Cataract matures slowly and is likely to have caused significant visual problems before this sign can be seen. Varying degrees of haze may be seen through the pupil. Reduced visual acuity and patient history will indicate the need for slit-lamp examination, which will reveal the degree and type of cataract. Reduced visual acuity should always be taken seriously. This may entail referral to an ophthalmologist but often cataracts are identified by optometrists at routine testing for spectacles.

**Surgical treatment of cataract**

Surgery is the only treatment for cataract, and cataract operations have been performed for more than 2000 years, although the approach to surgery has changed. ‘Couching’, a technique that involved pushing the cataractous lens back into the vitreous gel and therefore away from the pathway of light through the eye was the initial method of choice in ancient Indian and Arabian medicine and is still used as a method of vision improvement in parts of the world today.

The first successful removal of a cataractous lens was undertaken in 1750 by Jacques Davial (Albert and Edwards, 1996). Techniques have moved on significantly since then and the main technique used now is extracapsular cataract extraction.

**Extracapsular cataract extraction**

Extracapsular cataract extraction involves opening the anterior capsule of the lens and removing the contents – the cataractous lens. This can be undertaken in a number of ways. The technique initially involves making an incision at the corneo-scleral junction – the limbus – and then a small opening into the anterior chamber. A visco-elastic substance is then introduced into the anterior chamber, or a little further away from the cornea, in the sclera. Through this a tunnel is formed, diagonally, into the anterior chamber. Next, a single continuous circular tear is made in the anterior capsule (capsulorrhexis). The ‘phaco’ probe is then directed though the incision and the lens nucleus is emulsified and removed from the eye by an irrigation/aspiration technique. Finally, a small or foldable lens is placed in the remaining capsular ‘bag’ of the lens.

The advantages of small-incision surgery are that it is fast and often no sutures need to be used, which lessens postoperative astigmatism. Because the wound is smaller there is less likely to be leakage from it and dislodged sutures are unlikely to cause problems. A small wound also means a much faster return to good visual function for the patient. Moreover, there is less need for the patient to be particularly careful of the eye after surgery (although care must still be taken) and so a more rapid physical rehabilitation takes place. There are disadvantages of this technique, however, including a longer learning period for practitioners (Stein et al, 1994) and the fact that expensive equipment is required.

**Cool laser**

Another technique that is beginning to be used is ‘cool laser’. This is a method that uses a laser to generate shock waves by striking a titanium target at the end of an aspirating hand piece (O’Heineachain, 2002). The procedure takes place in a similar way to phacoemulsification, through a very small incision (1.4mm) but the laser does not generate heat, which is an advantage in that this prevents burning of the cornea and heating of tissues, which may occur with phacoemulsification.

**Intraocular lenses**

Historically, a major problem after cataract surgery was the need to wear very strong prescription lenses, which induced a lot of magnification and distortion of images. 

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Cataract is a condition that affects many older people and causes reduced vision, contributing to a reduced quality of life. The whole cataract ‘episode’, from recognition to surgery and aftercare is described, together with the role that nurses play in the care of patients with cataract.

The lens of the eye must be clear if light is to be able to pass unhindered through it and fall on the retina. The anatomy and physiology of the lens is described in Box 1.

**Box 1. Anatomy and Physiology of the Lens**

- The lens is a transparent, biconvex structure located behind and very close to the iris and in front of the vitreous humour, which fills the posterior segment of the eye (Fig 1, p39). It is held in position by fibres known as zonules, which are in turn attached to the ciliary body. The zonules are continuous with the anterior and posterior capsules of the lens.
- The lens is clear, which enables light to pass through it unhindered, and curved in such a way that light moving through it is focused onto the retina. Ideally, the eye is ‘configured’ so that light from infinity (distance) is focused onto the retina by a combination of the cornea and the lens. Many people do not have ideally configured eyes; they therefore need some help with this in the form of an ancillary lens (glasses or contact lenses, for example).
- Light coming into the eye from nearer than infinity needs more focusing and a ‘stronger’ lens. The lens is enabled to change shape so that vision remains clear at all distances (accommodation) by the smooth muscles of the ciliary body. When a person is looking at something near and wishes to bring it into focus, the smooth muscles in the ciliary body contract, relaxing the tension on the zonules that hold the lens in place and allowing the lens to change shape – it becomes fatter and more powerful so that the point of clear vision is closer to the face. The person is not conscious of the process, as it happens so quickly.
- New lens fibres form throughout life and older fibres migrate towards the centre of the lens. Older lens fibres therefore become compressed and the lens becomes denser and less elastic. It does not change shape easily as the ciliary muscles contract, and focusing for near vision becomes more difficult. Eventually, most people lose this ability to such a degree that a lens correction is required to enable focusing (reading glasses).
- The lens becomes increasingly yellow with age and growing density (nuclear sclerosis), although this is not associated with lack of clarity (Gregory and Talamo, 1996).

Symptoms of cataract formation

Image blur may result as the lens becomes unable to resolve separate points on an image. Vision becomes blurred, particularly for near vision. As the lens begins to scatter as well as focus light, because of the opacities within it, glare is likely to result.

The person with cataract may first be aware of changes in vision while driving at night, as light from headlights is scattered. Night driving may become impossible. Cataract may also cause distortion, and straight edges may appear wavy or curved. ‘Ghosting’ of images (where one distinct image is seen with the shadow of another next to it) may occur, and the patient may interpret this as ‘double’ vision (although true double vision is a binocular phenomenon and disappears when one eye is covered).

The increasing density of the lens tissue results in its yellowing, and this can lead to loss of some colour perception – objects appear more yellow and less blue than they did. Unusually, cataract progresses much more quickly in one eye than the other; and loss of vision may be interpreted as being of sudden onset if the patient happens to close his/her ‘good’ eye.

Signs of cataract formation

It is unusual for the cataract to appear as a white pupil.
The first lens for implantation within the eye was introduced by Ridley in 1949 (Stein et al, 1994). Further and continuing development of intraocular lenses that are inert within the eye has massively improved the visual outcomes of cataract surgery, and magnification and distortion of images have been reduced to zero.

Intraocular lenses are placed in a variety of positions within the eye, depending on the type of surgery that has been carried out. The preferred position is in the capsular ‘bag’, which remains after extracapsular cataract extraction, as it is the most anatomically correct.

Most intraocular lenses are single vision, simple lenses (the optic) with fixation devices attached; often simple curved loops (the haptic). The haptic may be compressed when the lens is implanted into the capsular bag; the haptics then act as ‘springs’ to keep the lens in place. Lenses may be rigid, or compressed so that they ‘unfold’ over a number of hours when they are in position inside the eye.

A single vision lens can correct impaired far or near vision but not both, so it is likely that the patient will still need spectacle correction of some sort after surgery. Further lens development has resulted in multifocal lenses, which can be very successful. Accommodating lenses, where the lens position changes as the person changes focus, are also in use and the development of new and better intraocular lenses continues.

Complications of cataract surgery

No surgery is simple and straightforward. Possible complications during and after cataract surgery include:

- Rupture of the posterior capsule during surgery, which may result in the nucleus dropping back into the vitreous cavity, necessitating a further procedure (vitrectomy) either during the surgery or later. Posterior capsule rupture may also result in the need to use a different type of intraocular lens in the eye;
- Raised intraocular pressure owing to the blockage of aqueous humour outflow channels with the viscoelastic substance used at surgery. Pressure may also rise as a reaction to the surgery or as a result of inflammation. The patient is likely to experience pain and new blurring of vision some hours after surgery;
- A shallow anterior chamber, which may result from inhibition of aqueous humour production because of a wound leak following postoperative trauma, or from raised pressure. This is of concern, because if the chamber becomes very shallow, the corneal endothelium may touch the iris. Damage to corneal endothelial cells may result in permanent corneal oedema;
- Retinal detachment may occur after cataract surgery in a very small number of cases. Any report by the patient of new floaters in the eye, flashing lights or the loss of sectors of vision indicates that an urgent examination is required;
- Cystoid macular oedema (oedema of the retina at the macular) is likely to cause some disturbance of central vision. It often disappears over time;
- Uveitis (inflammation of the iris and ciliary body) occurs as an inflammatory response to surgery. It is a normal consequence of surgery and patients are treated postoperatively with eye drops containing a steroid to reduce and control the inflammation. Pain and redness of the eye may occur if the inflammation increases, in which case modification of the drop therapy is required;
- Displacement of the intraocular lens may occur after surgery and is likely to necessitate further surgical intervention to replace the lens or correct its position;

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Posterior capsular opacification is the most frequent long-term complication of surgery and is reported in between 10 and 50 per cent of all cases (Apple et al, 2001). The posterior portion of the remaining lens capsule becomes opacified and the patient reports reduction in vision. Posterior capsular opacities are easily dealt with using a laser to burn a hole in the capsule (YAG capsulotomy). This is painless, and can easily be undertaken as an outpatient procedure.

Infection is always a possible complication of surgery, and for this reason a prophylactic antibiotic drop will be prescribed after cataract extraction. The anti-inflammatory and the antibiotic may be combined in a single drop such as Maxitrol.

Anaesthesia

Most cataract extraction takes place under local anaesthetic and is the preferred technique for cataract surgery owing to the much reduced morbidity and mortality associated with local as opposed to general anaesthesia (SIGN, 2001).

A number of local anaesthetic techniques are used in cataract surgery. Retrobulbar anaesthesia (involving an injection of local anaesthetic directly into the retrobulbar space) and peribulbar injection (involving a larger volume of anaesthetic being injected into the orbit outside the muscle cone) have been the preferred methods of anaesthesia for a long time, particularly because of the good muscle paralysis that these methods achieve. However, these techniques have their drawbacks, for example central nervous system symptoms as a result of the spread of the anaesthetic from the orbit, which may include respiratory arrest and brain stem anaesthesia (Hamilton et al, 1988; Nicoll et al, 1987). Other techniques of local anaesthesia are becoming much more common, tending to replace retrobulbar and peribulbar blocks. One technique, sub-Tenon’s anaesthesia, involves use of a blunt cannula to infiltrate anaesthetic into the retrobulbar space after dissecting through the conjunctiva. This also tends to achieve good muscle paralysis.

Topical anaesthesia using anaesthetic eye drops is increasingly being used, either alone or with injection of the anaesthetic into the eye once the incision has been made. This and subconjunctival injection have the drawback that patients must be able to keep their eye very still during surgery, as the extracocular muscles are not paralysed. However, some surgeons may find some ocular motility advantageous in phacoemulsification surgery as they can ask the patient to look in a particular direction to facilitate aspiration of the lens matter.

Eke and Thompson (1999) found that serious adverse events have been reported with all local anaesthetic techniques and attribute these to stress during surgery, the oculocardiac reflex, the systemic effects of topical treatments such as eyedrops, and coincidental effects. Patients must be monitored during surgery. Rapid access to advanced life support skills is mandatory when retrobulbar blocks are used and this may mean having an anaesthetist in the theatre suite. The patient should have access to intravenous infusion and blood pressure monitoring equipment if retrobulbar or peribulbar blocks are used. Oxygen saturation should be monitored by pulse oximetry and the heart by electrocardiograph during all ophthalmic surgery, with a member of the theatre team dedicated to these tasks (SIGN, 2001).

Preoperative assessment

The NHS carried out about 170,000 cataract operations in 1998–1999 (NHS Executive, 2000). The current waiting time for assessment and surgery, together with the UK’s ageing population, make it imperative that services are organised in an optimum way in order to enable the best use of time and resources so that treatment is not unduly delayed.

Action on Cataracts (NHSE, 2000) was published as best practice guidance to assist the ophthalmic services
to streamline care for patients. It has been a major driver in their reorganisation and the rapid move to day-case surgery, which has become the norm in most areas of ophthalmic practice. Patients having cataract surgery require more detailed assessment than is possible at a single consultation with an ophthalmologist. Day surgery in particular requires a comprehensive preoperative assessment, and this may take place on the same day as the consultation with the ophthalmologist, thus saving the patient another visit to the hospital (Rose et al, 1999; Prasad et al, 1998; NHSE, 2000).

The preoperative assessment involves:

- A medical evaluation, including recording details of current medication and history of any allergies;
- Biometry – this is a series of measurements of the eye, including assessment of the corneal curvature and the axial length of the globe so that calculations can be made on the intraocular lens power needed at surgery. Discussion with patients about their lifestyle will take place at this stage to determine whether near or far vision is more important to them;
- The identification of social problems that may require support, in which case services may be arranged and surgery is not delayed;
- The identification and initiation of treatment for any conditions that may increase the risk of severe postoperative infection (endophthalmitis), such as lid and conjunctival infections.

A large part of the preoperative assessment visit is concerned with information and education so that patients have all the knowledge they need to consent to surgery and to understand what will happen during the day-case episode. The benefits and risks must be clear to patients before consent is signed.

It is important that patients are aware of what to expect before, during and after surgery, and are informed about any medication that will be provided postoperatively. Information must be given in a form that is intelligible and timely, and creative solutions to the provision of information for people with vision problems must be considered.

During surgery patients need to be able to lie still and must be aware that they cannot move their heads or their eyes. They also need to be prepared for their faces to be covered, because this can be a very frightening experience initially.

A member of the theatre staff who acts as a liaison between the patient and the surgical team usually supports patients undergoing cataract surgery under local anaesthesia. This health care professional is often known as the ‘hand-holder’ but this title underestimates the importance of the role.

Postoperative care

All cataract patients used to be examined by an ophthalmologist on the first day after their operation. This event used to be known as the ‘first dressing’, when a nurse would remove the patient’s eye pad, examine the eye with a pen torch, clean the eye, instil any medication and then hand over the patient to an ophthalmologist for examination. This ritualistic approach to care has changed rapidly, particularly as a result of the new surgical techniques and also because it is now realised that patients suffer complications of cataract extraction in only a tiny minority of cases.

The SIGN (2001) guidelines suggest that there is no evidence that review is necessary on the first postoperative day but recommends that complex cases should be seen on the first day. It also recommends that all patients be seen within the first week. Patients must, therefore, have been given comprehensive, accurate and comprehensible information about what to do if things ‘go wrong’ or if they are worried. This means they must be given telephone numbers and lists of possible scenarios that should lead to their seeking help. The minimum advice a patient should receive is about key symptoms of pain, loss of vision and discharge.

A further recommendation by SIGN (2001) is that patients should be advised that any activity that causes pain in the operated eye should be avoided.

Once intraocular inflammation has settled and eye medication is no longer being used, patients have their eyes tested to record the final outcome of surgery. At this time any corrective lenses are prescribed. Patients are likely to be discharged from the eye unit at this stage.

The role of the nurse

Although the care of patients with a cataract is a multidisciplinary effort, nurses are increasingly undertaking much of the care surrounding the surgical procedure.

Assessment is commonly carried out in preadmission clinics, with ophthalmic nurses playing a lead role in the preassessment of the patient, including examining the eye, performing biometry, and obtaining informed consent (Stanford, 1998; Gregory and Lowe, 1991). Ophthalmic nurses also undertake a key role in theatre, including the giving of sub-Tenon’s anaesthesia and acting as first assistant to the ophthalmologist – a long-standing role within this specialty.

In some areas nurses undertake all postoperative care of patients who have had uncomplicated cataract surgery and this may include the modification of medication using patient group directives or supplementary prescribing, auto refraction and final discharge of the patient from the service. Often the only time the patient is in contact with an ophthalmologist is in theatre at the time of surgery. While this means that patients may feel that the service has been seamless in that consistent advice and care have been received from the same group of nurses, and that job satisfaction is enhanced for ophthalmic nurses because of their ability to carry out truly holistic care, the multidisciplinary teamwork envisaged by most members of the team sometimes appears to have changed in emphasis. However, creative ways of service organisation and delivery over the whole of the UK are making an impact on cataract services so that patients are receiving timely surgery to improve their quality of vision and therefore their quality of life.