Figure 3: Verisyse phakic IOL attached to the midperipheral iris

readings and precise placement centrally and in the bag are critical for success. Low postoperative astigmatism is important for satisfactory uncorrected acuity.

An ideal intraocular implant provides excellent vision at all focal distances. There is a great deal of research into the development of an accommodating lens. The first lens approved in the United States was the CrystaLens,[16] which is a plate design with hinges that are capable of flexing. The proposed mechanism of action is that ciliary muscle contraction results in increased vitreous pressure that pushes the lens forward with resultant improvement in near vision. The optic of the lens is small at 4.5 mm. A YAG capsulotomy does not diminish the effectiveness of the lens. Another accommodating implant in clinical trials is the Visiogen Dual Optic Lens (two optics joined by spring haptics).[17]

Intraocular procedures are typically associated with a minimal healing response and a rapid return of vision. The main risk is infection or endophthalmitis, which are extremely rare, occurring in <1 in 10,000 eyes. Patients with high myopia are at increased risk of retinal detachment with an intraocular procedure;[18,19] however, the risk appears lower with a phakic implant than with a refractive lens exchange. Preoperative and postoperative dilated fundus examinations are critical to detect any retinal tears that can be treated.

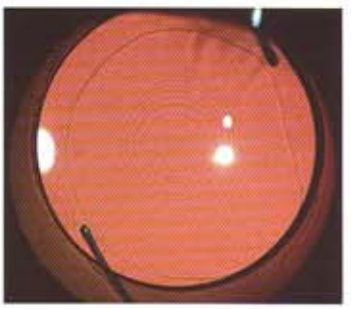
The quality of vision is generally excellent with a phakic IOL or a refractive lens exchange. If there is a residual refractive error, laser vision correction can optimize uncorrected visual acuity (UCVA). This is usually performed at least 2-4 months following the intraocular procedure. The combination of procedures is termed bioptics.

Thermal collagen shrinkage procedure

Thermal collagen shrinkage procedures of the cornea were developed to steepen the central cornea to correct

Figure 4: The Implantable Contact Lens

Figure 5: The Restor lens which has a central diffractive optic and a peripheral refractive optic



hyperopia. The holmium laser was used to create multiple superficial burns to the peripheral cornea; however, there was a high incidence of regression over a period of 1-2 years and this laser is rarely used today. New technology, developed by Refractec, known as "conductive keratoplasty," delivers radiofrequency energy into the midperipheral stroma to create multiple deep burns at 80% depth. When a series of 8 to 32 treatment spots are placed in up to 3 rings in the corneal periphery (6, 7, and 8 mm optical zones), striae form between the spots to create a band of tightening. This causes the central cornea to steepen and corrects hyperopia. Clinical data have demonstrated improved outcomes that are generally limited to up to 2 D of hyperopia.[20] The advantage of the procedure is that no incisions are made in the central cornea; however, predictability and stability are not as accurate as with laser vision correction. There has been renewed interest in the procedure for correction of presbyopia by inducing a myopic shift to allow for reading.

Intracorneal rings

This procedure was initially developed to correct low degrees of myopia by insertion of polymethylmethacrylate (PMMA) rings in the midperipheral cornea (Figure 6). A small vertical incision is made superiorly that is approximately two-thirds of the corneal depth. A suction device is then placed on the sclera to increase pressure in the eye to make the cornea firm. Using a circular metal dissector, a channel is created on either side of the initial incision. The ring segments (available in different thicknesses) are then inserted into the cornea. By increasing the thickness of the midperipheral cornea, the centre of the cornea is flattened. The new curvature of the cornea overlying the pupil allows low levels of myopia to be corrected. Although the procedure was appealing because of its potential reversibility, refractive outcomes have not been as accurate as with laser vision correction and

Figure 6: Intracorneal ring segments to correct myopia