

Capsule fixation device for cataract surgery

N.M. SERGIENKO¹, Y.N. KONDRATENKO¹, A.K. YAKIMOV²

¹Department of Ophthalmology, National Medical Academy of Postgraduate Education

²Eye Microsurgery Center, Kiev - Ukraine

PURPOSE. *The authors present a patient with Marfan syndrome who underwent cataract surgery using a novel device for fixation of capsular bag.*

METHODS. *The capsule fixation device (CFD) is poly(methyl methacrylate) arch with double-armed bent hook that can be introduced into the anterior chamber through the clear corneal incision, placed with a rest on the capsule equator, and sutured to the sclera without injury of the capsular bag. A 16-year-old patient with Marfan syndrome underwent consecutive phacoemulsification with in-the-bag intraocular lens and CFD implantation on both eyes.*

RESULTS. *During the surgery handling the CFD was technically simple with good visualization. The preoperative best-corrected visual acuity was 0.3 and 0.1 and postoperatively 0.6 and 0.8 in the right and left eyes, respectively. The postoperative follow-up was over 9 months.*

CONCLUSIONS. *Use of the CFD was successful in a case of lens subluxation with no complications observed during the period of follow-up. (Eur J Ophthalmol 2009; 19: 143-6)*

KEY WORDS. *Ectopia lentis, Lens subluxation, Marfan syndrome, Weakness of zonule*

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INTRODUCTION

For a long time, subluxation of lens either caused by trauma or as manifestation of metabolic syndrome had been a substantial problem. Ophthalmologists were often reluctant to perform surgery in face of severe complications such as detached retina or glaucoma.

Introduction of the specially designed endocapsular ring (1-3) became a key point in treatment of ectopia lentis. Soon new approaches were described for fixation of capsular bag with positive clinical results (4, 5). We developed a new device for suturing a dislocated capsular bag and report utilizing this device in both eyes of a young patient.

The capsule fixation device (CFD) (Fig. 1) is made of poly(methyl methacrylate) and consists of the following elements: arch that is placed at the equator of capsular bag and double-armed bent hook for scleral fixation with a single suture; the lower part of the hook is located in the bag and the upper part is directed over the edge of

capsulorhexis toward iris root at the sulcus ciliaris.

The CFD has the following dimensions: length of the arch 5.5 mm; width 3.0 mm; space between the arch and the upper part of the double-armed hook 0.5 mm.

METHODS

A 16-year-old patient presented to the Eye Microsurgery Center complaining of decreased vision in both eyes. The patient had history of Marfan syndrome for several years. The preoperative refraction was cyl -6.0 x 10 in the right eye and cyl -6.0 x 20 in the left eye providing best-corrected visual acuity (BCVA) 0.3 and 0.1, respectively. The keratometry reading was 41.51 x 15/43.05 x 105 and 41.72 x 162/43.66 x 72 for the right and left eyes, respectively.

Slit lamp examination revealed severe ectopia lentis (Fig. 2) in both eyes with extended zonular threads observed even without pupil dilatation. The axial length,

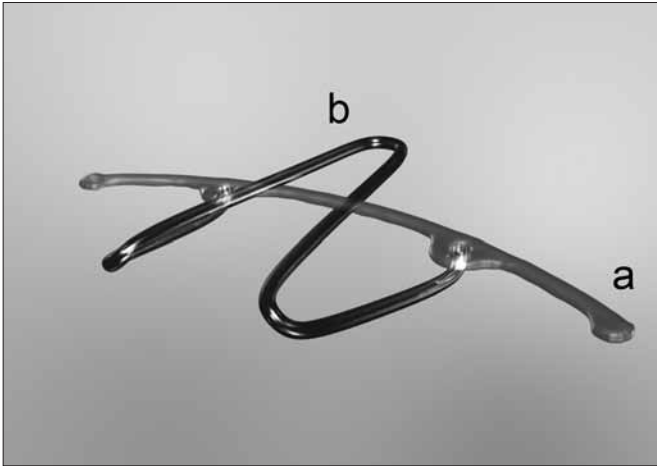


Fig. 1 - Capsule fixation device (CFD). The arch (a is to be placed in the bag at the equator toward the dialysis and the upper (outer) part of hook (b) is for fixation of suture thread to be pulled at the sulcus ciliaris to the sclera.

measured by the IOL Master (Carl Zeiss Meditec), was 23.54 mm and 23.53 mm in the right and in the left eye, respectively.

In November 2006 the patient underwent surgery on the left eye under peribulbar anesthesia. After clear cornea incision the anterior chamber was filled with ophthalmic microsurgical device (OVD): sodium hyaluronate 3.0%–chondroitin 4.0% (Viscoat) and sodium hyaluronate 1.0% (Provisc). A continuous capsulorhexis about 4 mm in diameter was created by forceps. The capsulorhexis edge was temporary fixed by two iris retractors in the place of zonular extension and pulled toward iris root. After insertion of a conventional capsular tension ring (CTR) the lens material was removed by bimanual infusion/aspiration cannulas. The posterior capsule remained intact.

Implantation of an AcrySof SN60AT (Natural) 22.0 D was performed in standard manner via Monarch II injector. CFD was introduced into anterior chamber through the clear cornea incision. The arch of device was placed at the equator in the capsular bag toward the dialysis while outer part of hook with knotted 9-0 polypropylene (Prolene) thread was placed anteriorly to the capsular bag and fixed to the sclera. The knot was secured beneath the previously formed scleral flap. The main procedure was completed after the incisions were closed by stromal hydration.

In April 2007, the same surgery was performed on the right eye.

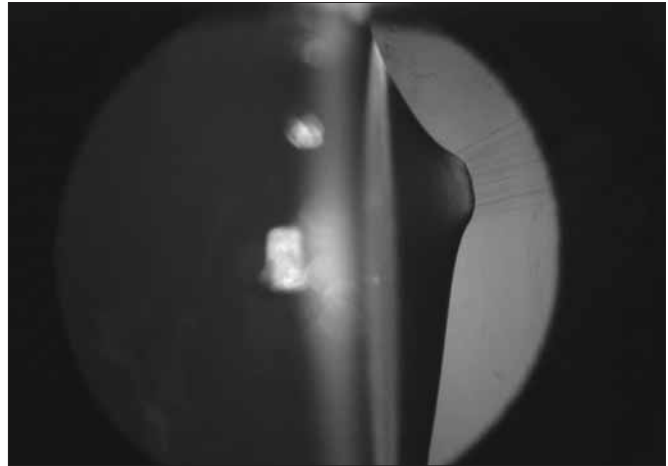


Fig. 2 - Right eye of the patient with Marfan syndrome before surgery: absence and highly dilated zonules are seen at about one third of the eyeball perimeter.

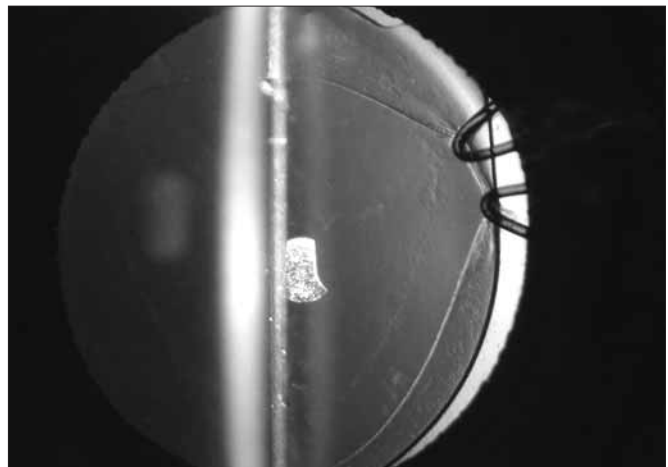


Fig. 3 - The same eye 1 month postoperatively: the AcrySof SN60AT IOL is implanted in-the-bag; a fragment of the CFD is seen at the edge of the dilated pupil.

RESULTS

Clinical appearance of the right eye 1 month after the surgery is shown in Figure 3. The BCVA was 0.7 in the right eye and 0.8 in the left eye. The postoperative refraction was $-1.5 -0.5 \times 20$ and $+1.5 -1.75 \times 150$ for the right and left eyes, respectively. Visual acuity did not improve further, probably due to amblyopia.

DISCUSSION

Initiation of the modified CTR (1-3) is undoubtedly a successful advance in cataract surgery in cases of missing or loose zonules (6-8). The idea of capsular bag fixation by suturing received its development in creation of other devices (4, 5); the authors assumed it profitable to use separate insertion of conventional CTR and element for suturing. We also followed their approach, being guided by the following reasons:

Indications for suturing the capsular bag are often determined in the course of operation. If necessary, the device for suturing is inserted into the eye and suturing is performed. In case of absence of such a necessity, a presence of the single conventional CTR is regarded as sufficient.

Depending on degree of zonular dialysis (mild, moderate, or severe), one, two, or even three devices may be used. Suturing is done under direct visualization in the meridians where fixation is more reasonable.

Unlike the capsular anchor (5), which provides contact with margin of capsulorhexis, the CFD is rested by the wide arc on the capsular equator and therefore enhanced the action of CTR. Theoretically, CFD due to its equator support may be utilized without the CTR in case of mild zonular defect.

Pars plana lensectomy-vitreotomy allows good visual results postoperatively (9). However, the surgery technique requires sophisticated training and the intervention itself connected with removal of lens capsule and significant part of vitreous looks substantially more traumatic. Fixation of the capsular bag presents a more accessible and reliable approach in cataract surgery.

Utilizing a conventional CTR is useful during the surgery but does not guarantee prevention of late complications. Often cases of in-the-bag intraocular lens and CTR dislocation are reported in the literature (10-15). The modified CTR (2, 3) presents a reliable solution in treatment of ectopia lentis. Our device (CFD) as well as capsular tension segment (4) reflects development of the abovementioned idea. Separate insertion of the CTR and additional elements for suturing makes the surgery easier. Depending on the situation, a surgeon can use one or two CFDs placed directly at the meridians requiring fixation.

Use of the CFD resulted in good visual outcomes during the early postoperative period in a given patient with ectopia lentis. Surgery technique in respect of handling the CFD is simple with good visualization control. We hope that CFD may be successfully utilized in adult cataract patients with zonule weakness.

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Reprint requests to:
Andrey K. Yakimov, MD
Eye Microsurgery Center
Komarov Ave, 3
Kiev, 03680, Ukraine
a_yakimov@voliacable.com

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