
Our vision: Is for Australians to be free of glaucoma blindness

Neovascular (Rubeotic) Glaucoma

The normal eye has a very high demand for nutrients such as oxygen to allow it to function normally. Various processes ensure the delivery of oxygen to these tissues via the ocular circulation. However some diseases may result in the eye being starved of blood and oxygen which may lead to a cascade of processes finally resulting in neovascular glaucoma.

Causes

In Australia the most common causes of this are retinal vein occlusion, advanced diabetic eye disease and ocular ischaemic syndrome. In retinal vein occlusion there is a blockage in the main venous drainage from the retina, resulting in very poor circulation. Severe narrowing of retinal arterioles in advanced diabetic retinopathy may also lead to poor delivery of blood and oxygen to the retina.

Ocular ischaemic syndrome describes a condition where there is poor delivery of blood to the eye as a whole, usually due to severe narrowing of the carotid artery in the neck. When this occurs, cells within the retina become stressed and, in an attempt to overcome the lack of oxygen, they produce a range of chemicals known as angiogenic factors. These chemicals diffuse through the retina and into the front of the eye with their main effect to cause new blood vessels to grow. Elsewhere in the body this may help to overcome the ischaemia but in the eye it has disastrous results.

Who is at risk?

Individuals 40 years and older with diabetes, high cholesterol and high blood pressure who have experienced a retinal vein occlusion or have diabetic retinopathy.

Symptoms and Detection

Under this influence new vessels begin to grow on the surface of the iris, with a fibrotic membrane eventually growing across the drainage channels in the front of the eye, blocking them completely. This results in a sudden and extreme rise in intraocular pressure, making the eye very painful. The conditions underlying this neovascular process by themselves are often associated with poor vision but the additional insult of very high intraocular pressure may damage what residual vision there is.

Prompt treatment is necessary to try to salvage any remaining vision as well as to make the eye more 'comfortable'.

Treatment

Treatment is two-fold: firstly controlling the intraocular pressure and secondly identifying the cause of and treating the neovascular process. These treatments are undertaken concurrently.

Initially, medical treatment with eye drops to decrease aqueous fluid production is commenced to lower intraocular pressure. Often additional oral agents such as acetazolamide are needed, because the pressure can be very difficult to control. Even with multiple medications, adequate pressure control may not be achieved and frequently, laser or surgery may be required.

Controlling the neovascular process involves trying to switch off the production of the stress response chemicals or angiogenic factors. Significant advancements in the understanding of these agents have occurred over the past, resulting in the development of drugs such as Bevacizumab. This is a manufactured antibody that neutralises the angiogenic factor. Given into the eye by injection it can rapidly turnoff the neovascular process but is not a complete treatment in itself.

To stop further production of the angiogenic factors, areas of ischaemic retina need to be treated with laser; or if the problem is due to carotid artery disease this needs to be addressed by vascular surgery.

If medical treatment mentioned above is not sufficient to control the intraocular pressure, as is not uncommon, surgery or cyclodiode laser may be

required. The approach taken is dependent on the level of remaining vision. If there is reasonable salvageable vision surgery such as trabeculectomy or a tube/shunt procedure may be advised. These both create an artificial channel to allow aqueous fluid to bypass the blocked drainage channels. In the tube procedure aqueous drains out of the eye via a fine silicone tube to a reservoir created by a plate secured to the white of the eye.

If the potential for vision is poor then cyclodiode laser may be performed with a series of treatments placed over the region of the ciliary body at the front of the eye. This area is responsible for the production of the aqueous fluid and by selectively destroying some of this tissue with the laser the amount of aqueous fluid produced decreases, allowing the intraocular pressure to decrease.

In summary, this is an aggressive type of glaucoma which often has a poor outcome, as vision is frequently damaged by the underlying cause of the neovascularisation. The main goals of treatment are to preserve the remaining sight and to leave the patient with a comfortable eye.

Ongoing Management

As with other types of glaucoma, regular review by an eye specialist is critical to protect against further visual loss.

