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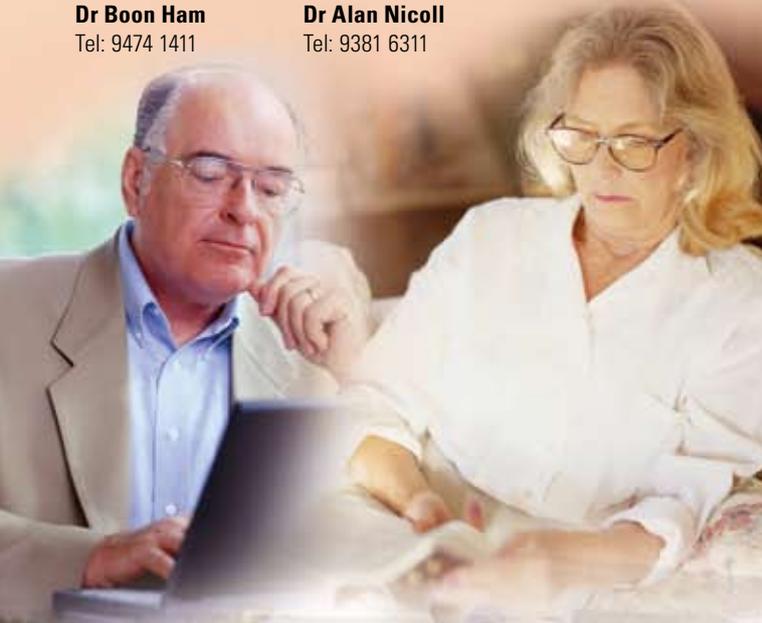
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Expanding options for presbyopia

By Dr Ross Littlewood, Ophthalmologist.



Baby Boomers who don't like the view through their aging eyeballs are fuelling a demand for presbyopia minimisation.

The human lens is derived from embryonic ectoderm and never stops growing during life. Lens enlargement inevitably decreases zonular tension, reducing the effect of ciliary muscle contraction. Oxidative changes in lens protein decrease its elasticity (sclerosis). Neither mechanism is ameliorated by eye exercises or aggravated by spectacle wear. Traditionally, the only ways to avoid presbyopia were myopia or an early death!

Over 50% of presbyopic eyes have 'latent' hyperopia – neutralised in the young eye by exerting extra accommodative effort. Acquired image blur for near objects results from the sum of the latent optical error plus any age-related accommodative loss.

'Older' corneal procedures

Conductive thermal keratoplasty (CTK) and hyperopic 'Lasik' can neutralise 'latent' hyperopia by 'steepening' the corneal surface. These procedures can be modified to also reduce astigmatism. Spectacle independence can usually be achieved in those under 50 but eventually the residual accommodative range is insufficient to shift the focus from the horizon to the reading distance, and beyond 60 it is virtually zero. One option for spectacle independence beyond 50 years is 'monovision' – myopia in the non-dominant eye.

Many presbyopes tolerate mild distance blur from low level myopia in one eye if it gives them unaided reading vision. Beyond 55 years, this strategy requires such significant levels of myopia that the loss of distance focus eventually becomes unacceptable. Since 'older' corneal procedures are not applicable to older presbyopes a demand has arisen for alternative treatments.

Newer procedures

Multifocal and accommodative lenses can be implanted after removal of the sclerotic human lens in a procedure similar to cataract surgery.

Multifocal implants produce multiple foci of different lengths but only one is on the retina at any time and the others are usually not perceived. The commonest designs involve concentric rings of different focal lengths resulting in a fixed proportion of the available light from an object occupying a retinal image. This decreases image contrast which may be a problem in low illumination and for eyes with macular disease. Undesirable aberrations include rings around glare sources such as street lights, but most patients remain satisfied with these lenses despite their limitations and they seldom need to be exchanged.

Accommodative implants are designed to move within the eye in response to volume displacement caused by contraction of the ciliary muscle. This is not 'physiological' accommodation but provides a similar benefit. Most designs have a flexible support permitting anterior movement of the optic. They look similar to conventional lens implants and are implanted the same way. Spectacle independence in 85% of recipients at one year is typical.

Presbyopic laser correction produces a multifocal corneal surface with a central 'steep' area which has a short focal length surrounded by a 'flatter' curvature to focus distant objects. The functional result is similar to a multifocal lens implant but unless the eye also has cataract surgery future changes in the human lens will lead to decreased benefit over time.

Scleral expansion rings are implanted within the sclera overlying the ciliary muscle. They outwardly stretch the ciliary body which restores zonular tension but may suffer from extrusion and other complications so are not widely used.

The risks

The risk of retinal detachment after intraocular surgery is slightly higher before 50 and there are conflicting reports about the possible increased risk of macular degeneration after early lens surgery. There is a small risk of endophthalmitis after all intraocular procedures. Neither Medicare nor private health funds cover refractive surgical procedures.

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