Bean-shaped ring segments for capsule stretching and centration of bag-in-the-lens cataract surgery

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The bag-in-the-lens (BIL) is a unique approach to IOL placement in cataract surgery. The BIL intraocular lens (IOL) is suspended centrally, supported by the anterior and posterior capsulorhexes. The placement confers a high degree of centration and stability; however, it is dependent on capsular and zonular integrity. In this report, we describe a patient with posttraumatic cataract featuring a sector of iris and suspensory zonule loss. The insertion of custom-designed bean-shaped segments provides capsular tension over the area of defect and a central aperture designed to support the BIL IOL.

Financial Disclosure: Dr. Tassignon has a proprietary interest with Morcher GmbH for both the bag-in-the-lens implant and the bean-shaped capsular tension ring segments. Dr. Ní Dhubhghaill has no financial or proprietary interest in any material or method mentioned.

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Online Video

The bag-in-the-lens (BIL) intraocular implantation technique is a validated approach to cataract surgery that provides quality visual outcomes while eliminating posterior capsule opacification.[1,2] The acrylic monofocal BIL IOL features a 5.0 mm central optic with elliptical flanged haptics on the anterior and posterior surfaces (Figure 1). The haptics are oriented 90 degrees to each other. The insertion technique requires the creation of calibrated anterior and posterior capsulorhexes into which the BIL IOL is placed. The capsular blades wrap tightly around the center of the lens optic, supported entirely by the lens capsule. This BIL placement confers a high degree of centration and rotational stability over time.[3,4] Since the placement depends heavily on capsule integrity, significant suspensory zonular loss and capsular instability have been considered contraindications to the BIL approach. We describe a modification to supplement the standard capsular tension rings (CTRs) that further reinforce the capsule and facilitate BIL placement.

The poly(methyl methacrylate) bean-shaped ring segments are available in a range of outer ring diameters that can be selected based on the size and laxity of the patient's capsule (Figure 2). The inner diameter has a radius of 2.5 mm in all cases; thus, when 2 bean segments are placed and oriented 180 degrees to each other, they form a central aperture of 5.0 mm diameter. The segments are designed so that when the IOL is placed, the inner semicircles of the bean segments slot into the interhaptic groove of the BIL, providing additional support to the IOL.

CASE STUDY

A 65-year-old man presented with a symptomatic cataract on background of a penetrating anterior segment trauma to the left eye sustained at 14 years of age. The injury had resulted in significant iris and zonular damage, but the anterior and posterior capsules had remained intact (Figure 3). No significant posterior segment trauma had been sustained. Over the intervening years, a cataract had developed and the patient's corrected distance visual acuity was 0.05 in the left eye (decimal) with an optimal refractive correction of $-1.00\ -1.50 \times 44$, 1.0 in the right eye with a correction of −2.50 diopter sphere at the initial consultation.

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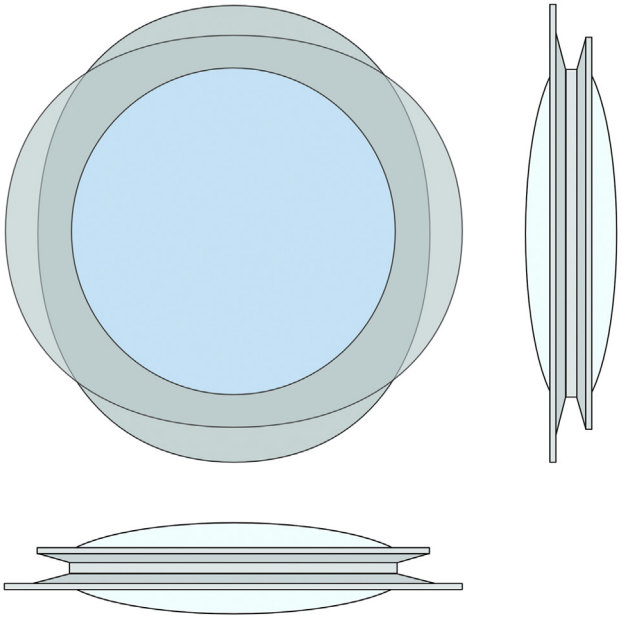

Figure 1. Schematic of the BIL IOL.

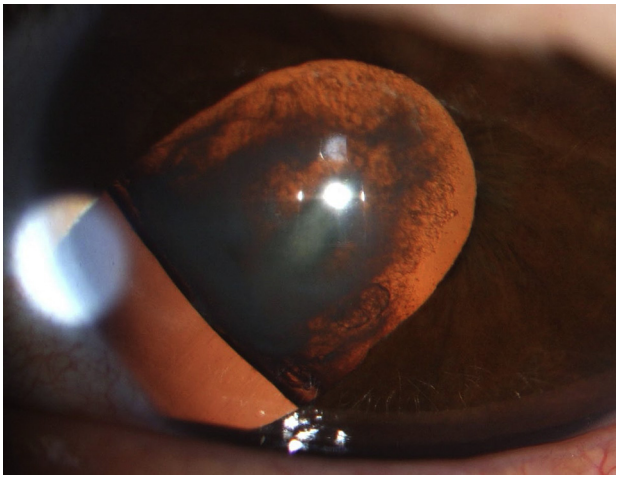

Figure 3. Preoperative image showing traumatic cataract, iris, and zonular loss.

The standard BIL approach was considered inappropriate as the lack of zonular support from the 6 o'clock to the 9 o'clock position would result in poor centration and predictability. The patient was therefore selected for treatment with BIL surgery augmented by a standard CTR and the bean-shaped ring segments with an outer radius of 5.5 mm.

Surgical Technique

The surgery, performed under topical anesthesia, commenced with a standard 3-step temporal limbal incision using a 2.8 mm keratome. Anesthesia and pupil dilation were augmented with an intracameral injection of an adrenalin (1:1000) and xylocaine solution. Despite the preexisting trauma, the pupil was

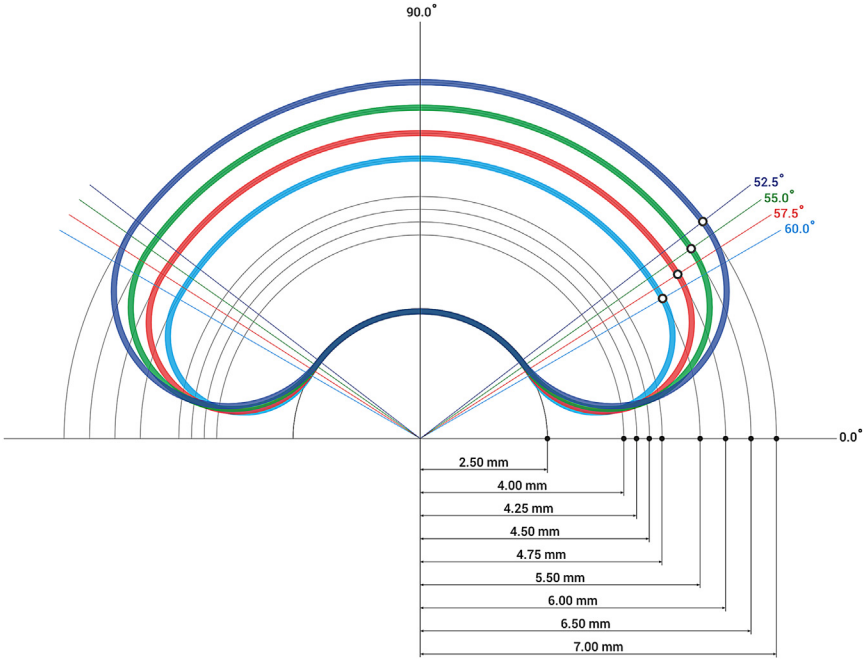

Figure 2. Schematic of the bean-shaped segment sizes and radii.