

THE EYE

GLOBE (EYE BALL)

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Terms relate to the eyeball

Anophthalmia: Complete absence of the eye ball

Exophthalmos: It is an abnormal protrusion of the eyeball. It may be a congenital condition or may be due to retrobulbar abscess, haematoma, or inflammation. It may be seen as a symptom of diseases like hydrophthalmos and glaucoma. Exophthalmos due to goiter resulting from iodine deficiency is rare in animals.

Enophthalmos (pig eye): Enophthalmos is an abnormal retraction of the eyeball into the orbit. May be congenital or sometimes due to debility or dehydration where there will be reduction in vitreous volume.



Hydrophthalmos:

An enlargement of the eyeball associated with increase in the quantity of aqueous humour.

When congenital, it is called megaophthalmos or *megaophthalmos congenitus*.

Usually results from interference with the drainage of aqueous humour and may be due to the adhesion of iris to the cornea at the filtration angle.

The tunics of the eyeball, especially the sclera and cornea become thin and weak. This condition is common in cats.

The eyeball bulges forward causing exophthalmos and lagophthalmos. This may cause drying or dessication and interference with the nourishment of the cornea.

The cornea becomes opaque, due to pannus. The lens is detached and usually floats in the aqueous humour (*subluxation*) and may become adherent to the cornea or vitreous humour. Keratoglobus (protrusion of cornea into a globular enlargement) or keratoconus (conical enlargement of the cornea) may be observed.

Prognosis is guarded. Treatment involves anterior chamber centesis to decompress the anterior chamber. If hydrophthalmos is due to adhesion of the iris to the cornea or other structural deformities, treatment is confined to removal of diseased eyeball.



Strabismus/Squint

It is a condition where there is abnormal deviation (*from the visual axis*) in the position of the eyeball. Different types of squint are:

- Horizontal squint: deviation is along a horizontal plane. Horizontal squint may again be classified as lateral (divergent) squint and medial (convergent) squint.
- Vertical squint when the deviation is in the vertical plane. Vertical squint may be in the form of an upward deviation of the eyeball or a downward deviation of eyeball.
- Oblique squint when the deviation is in a direction other than the horizontal or vertical plane.

Causes: Squint may be a congenital condition without any apparent cause or

Acquired as in middle ear infections, brain tumours, etc. are sometimes responsible for squint.



Strabismus/Squint

Treatment: If not due to any apparent disease condition like meningitis, surgical treatment may be adopted with an objective to correct the position of the eyeball by incising the particular eye muscle which is causing undue tension on the eyeball.

Technique: With proper aseptic precaution, retract the eyelids with wire speculum. Incise the conjunctiva at the level of the muscle to be divided.

Insert a strabismus hook through this incision to locate the muscle to be divided. Incise the muscle is then cut close to its scleral attachment with a narrow, thin bladed knife. The eyeball may rotate to the normal position as soon as the muscle is cut. The eye speculum is released. Post operative topical antibiotic drops.



Glaucoma (ग्लॉकोमा)

Primary- Goniodysgenesis

Secondary- Lens luxation,

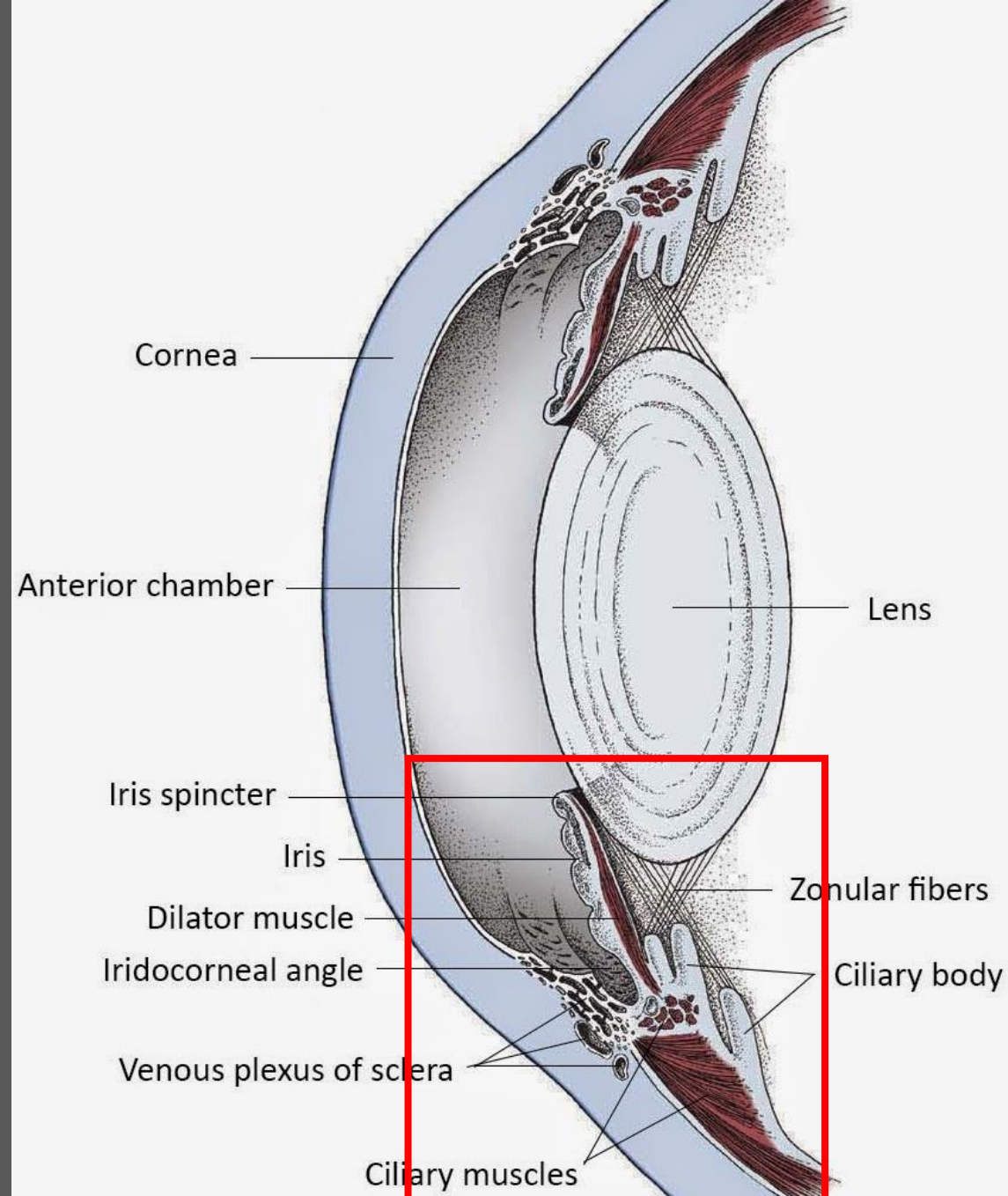
uveitis

neoplasia

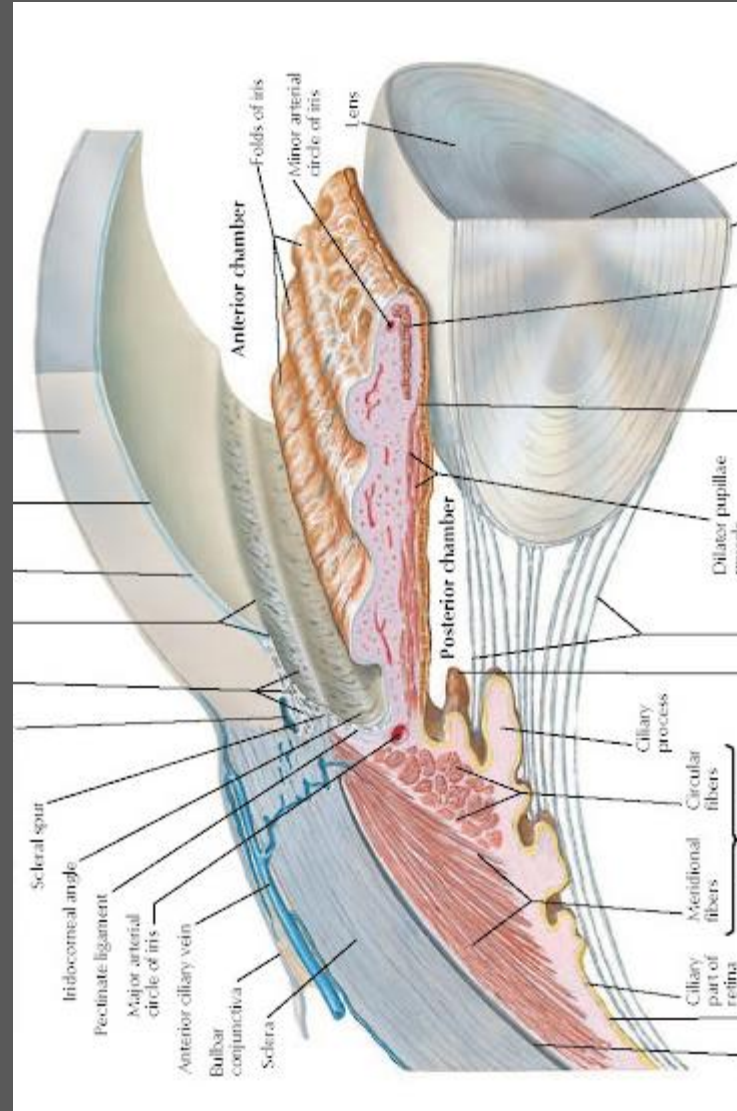
intraocular haemorrhage etc.



Glaucoma (ग्लॉकोमा)



Glaucoma (ग्लॉकोमा)

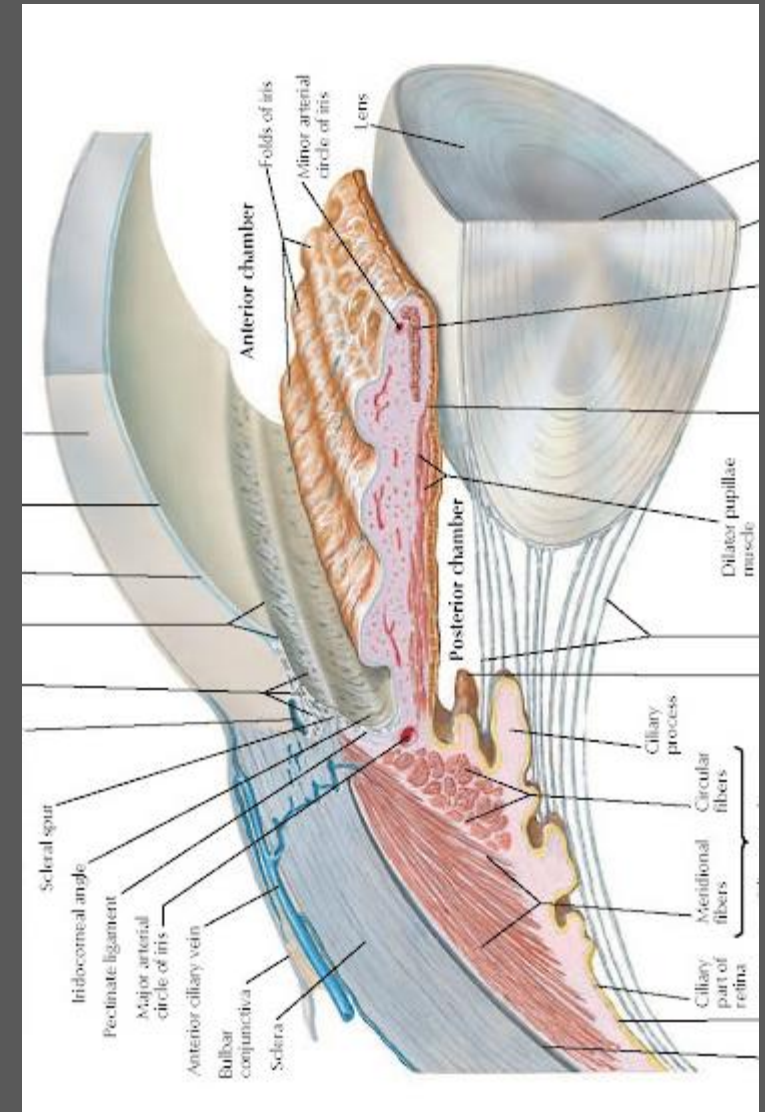


Glaucoma (ग्लॉकोमा)

Marked rise in intra ocular pressure (IOP)

Seen in dogs but rare in other animals

Excessive amount of Aqueous humour



Glaucoma (ग्लॉकोमा)

Pain, Photophobia

Peripheral view greatly reduced

Increased tension on the eye ball, IOP > 50 mm Hg

Fixed, dilated pupil, scleral vessels are enlarged

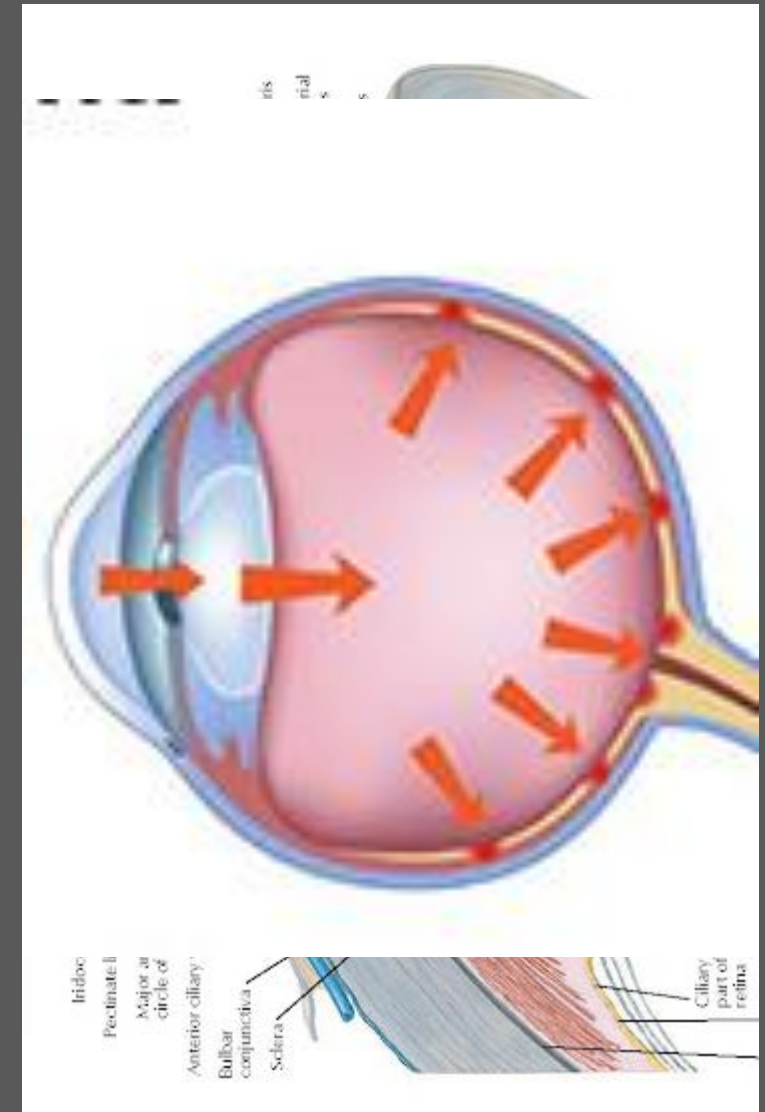
Lens luxation

Lacrymation, cornea sensitive to touch

Ophthalmoscopically-

retinal arteries constricted due to pressure
cupping of optic disc

Pressure atrophy of retina and choroid

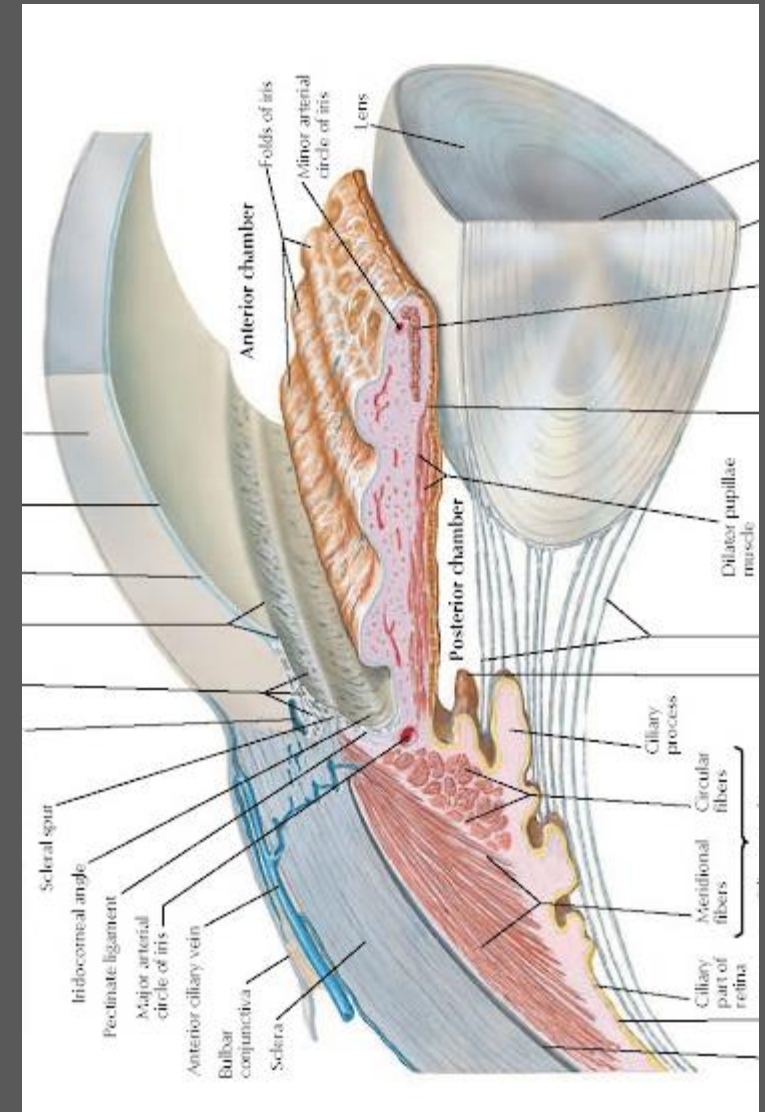


Glaucoma (ग्लॉकोमा)



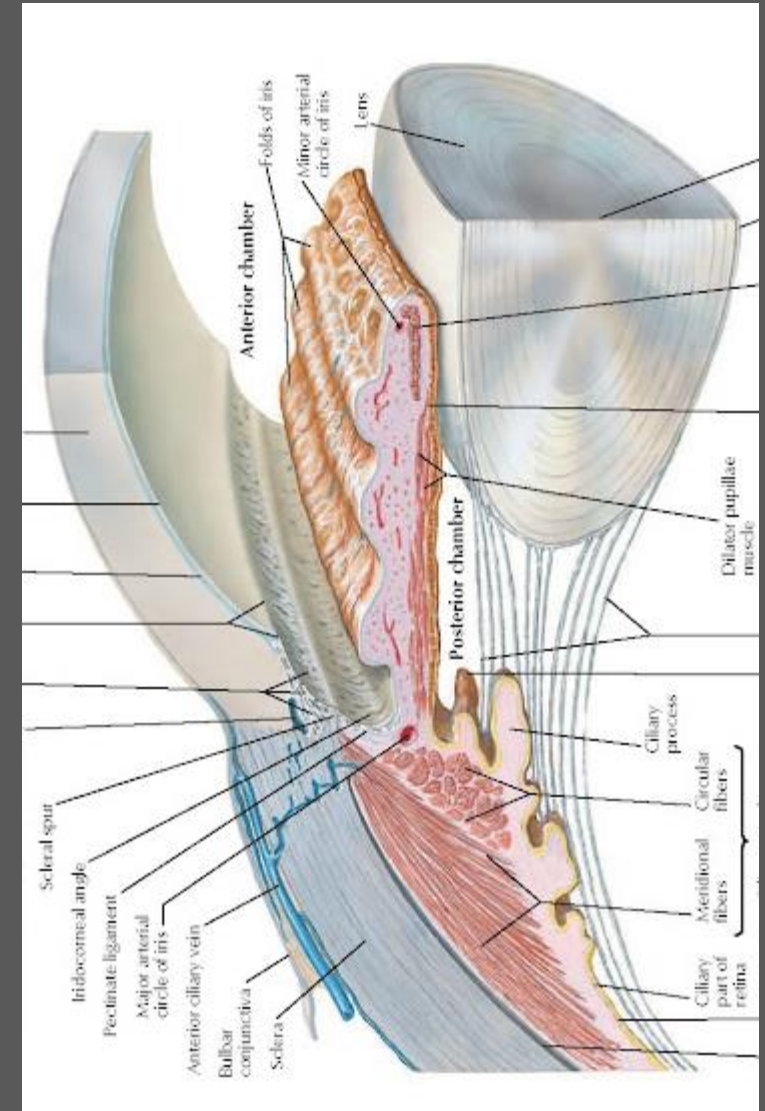
Glaucoma (ग्लॉकोमा)

- Osmotic diuretics
 - Mannitol 1-2 g/kg iv as 10to 20% soln.
- Prostaglandin analogs
 - Topically
 - Latanoprost, travaprost, bimatoprost
- Carbonic anhydrase inhibitors
 - Dorzolamide HCl (Topical) 2%
 - Acetazolamide orally (10-25 mg/kg bid)
- Miotics
 - Pilocarpine 1-2% topically



Glaucoma (ग्लॉकोमा)

- Scleral puncture
- Partial destruction of ciliary body
 - Laser, cryo or chemo.
- Drainage
 - Peripheral iridectomy
- Enucleation
- Correction of causes eg. Uvietis etc.



Corneal affections

Keratitis: the inflammation of cornea, due to:

- bacterial, viral, rickettsial infections,
- trauma (including irritation caused by eyelashes, in entropion, trichiasis, distichiasis, etc.),
- chemical irritants,
- parasites in eye,
- allergy,
- deficiency diseases (Vitamin A, Riboflavin, etc.),
- senility (due to old age),
- neoplastic conditions as dermoids,
- toxæmia, diabetes etc.



Corneal affections

Keratitis: the inflammation of cornea, due to:

- May be classified as superficial, interstitial (parenchymatous), vascular, ulcerative, suppurative, or non – suppurative keratitis.
- The normal, clear, transparent, moist and glistening appearance of cornea is altered, cloudiness or opacity is evident.
- Painful condition, photophobia and blepharospasm.
- In severe cases, vascularisation of the cornea (*pannus*) may be noticed.
- Invading vessels may originate either from the superficial vessels of the conjunctiva (bright red, wavy and superficial) or from the deeper ciliary vessels, situated at the limbus (appear pale or bluish grey and have a more or less straight course).



Corneal affections

Keratitis: Treatment:

- Removal of the cause,
- NSAIDS topically to relieve pain,
- Irrigating with antiseptic solutions like 5% povidone iodine,
- Adequate intake of vitamin A, D and B-complex,
- Instilling topical antibiotics following a antibiotic sensitivity test (ABST) and parenteral administration of antibiotics.



Corneal affections

Keratoconjunctivitis sicca (KCS):

- Either reduced lachrymal secretions (e.g. immune mediated lachrymal adenitis).
- Lagophthalmos.
- Exophthalmos (brachycephalic dogs)



Corneal affections

Corneal Ulcer:

- A corneal ulcer is a wound or abrasion on the corneal surface. A superficial corneal ulcer involves only the surface epithelium.
- A deep corneal ulcer involves the corneal stroma. If the ulcer extends to the deepest level of Descemet's membrane, this is referred to as a descemetocele and is considered a serious emergency due to risk of rupture of the eye. If Descemet's membrane ruptures, the fluid inside the eye leaks out and can potentially lead to irreparable blinding damage to the eye
- Fluorescein dye test positive corneal ulcer viewed through the cobalt filter of ophthalmoscope.
- The green colour in the center of the cornea indicates stain uptake by the corneal stroma.
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Corneal affections

Corneal Ulcer:

- Ulcerative keratitis is frequently met within animals (may be caused due to trauma, infections like distemper in dogs), or nutritional deficiencies (like vitamin A deficiency and Riboflavin deficiency)
- Prognosis is guarded and depends on how deep the ulcer is. When the ulcer heals a localized opacity of cornea results, because of the scar tissue.
- Diagnosis is aided by fluorescein dye test in which impregnated paper strips moistened with saline are placed in dorsal bulbar conjunctiva. Excess stain is washed with normal saline.



Corneal affections

Corneal Ulcer:

Complications-

- *Keratocele/Descemetocoele: Protrusion of an intact descemet's membrane through the ulcer is called keratocele. Keratocele may rupture. Rupture may predispose to prolapse of iris if the wound on the cornea is sufficiently large. So it is better to make a small puncture of the keratocele artificially to let out the aqueous humour and facilitate collapse of the protruded portion. The keratocentesis may be repeated, if necessary.*
- *Staphyloma: It is a protrusion of iris through a wound or ulcer on the cornea. There is leakage of aqueous humour and there is also chance of infection being carried through the perforation of the cornea. If the opening is large the lens may also prolapse. A small staphyloma resulting from a narrow opening in the cornea may slough off during the healing of the corneal wound.*



Corneal affections

Corneal Ulcer:

Treatment of corneal ulcers:

Surgical treatment: temporary tarsorrhaphy, third eyelid flap, conjunctival flap, direct corneal suturing, therapeutic contact lenses, and collagen grafting. In addition to the surgical treatment, medical therapy is also indicated, which include topical antibiotics, collagenase inhibitors, atropine to prevent ciliary spasm, ocular lubricants, and systemic corticosteroids.



Corneal affections

Opacity of cornea:

Corneal opacity is one of the symptoms of chronic keratitis. In mild forms there will be only cloudiness which clears up once the inflammation subsides. In chronic cases this opacity becomes permanent. According to the degree, opacities of the cornea may be classified as Severe, Moderate, Mild and Normal. For treatment, rule out Intra ocular pressure (IOP) rise. Medical management is affected by use of topical antibiotics and NSAIDS (Flurbiprofen) four times daily, use of saline irrigation, administration of placental extract sub-conjunctivally. Surgical management involves superficial keratectomy



Affection of lens

Opacity of Lens is known as cataract. It is a degenerative lesion of the lens.

Classification

- Congenital cataract – Cataract present at birth. (Note: In foetal life the lens receives its nutrition through vascular channels. After birth the lens is entirely dependent on the aqueous humour for its nutrition. In puppies and kitten it is normal for the vascular covering of the foetal lens to persist for a few days after the eyes have opened. This should not be mistaken for congenital cataract.)
- Acquired cataract – cataract developing later in life
- Complete cataract, involving the lens completely.
- Partial cataract.
- Progressive cataract.
- Stationary cataract.
- Juvenile cataract. - Cataract seen in young animals.



Affection of lens

- Senile cataract – Cataract developing due to old age. This is common in veterinary practice.
- Diabetic cataract – This also is not seen in veterinary practice. Diabetic cataract is characterized by minute opacities developing on the superficial cortex of the lens due to turgidity of cells in the superficial cortex of the lens. The turgidity of cells is apparently associated with the sugar content of aqueous humour.
- Toxic cataract – Cataract caused by the circulation of toxins or poisons in the body, e.g., cataract due to equine influenza, periodic ophthalmia, distemper, chronic nephritis, ergot poisoning in cattle and pigs, experimental feeding of naphthalene, etc.
- Capsular cataract – (Anterior capsular cataract and posterior capsular cataract). This is not common.
- Cortical cataract – (Anterior cortical and posterior cortical cataracts). Majority of cortical cataracts are stellate cataracts, i.e., spreading from the centre of the lens to its periphery. Cortical cataract sometimes develops as a complication of a perforating corneal ulcer.
- Pyramidal cataract – A localized opacity of the lens.
- Lamellar cataract – The opacity is seen in the area between the lens nucleus and cortex.
- Perinuclear cataract – This is lamellar cataract seen in horses.



Affection of lens

- Nuclear cataract – Confined to the central portion (nucleus) of the lens.
- Diffuse cataract – Spreading evenly through the entire lens substance.
- Calcareous cataract – Cataract in which the lens substance is partly converted into chalky materials.
- Depending on the stage for surgical removal of the lens cataract is describes as:
- Immature, mature or hyper mature cataract.
- Immature (unripe) cataract is a cataract in which the lens has not become completely opaque.
- Mature (ripe) cataract is one in which the entire lens substance has become opaque and is indicated by a grey white or amber colour. This is the best stage for surgical removal of lens.
- In hyper mature cataract there may be partial calcification of the lens and some portion of the lens may also undergo liquefaction. The cortex appears milky white in colour. The nucleus of the lens may sink into the bottom of liquefied lens substance. Complete removal of the lens is difficult when the cataract is hyper – mature.



Affection of lens

Ætiology:

- Hereditary predisposition,
- Toxins,
- Senile changes attended with old age,
- Sequel of diseases of the eye like irridocyclitis or
- Systematic diseases like diabetes.
- For juvenile cataract seen in young animals, the prognosis is good. The diagnosis can be made by using an ophthalmoscope before which the pupil is dilated by instilling tropicamide (2%) into the eye, in order to facilitate examination of the lens.



Affection of lens

Treatment:

- *Discission or Needling*: The anterior capsule of the lens is incised in a cruciate fashion, using a cataract needle so that the aqueous humour will come in contact with the lens substance and will facilitate re-absorption of the opacity.
- It is to be repeated periodically to obtain the desired effect. It may not be effective in all cases.



Affection of lens

Treatment:

- Removal of the lens: More difficult as compared to humans, as the lens in dog is much larger, and the zonular fibrils are tough. Removal of the lens will not serve any purpose if there are degenerative changes in the retina associated with cataract.
- Two methods for removal of the lens- intracapsular, and extracapsular. Intracapsular extraction (extraction of the lens with its capsule) is difficult in animals because of the tough suspensory ligament.
- Extracapsular extraction (extraction of the lens without its capsule)- The anterior capsule of the lens is incised and through that the lens substance is removed.
- Successful only if the cataracts is ripe (mature) as the remaining endothelial cells of the capsule are incapable of proliferating. If the done before being fully ripe, the proliferation of the endothelial cells after surgery may once again create opacity and this will interfere with vision. Extracapsular extraction of the lens is difficult if the cataract is hyper – mature because of the partial liquefaction or softening of the lens substance.

