33 Cataract assessment

Anatomy

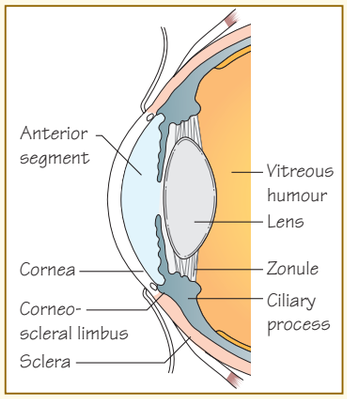
The **lens** is crystalline with an inner nucleus of older inactive cells and an outer cortex, the whole being encapsulated. The **epithelium** is active metabolically, it synthesizes protein for **lens fibres**, transports amino acids and maintains a cation pump to keep the lens clear. At the equator of the lens, epithelial cells differentiate into lens fibres, which lose their organelles and ability for aerobic metabolism

Zonule filaments suspend the lens **ciliary processes** to the **ciliary muscle**. When the muscle contracts the filaments relax allowing the lens to become more convex with a shorter focal length for reading

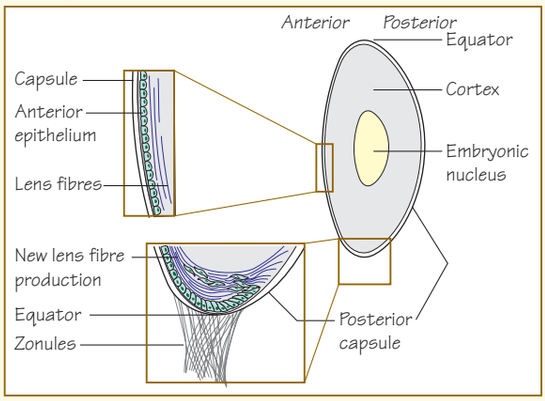
Definition

Cataract: Opacity of the lens of the eye, which occurs when fluid gathers between the lens fibres. The refractive index alters and causes light scatter with resultant blurred vision. Acquired lens changes occur in 95% of people over 65, however, not all these people will require cataract surgery

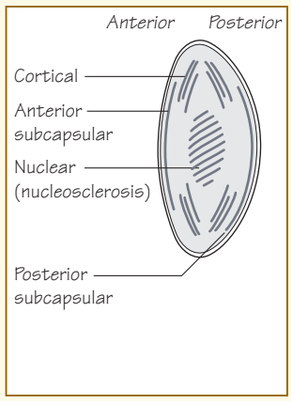
Diagram of normal anterior segment



Close up of normal lens cross-section



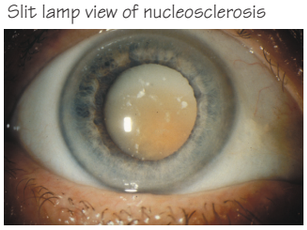
Lens with cataract

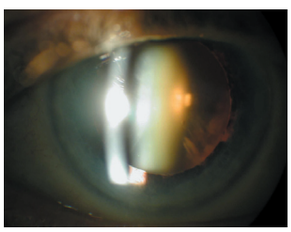


Causes of cataract

- Old age (commonest)
- Associated with other ocular and systemic diseases (diabetes, uveitis, previous ocular surgery)
- Associated with systemic medication (steroids, phenothiazines)
- Trauma and intraocular foreign bodies
- Ionizing radiation (X-ray, UV)
- Congenital (dominant, sporadic or part of a syndrome, abnormal galactose metabolism, hypoglycaemia)
- Associated with inherited abnormality (myotonic dystrophy, Marfan's syndrome, Lowe's syndrome, rubella, high myopia)

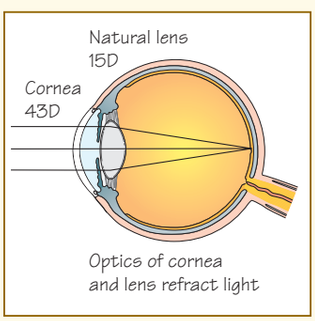
Slit lamp view of nucleosclerosis





Biometry: intraocular lens power calculation

The desired implant should produce a sharp image on the retina. Since each eye has a different corneal curvature and axial length, the implant size has to be measured preoperatively in each patient. The optics of the eye are such that light is refracted by the cornea (effective power of 43D) and by the natural lens (effective power 15D), both of these together give the total power of the focusing components of the eye. A special equation is used to calculate the intraocular lens power, which is usually in the range of 19–22D, with some very short-sighted eyes needing lower powers and long-sighted eyes needing higher powers for clear focused distance vision



Aims

1 Anatomy of the lens.
2 Causes of cataract.
3 Symptoms and signs.
4 Treatment of cataract.

Cataract is the most common cause of blindness in adults worldwide.

Symptoms

- Reduced visual acuity (near and distant objects).
- Glare in sunshine or with street or car lights.
- Distortion of lines.
- Monocular diplopia.
- Altered colours (white objects appear yellowish).
- Not associated with pain, discharge or redness of the eye.

Signs

- Reduced acuity measured on a Snellen chart or LogMar and near vision chart.
- An abnormally dim red reflex is seen when the retina is viewed with an ophthalmoscope at arms length. Nuclear cataract causes a central black shadow across the red reflex and cortical cataracts cause black spoke-like shadows coming from the edge of the red reflex.
- Reduced contrast sensitivity can be measured by the ophthalmologist.
- Only very dense cataracts causing severely impaired vision cause a white pupil.
- After pupils have been dilated, slit lamp examination shows whether the cataract is cortical, nuclear or posterior subcapsular and allows fundus examination.
- Cataract in children is unusual but may be associated with a white pupil, inability to fix on a target (e.g. a light) and the development of a squint.

TIP

Pupils are normal if there is no other ocular or optic nerve disease.

Treatment

- Cataract alters the refractive power of the natural lens so a change in glasses prescription may allow good vision to be maintained. The eye may become more myopic (lenticular-induced myopia) or hyperopic. The legal requirement for driving a car in the UK is 6/10 in one eye. NB, the Snellen chart only has lines corresponding to 6/9 and 6/12.
- If further changes occur in the lens, with increased disturbance of the lens fibres, the visual acuity cannot be improved with glasses and surgical removal of the cataractous lens is required.
- Modern surgery involves removal of the lens fibres, which form the nucleus and cortex of the cataract, leaving the posterior epithelial capsule to hold the new artificial lens and keep the vitreous humour away from the anterior chamber.

Preparation for cataract surgery

- Biometry: ultrasound measurement of the length of the eye and keratometry to measure the curvature of the cornea and hence calculate the power of the implant to be inserted in the eye during surgery.
- Confirm that general health problems are stable, particularly hypertension, respiratory disease and diabetes.
- Some medication increases the incidence of haemorrhage. Warfarin does not need to be stopped but the INR should be less than 3. Aspirin may be stopped 1 week before surgery.
- Inform patients of expected outcome and the complications of surgery (informed consent).

KEY POINTS

- Cataract is common, it is one of the three main causes of blindness worldwide.
- Can occur at any age and in all races.
- Effectively treated by glasses in the early stages and by surgery when more advanced.