

The Management of Small Pupils: The Malyugin Ring

Andrea Mercanti^{1*} and Gino Dalla Chiara²

¹Director of the Department of Ophthalmology at ASST Bergamo West, Treviglio, Italy

²Ophthalmologist in Vicenza, Italy

***Corresponding Author:** Andrea Mercanti, Director of the Department of Ophthalmology at ASST Bergamo West, Treviglio, Italy.

Received: April 17, 2017; **Published:** April 22, 2017

Despite the different treatments available to protect the iris during cataract extraction, performing surgery in an eye with a small pupil remains technically challenging. This is due, in part, to the different mechanisms causing small pupils, as well as the surgeon's skill and experience in managing this condition.

During cataract surgery, inadequate pupil dilation may lead to several complications including: cystoid macular edema, iris trauma, anterior capsular tear, posterior capsular rupture and may also yield a poor capsulotomy. Small pupils present a challenge to surgeons as may occur in patients with conditions including intraoperative floppy iris syndrome (IFIS), glaucoma, pseudoexfoliation syndrome and diabetes mellitus.

Cataract surgeons typically assume a conservative approach to pupil dilation, starting with topical mydriatic agents such as atropine and phenylephrine, or an intracameral injection of lidocaine 1%, to maximize pupil dilation. If pupil dilation is still inadequate, it becomes necessary to stretch the iris. There are few ways this may be achieved. Iris hooks may be employed through small side-port incisions to create a rectangular or pentagonal shaped pupil. The surgeon may otherwise choose to introduce a pupil expansion device such as the Malyugin Ring (Microsurgical Technology [MST], Redmond, WA, USA), the I-Ring (Beaver-Visitec International, Waltham, MA, USA) or the Assia Pupil Expander (APX Ophthalmology, Haifa, Israel). In my practice, I always use the Malyugin Ring.

First presented in 2007, the Malyugin Ring is a single-piece device made from 4-0 polypropylene. The Malyugin Ring design features four scrolls and four struts that hold the iris and afford expansion at eight equidistant points of contact, thereby creating a round pupil. One of the main advantages of the Malyugin Ring is that it is inserted through the main incision and eliminates the need to create additional incisions, such as the case with iris hooks. The Malyugin Ring creates minimal contact with the iris which in turn helps to reduce iris chafing and minimizes the risk of overstretching the iris sphincter. This outcomes in the anatomy of the eye remaining unchanged following removal of the device.

There are published studies matching the Malyugin Ring with other pupil expansion devices. In 2013, Wilczynski and colleagues published results showing that the Malyugin Ring makes surgery easier and allows for better functional results and less corneal endothelial cell loss in comparison with manual pupillary stretching with iris hooks. The study, which involved 23 eyes of 23 patients whose pupils were dilated using Malyugin Ring (Group 1), and 17 eyes of 17 patients whose pupils were dilated manually by stretching with hooks (Groups 2). The outcomes showed the mean corneal endothelial cell loss measured 30 days postoperatively was $9.35 \pm 11\%$ in Group 1 and $13.77 \pm 8.0\%$ in Group 2 ($p < 0.05$). Additionally, mean postoperative BCVA in Group 1 was 0.75 ± 0.30 versus 0.56 ± 0.56 in Group 2 ($p < 0.05$) [1].

The Malyugin Ring is inserted before phacoemulsification through an incision of 2.2 mm; however, it can also be inserted at any stage of the procedure affording to surgical requirements.

Once inserted, the ring expands the pupillary opening to 6.25 mm or 7.0 mm depending on which size Ring the surgeon uses. A 7.0 mm pupillary opening is particularly useful in IFIS cases, while the 6.25 mm Ring size is easier to insert and to remove and can be used in most cases.

Citation: Andrea Mercanti and Gino Dalla Chiara. "The Management of Small Pupils: The Malyugin Ring". *EC Ophthalmology* 6.3 (2017): 87-88.

The newest version - the 7.0-mm Malyugin Ring produced by MST - offers a larger pupil diameter compared to the conventional 6.25-mm ring. The 7.0 Ring can be both implanted and removed with the same insertion device, which is similar to the standard-Ring version. With the 7.0 mm Ring, the entire surgical procedure is easier for surgeons who practice the phaco flip nucleus removal technique and also for those who prefer IOLs with 6.5-mm optics. Removal of the cortical material is also easier and safer. In addition, the 7.0-mm Ring handles IFIS cases more easily. When the iris is very flaccid but the pupil is wide, the 6.25 mm Ring can be displaced at one or two scrolls and would need to be repositioned. This does not occur with the larger-size Ring.

The Malyugin Ring has undergone several adjustments throughout its 9 years on the market. Robert Osher, M.D., University of Cincinnati College of Medicine and Medical Director Emeritus of the Cincinnati Eye Institute, improved the injector to allow for easier engagement and disengagement of the proximal scroll of the ring.

In recent times, MST released the next-generation Malyugin Ring 2.0. While the original Malyugin ring design allowed for insertion through a 2.2 mm incision, the second generation, Malyugin 2.0 permits for insertion through a 2.0 mm incision which means that micro-incisional cataract surgeons can now harness the benefits of the device without having to practice the wound-assisted technique. Personally, I found I can easily insert and remove the Malyugin Ring 2.0 through a 1.8 mm incision. This is possible because the next-generation device is made from 5-0 polypropylene (rather than 4-0 polypropylene), which is smaller and more flexible. The new ring also features a larger scroll gap which allows for easier engagement of the iris. The Malyugin Ring 2.0 injector has also been modified to fit through a 2.0 mm incision.

Some differences can be noticed when using the Malyugin Ring and the Malyugin Ring 2.0. Specifically, the 5-0 polypropylene of the new version requires less force to compress than the 4-0 polypropylene. The new device being more flexible, has a slightly changed feel and it takes some experience to learn the new maneuverability. Nevertheless, both versions of the device have proven to be invaluable in my practice and have changed the way I manage my small pupil cases.

Bibliography

1. Wilczynski M., *et al.* "Results of phacoemulsification with Malyugin Ring in comparison with manual iris stretching with hooks in eyes with narrow pupil". *European Journal of Ophthalmology* 23.2 (2013): 196-201.

Volume 6 Issue 3 April 2017

© All rights reserved by Andrea Mercanti and Gino Dalla Chiara.