowish, subretinal mass with surrounding exudative retinal detachment.
- May mimic a choroidal tumour.
- May be located anywhere
- Measures from 4 to 14 mm in size



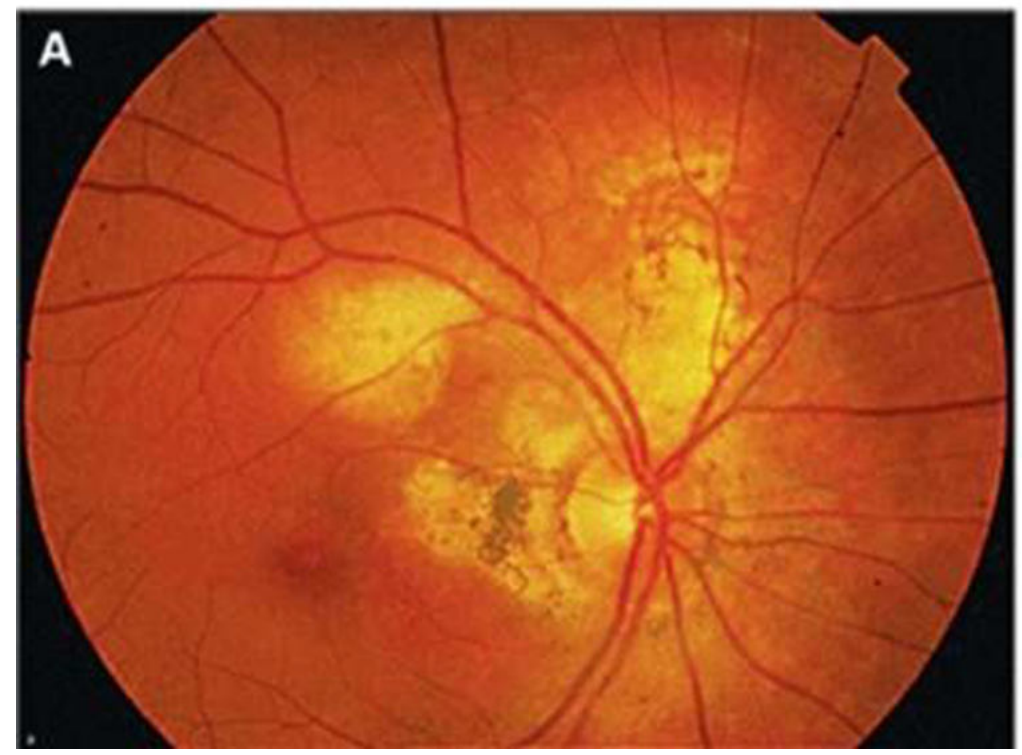
CHOROIDAL TUBERCULOMA

- May occur in immunocompetent patients and in patients with disseminated tuberculosis.
- On ultrasonography, these lesions are solid, elevated masses with moderate to low internal reflectivity.
- Respond well to antituberculosis treatment.



SERPIGINOUS LIKE CHOROIDITIS

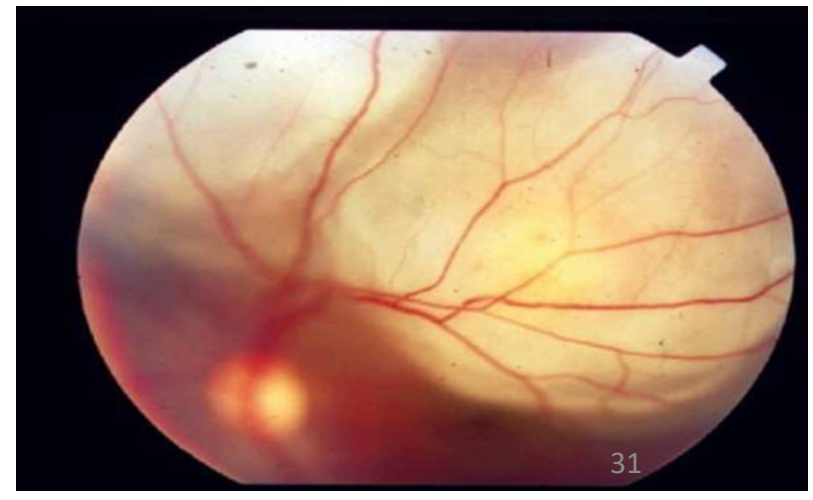
- Chronic, progressive and recurrent inflammation that primarily involves the choroid and choriocapillaris.
- Progresses to involve the retina secondarily .
- These lesions begin in the peri papillary area and spread centrifugally.
- On progression, acquires an active advancing edge



- It represents an immune-mediated hypersensitivity reaction with progression despite administration of antitubercular treatment.
- Antituberculosis treatment in conjunction with oral corticosteroids/immunosuppressive agents may reduce the number of recurrences.
- The healing of such lesions may lead to peripapillary retinochoroiditis scar.

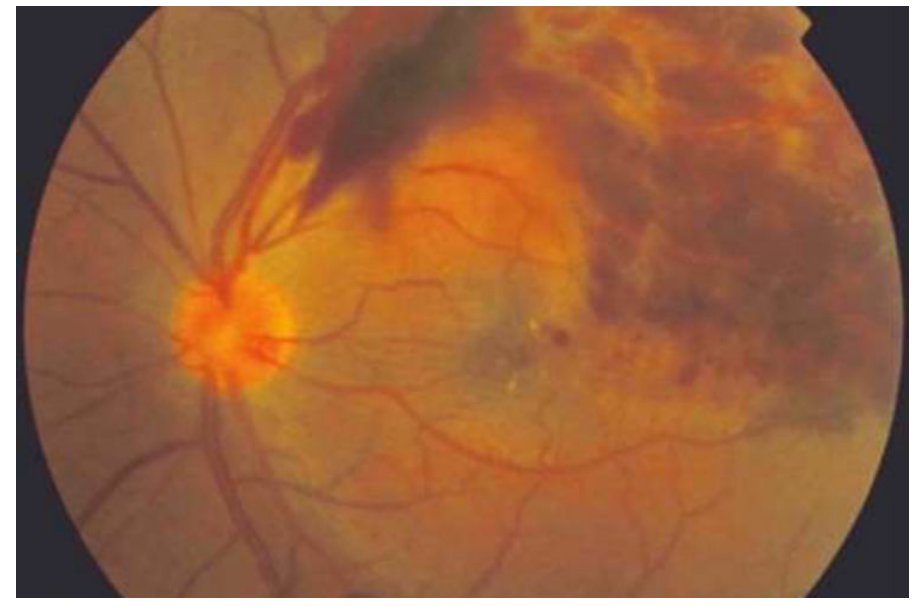
SUB-RETINAL ABSCESSES

- Results following liquefaction of caseous material in the granuloma.
- Yellowish lesions associated with overlying vitritis, retinal haemorrhages and serous retinal detachment.
- Rarely, these lesions can rupture into the vitreous cavity and may lead to endophthalmitis or panophthalmitis



RETINAL VASCULITIS

- Involves mainly the veins
- Characteristic feature is Periphlebitis
- Associated features
- vitreous infiltrates (vitritis)
- perivascular cuffing
- retinal haemorrhages
- neo- vascularization
- neuro-retinitis

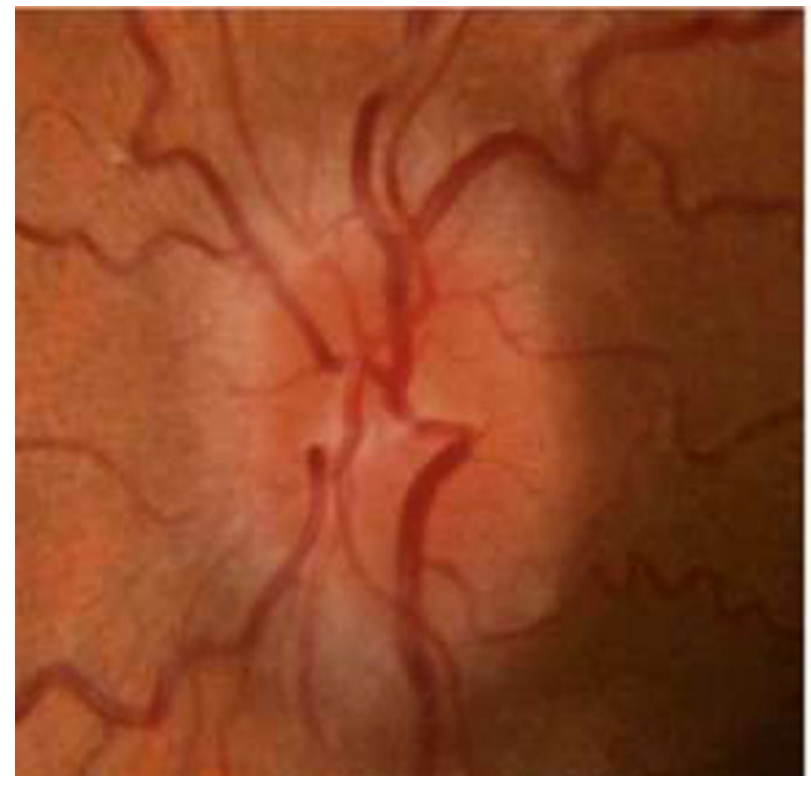


NEURO-OPHTHALMIC MANIFESTATIONS

- The optic neuropathy develops either from direct infection induced by mycobacteria or from a hypersensitivity to infectious agent.

- The involvement may manifest as
- papillitis,
- retrobulbar neuritis
- neuroretinitis.

- Clinical features
- Rapid painful loss of vision
- Vitreous haze
- Hyperemia of the disc
- Blurring of disc margins
- Optic atrophy
- Treatment
- Systemic steroids: methyl prednisolone 1g IV
- ATT



DRUG-RELATED OCULAR TOXICITY

1. Isoniazid
- Optic neuritis
- Steven Johnson syndrome involving lids and conjunctiva

2. Rifampicin
- Orange-red discoloration of tears

3) Rifabutin
- Anterior uveitis .

4)Ethambutol

Ocular toxic effects include
- Optic neuritis, colour vision abnormalities and visual field defects.
- Toxicity is dose and duration dependent.
- The incidence is up to 6% at a daily dose of 25 mg/kg and rare with a daily dose not exceeding 15 mg/kg.
- Toxicity typically occurs within 3–6 months of starting treatment.

COMPLICATIONS OF OCULAR TUBERCULOSIS

- Cataract
- Glaucoma
- Cystoid Macular oedema
- Retinal detachment
- Corneal Scarring

DIAGNOSIS

- Confirmation of the diagnosis is a challenge since intraocular tissue or fluids are examined rarely.
  The diagnosis of ocular tuberculosis has remained largely presumptive and dependent on associated systemic infection.
- The diagnosis is typically made based on the clinical presentation in conjunction with corroborative evidence, direct evidence, and therapeutic response.

INVESTIGATIONS

- Corroborative evidence
- Mantoux test
- Chest X RAY / CT Scan
- Serodiagnosis
- Interferon Gamma Release Assays (IGRA)

- Direct evidence
- Smear and Culture of AFB
- PCR

- Ocular Investigations

- Fundus Fluorescein Angiography and ICG

- Optical Coherence Tomography

- Ultrasonography

- Ultrasound Bio Microscopy

TREATMENT

- Based on evidence - Clinical
- - Indirect and direct evidence
- ATT – drugs similar to the regimen for pulmonary TB, with varying duration
- Corticosteroids – Concomitant use
- Prolonged and difficult in MDR TB

Treatment

ATT	Adult dose	Paediatric dose
Isoniazid	5 mg/kg PO; not >300 mg/d	10-20 mg/kg/d PO; not >300 mg/d
Rifampin	600 mg PO/IV OD	10-20 mg/kg PO/IV; not >600 mg
Ethambutol	15 mg/kg PO OD	<13 years: 15-25 mg/kg/d >13 years: as in adults
Pyrazinamide	15-30 mg/kg PO OD	As in adults

Treatment

- Addition of ATT to corticosteroids in uveitis patients leads to significant reduction in recurrence.
- Systemic corticosteroids used for the first 4–6 weeks, together with ATT, may limit damage to ocular tissues caused from delayed type hypersensitivity.
- One should avoid using corticosteroids alone without concomitant ATT.
- Close follow-up and monitoring of the liver function and renal function is mandatory.

SUMMARY

- Ocular tuberculosis involves almost all ocular structures except lens.
- Commonest manifestation is in the posterior segment.
- Diagnosis depends on clinical findings and suspicion of TB.
- Newer diagnostic modalities, IGRA and PCR are better tools in diagnosis and for initiating antitubercular treatment.
- All patients on ATT should be screened for ocular toxicity.

THANK YOU