Prosthetic Iris Devices

When implanted properly, these devices treat cosmetic flaws, glare, and photophobia.

BY HERIBERTO M. MAROTTA, MD; AND FERNANDO ARASANZ, MD

The total or partial absence of the iris can be acquired or in rare circumstances a congenital condition.1,2 Symptoms of aniridia range from decreased visual acuity to incapacitating glare and photophobia. The cosmetic aspect of aniridia poses a challenge to the surgeon. This article discusses some of the prosthetic iris devices available and complications that can arise if they are not implanted properly.

TECHNIQUES

Various techniques have been used to treat the symptoms and cosmetic appearance of aniridia. When surgery is not a consideration, contact lenses are a good solution; however, they are not always well tolerated and may not provide the cosmetic solution patients expect. Corneal tattooing, or keratopigmentation, can be performed when sutures or other forms of intraocular surgery are either not possible or insufficient.3 In cases in which an adequate amount of iris tissue remains, reconstruction can be performed with sutures. A Siepser knot created with 10-0 polypropylene can obtain a good functional result. Frequently, the patient is unhappy with the cosmetic appearance (Figure 1), so he or she must be counseled preoperatively about the cosmetic result. Prosthetic devices can be positioned in the bag or sulcus or fixated to the sclera.

In-the-bag devices. The most commonly used in-the-bag device is the coloboma ring (Morcher GmbH, Stuttgart, Germany) for repair of partial aniridia. Morcher's iris diaphragm is used for total iris defects. These devices are available in three styles, depending on the pupil aperture. They can be inserted through a small incision, but they are technically difficult to manage because two overlapping rings must be implanted, leaving only a small space to maneuver during IOL implantation.4 Additionally, because the ring material is fragile, the procedure must be done with extreme caution to avoid breaks. The cosmetic result tends to be poor because the implants are black.5

The Iris Prosthetic System (IPS; Ophtec BV, Groningen, Netherlands) is a multipiece device with 180° segments that are aligned in the bag. It is available in four colors, usually providing patients with an acceptable cosmetic outcome.

Sulcus or sceral-fixated devices. Iris diaphragm IOLs have the advantage of providing optical correction, but large incisions are required for their implantation. Several available options provide good cosmetic appearance. Morcher's diaphragm IOLs do not provide a good cosmetic result because they are black. Colored lenses generally provide good cosmetic outcomes, such as Opthec's aniridia lenses, which come in four colors, or Morcher's IrisMatch lenses, which are available in 55 colors.

A relatively new option for use in aphakic patients is the Dr. Schmidt artificial iris (Dr. Schmidt Intraocular-linsen GmbH, St. Augustin, Germany). In addition to providing a diaphragm designed to correct glare and
photophobia like other devices, these are foldable and color customized. They can be fixated in the sulcus or to the sclera. To customize the color in full aniridia cases, a hard copy photograph of the contralateral eye can be sent to the manufacturer. In partial aniridia, the eye of concern is photographed.

CASE PRESENTATIONS

Case 1. A 59-year-old man presented with traumatic mydriasis, aphakia, bullous keratopathy, and contact lens intolerance (Figure 2). To address the patient’s cosmetic requirements, glare, and photophobia, we used the Dr. Schmidt customized artificial iris. The device was trimmed to fit the size of the sulcus, which was measured preoperatively with ultrasound biomicroscopy and optical coherence tomography (OCT). We performed an iridectomy. A foldable IOL was first sutured to the sclera because the iris device provides no optical correction. After the device was prepared, it was folded, implanted, and then sutured to the sclera with 10-0 polypropylene sutures with two sliding knots. The device can also be sutured under a scleral flap.

Long-acting parabulbar anesthesia is preferred due to the complicated nature of these cases. Dr. Schmidt’s customized artificial iris is a three-layered silicone implant. The first layer is transparent, the second is pigmented for cosmetic purposes, and the third is made of a blackout material to prevent glare and photophobia.

In a second surgical procedure, Descemet’s stripping automated endothelial keratoplasty (DSEAK) was performed to address the patient’s bullous keratopathy. The patient achieved an excellent postoperative result. At 1 year, there was no sign of elevated intraocular pressure (IOP) or other complications, such as uveitis, related to the implant (Figures 3–5).
Case 2. A 23-year-old man presented to our practice with pain, elevated IOP in both eyes (35 mm Hg OD; 52 mm Hg OS), ciliary and perikeratic injection, and keratic precipitates in the corneal endothelium. The patient had been implanted at another center with phakic prosthetic iris devices in both eyes for an iris color change. This patient, after being unable to find a surgeon in our country who would perform this surgery solely for cosmetic purposes, contacted a practice elsewhere through the Internet that was willing to do the surgery (Figure 6). The devices implanted were silicone artificial irises. His elevated IOP was treated with oral pilocarpine and acetazolamide, and the inflammation was treated with NSAIDs.

The patient's endothelial cell count was low. OCT revealed that the devices were resting on the iris, producing a mechanical inflammation of the angle and causing anterior synechiae (Figure 7). We think that this was due to an error in the calculation of the size of the prosthesis. Once the patient's IOP was within normal values and the inflammation was reduced, we explanted the right eye prosthesis (Figure 8). One week after explantation, no infections or additional complications were seen in the right eye. Therefore, we explanted the prosthesis in the left eye.

The explantation procedure was begun by filling the anterior chamber with an ophthalmic viscosurgical device (OVD) through a paracentesis. A 3-mm sclerocorneal incision was made at the site of the artificial peripheral iridectomy in the implanted device, which was located before surgery with a three-mirror lens. This step is important to avoid unnecessary maneuvers inside the eye while locating the site. OVD was used to separate the prosthesis from the iris and to enable cutting the prosthesis with scissors without damaging the iris. The prosthesis was removed as gently as possible with forceps. A peripheral iridectomy was performed to avoid further complications (Figure 9).

In our opinion, an iridectomy should have been performed with Nd:YAG laser before the original
Implantation surgery to match the artificial iridectomy of the device and to avoid iris blockage and elevated IOP.

It is mandatory that the anterior chamber be measured accurately to avoid angle inflammation caused by the device’s positioning flaps. Comparison of endothelial cell counts taken before and after the surgeries showed no significant change in either eye.

CONCLUSION

Prosthetic iris devices are an excellent option for correcting glare and photophobia in patients with total or partial aniridia. Newer devices are especially useful for cosmetic improvements. For these cases, we strongly recommend adequate patient selection and meticulous preoperative study to avoid complications like the one in Case No. 2. We suggest that surgeons do not use these devices solely for iris color change.

Fernando Arasanz, MD, is in private practice in Buenos Aires, Argentina. Dr. Arasanz states that he has no financial interest in the products or companies mentioned. He may be reached at e-mail: drfernando@arasanz.com.ar.

Heriberto M. Marotta, MD, is Director of Santa Lucia de Quilmes, Quilmes, Argentina; and Co-Director of the Ophthalmology Service of Sanatorio Otamendi y Miroli, and of Oftalmos, both in Buenos Aires, Argentina. Dr. Marotta states that he has no financial interest in the products or companies mentioned. He may be reached at e-mail: cmarotta@santaluciaquilmes.com.ar.