



# The Use of Temporary and Permanent Capsular Devices in Eyes with Compromised Zonules

Alan S. Crandall, MD

John A. Moran Eye Center, University of Utah, Salt Lake City, UT, USA

## Keywords

- Pseudoexfoliation • Cataract surgery • Zonular compromise • Trauma
- Congenital cataracts • Marfan syndrome • Iatrogenic zonular compromise

## Key points

- Capsule support devices are divided into 2 categories: temporary and permanent.
- These devices can convert an unstable situation in which lens, capsule, and vitreous problems could lead to early and late complications into a more or less routine situation.
- Careful examination is critical for planning the surgical technique.



**Video content accompanies this article at [www.advancesinophthalmology.com](http://www.advancesinophthalmology.com).**

## INTRODUCTION

Phacoemulsification and in-the-bag implantation of an intraocular lens is the standard of care. However, in eyes with compromised zonules, that goal can be difficult to achieve. Understanding the use of capsular devices, not only which ones but also the timing of the insertion, can minimize the potential complications.

There are numerous conditions that are associated with zonular instability. The most common is pseudoexfoliation syndrome (PXE) but can be seen with ocular trauma, postvitrectomy, uveitis, narrow angle, and congenital eyes, especially Marfan syndrome. There are other (usually rare) conditions also associated with zonulopathy: Weill-Marchesani syndrome, spherophakia, coloboma, and idiopathic ectopia lentis [1,2].

*E-mail address:* alan.crandall@hsc.utah.edu

To formulate the surgical approach, it is important to be able to identify the presence of a zonular weakness and to understand which devices are appropriate for the case.

There are several signs that suggest the presence of zonular instability. Certainly history is important as well: previous ocular trauma, previous surgery for glaucoma, retina, pars plana vitrectomy, and known PXE. There can be obvious signs such as phacodonesis, lens subluxation (especially Marfan syndrome), iris coloboma, and PXE material on the lens. However, there are some very subtle signs that can suggest a potential issue: depth asymmetry of the iris, angle recession (trauma) seen with gonioscopy, narrow angle.

If the zonulopathy is known, then the author tries to categorize it to assist with surgical plan: mild is less than 4 clock hours; moderate is 4 clock hours to 180°; severe is greater than 180°. However, one must be aware that there is often more than is visible; the author usually adds 2 hours more to the obvious zonulopathy.

## CAPSULE SUPPORT DEVICES

Capsule support devices are divided into temporary and permanent. The capsular hooks can be used to stabilize the bag, and they are significantly different from classic iris hooks. Before the development of the capsular hooks, iris hooks could be used to help with the bag, but they are not designed to hold the bag and do not support the entire anterior capsule as the capsular hooks do (Box 1, Fig. 1).

The capsular hooks are temporary and can be used to support areas of zonular weakness to prevent further dehiscence as well as posterior of the lens until the nucleus has been removed. They can also be used to aid with the capsulorhexis by supporting the capsule with traction to aid with the rhexis and in lenses that are significantly subluxed (such as Marfan syndrome) (Fig. 2). They can help center the lens, aiding in the capsulorhexis and lens removal (Videos 1 and 2).

Capsular hooks currently come in 4 options, but 2 are easy to order (Box 2). The MST capsule retractors (MicroSurgical Technology, Redmond, WA, USA) have long looped ends that spread forces over a relatively large area (see Fig. 1). Mackool hooks (Impex Surgical, Brooklyn, NY, USA) have a simple poly(methyl methacrylate) (PMMA) hook with a polished end for good

### Box 1: Capsular support devices

- Support (usually temporary) that allows delay in placing a permanent device
- Iris hooks
  - Not designed for the capsule, and the ends are not polished
- Mackool capsule support (Impex)
- MST hooks (MicroSurgical Technology)
- Haguchi-Kizau 2-point fixation from Japan, but difficult to obtain

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