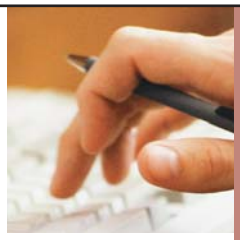

Corneal graft case study

Eye series - 15

Chris Hodge, BAppSc, DOBA, is Research Director, The Eye Institute, Chatswood, New South Wales.
Michael Lawless, MBBS, FRACO, FRACS, FRC (Ophth), is an ophthalmic surgeon, The Eye Institute, Chatswood, and Senior Clinical Lecturer, University of Sydney, Royal North Shore Hospital, New South Wales.

Case history

A young patient has returned from their ophthalmologist having been diagnosed with keratoconus. It was explained that if eye glasses or contact lenses become insufficient in correcting their vision, a corneal transplant may be necessary.
The patient is concerned about this possible development.

Question 1

What is keratoconus?

Question 2

Describe the symptoms of keratoconus.

Question 3

What causes keratoconus?

Question 4

How is keratoconus treated?

Question 5

Detail the corneal transplant process.

Question 6

What is the success rate of corneal transplant surgery?

Question 7

Describe the possible side effects of transplantation.

FEEDBACK

Answer 1

Keratoconus is a noninflammatory, thinning disorder of the cornea. As the condition progresses, the cornea protrudes and forms an irregular shape. Keratoconus literally means 'cone shaped cornea'. This is a relatively uncommon condition varying in incidence of 50–230 people per 100 000 in the general population. Almost always occurring bilaterally, the condition begins during puberty and increases until the third or fourth decade of life when it stabilises.

Answer 2

Blurring and distortion of vision are the earliest symptoms of the disease. In the early stages, vision may only be slightly affected and is corrected well with glasses or soft contact lenses. As the condition deteriorates, the cornea will become increasingly abnormal leading to further deterioration in vision. (At this stage glasses cannot compensate for the increasingly irregular shape of the cornea). The patient may also notice increasing glare, light sensitivity and irritation over time. It is common for the eyes to be affected asymmetrically. In severe cases the corneal endothelium may split leading to painful oedema (*Figure 1*). The oedema may persist for weeks or months and is gradually replaced by scar tissue. Vision may be severely compromised at this point.

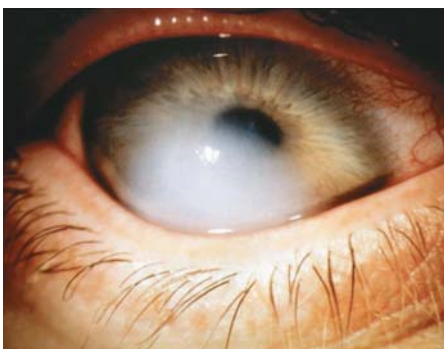

Figure 1. Corneal oedema due to break in endothelium

Answer 3

The exact aetiology of keratoconus is unknown. The condition is most likely multifactorial in nature. Possible factors include:

- elevated matrix metalloproteinase endopeptidases
- micro trauma (eye rubbing, contact lens use or allergy), and
- genetic factors.

Keratoconus has also been associated with a number of other conditions such as Down syndrome, Leber congenital amaurosis, and Marfan syndrome. Atopy, causing itchy, irritable eyes, is common in keratoconus patients.

Answer 4

The first and most appropriate step is to prescribe correction for the refractive error induced by the corneal changes. In mild cases, eye glasses will often provide adequate vision. In more advanced cases, the capacity of glasses to correct the patient's vision is dramatically reduced, and hard or rigid contact lenses are required to overcome

corneal irregularities. Improved lens design has enabled patients with keratoconus to enjoy contact lens wear for longer periods of time. Occasionally other ocular conditions such as atopic or allergic conjunctivitis are seen in association with keratoconus and will require treatment to enable the patient to continue with comfortable contact lens wear.

Corneal transplant surgery is indicated for patients who fail to achieve adequate vision with hard contact lenses or become intolerant to contact lenses. Although keratoconus is the most common reason for corneal transplantation, less than 5% of patients with this condition will progress to transplant surgery.

Answer 5

Once an ophthalmologist decides the patient will require a corneal graft, the patient will be placed on the transplant registry list. Due to the nature of transplant donation, the patient will usually receive little notice before surgery. Surgery is routinely done under assisted local anaesthetic. Sutures are required to hold the donor cornea in place and are left in for approximately 12 months depending on the corneal shape and healing. As the sutures are buried, they do not cause any local irritation (*Figure 2*). Vision will fluctuate in the early postoperative period stabilising after about 8 weeks. The final, best vision will not be achieved until after the sutures are completely removed. The patient is required to use topical antibiotic medication for 1 month and topical low dose corticosteroid medication until the sutures are removed. Systemic immunosuppression is not required.

Answer 6

Generally over 90% of corneal grafts are successful in achieving functional vision after surgery. The success rate, however, will vary depending on the host disease with nonvascularised, noninflammatory diseases with normal intraocular pressure predictably achieving the best results. This is the case in keratoconus patients.

Answer 7

Corneal transplantation, as with any surgery, carries the risk of side effects. These include:

- infection and intraocular haemorrhage during surgery or in the immediate post operative period (low incidence)
- primary donor failure due to poor quality corneal endothelium (occurs within the first few weeks postsurgery)
- corneal graft rejection (most common cause of graft failure), or
- raised intraocular pressure.

Graft rejection is characterised by a red or painful eye with increased light sensitivity and decreased visual acuity (*Figure 3*). The extent of symptoms depends on the severity of the rejection episode. Most cases, if handled promptly, can be successfully treated. Treatment usually consists of a short course of intensive topical corticosteroids. In some cases systemic medication may be necessary. Some cases will go on to irreversible graft failure despite treatment.

Sometimes a keratoconus patient will achieve an excellent anatomical result after corneal transplantation but have poor vision due to a large optical error (often myopic astigmatism). Treatment options include eye glasses, contact lenses or refractive surgery. This type of secondary surgery is employed in approximately 10% of graft patients.

Conflict of interest: none declared.

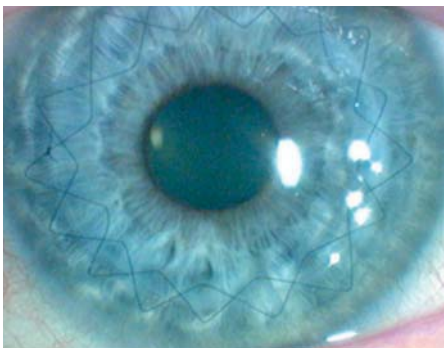

Figure 2. Clear corneal graft with sutures in situ

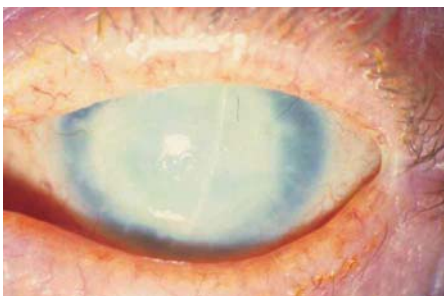

Figure 3. Complete corneal graft rejection

Correspondence
Email: chodge@theeyeinstitute.com.au