Asymptomatic capsular bag distension 10 years after cataract surgery

Eva Mönestam, MD, PhD

Ten years after surgery, 120 patients who were part of a prospective longitudinal long-term study of cataract surgery outcome had a routine eye examination that included Scheimpflug photography (Pentacam HR). No patient had a previous posterior capsulotomy. Seven patients (6%) with distended capsular bags were found. None had experienced clinical symptoms. The distance between the intraocular lens (IOL) and the posterior capsule was between 300 μm and 740 μm. These cases suggest there is an asymptomatic timespan in cases with late-onset capsular bag distension syndrome. It is important to be aware of this syndrome when examining patients who had cataract surgery many years previously and no posterior capsulotomy. If there is a tendency for accumulation of fluid behind the IOL, most patients will need posterior capsulotomy within a few years, especially if the distance between the IOL and the posterior capsule is greater than 500 μm.

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Several reports have been published of capsular bag distension syndrome that can develop many years after phacoemulsification with capsulorhexis and implantation of a posterior chamber intraocular lens (PC IOL). Capsular bag distension syndrome can be classified into 3 groups according to the time of onset and the probable cause: intraoperative, early postoperative, and late postoperative.1

Late-onset capsular bag distension syndrome is postulated to be caused by liquefied posterior capsule opacification (PCO)2 or capsulorhexis-related lacteocrumenasia.3 In this type of capsular bag distension syndrome, the fibrosed anterior capsule rim adheres to the anterior surface of the IOL and causes occlusion and formation of a closed chamber between the IOL and the posterior lens capsule. Ocular examination shows a distended posterior capsular bag. A homogeneous milky-white substance fills the space between the back of the IOL and the capsular bag (lacteocrumenasia), and the IOL is pushed anteriorly, often inducing myopia.4 The origin of this unspecified substance is not clear, but it is postulated to be generated by metaplasia of residual lens epithelial cells or by osmotic forces.5

Patients with this syndrome are referred because of visual function problems. The most common symptoms are increasing glare and reduction of visual acuity.6 7 The treatment for capsular bag distension syndrome is a posterior neodymium:YAG (Nd:YAG) laser capsulotomy to disrupt the opacified posterior capsule to drain the milky fluid into the vitreous.8

The following case reports describe the occurrence of asymptomatic capsular bag distension 10 years after phacoemulsification with IOL implantation. The patients were part of a prospective longitudinal long-term study of cataract surgery outcome starting 10 years previously.9

CASE REPORTS

One hundred twenty patients had uneventful standard phacoemulsification with capsulorhexis and
implantation of a hydrophobic acrylic PC IOL (Acrysof MA60BM, Alcon Laboratories, Inc.) in the capsular bag. Ten years later, they had a routine eye examination including photographs with the Scheimpflug camera (Pentacam HR, Oculus Optikgeräte GmbH), software version 1.20r10. This noninvasive system uses the principle of Scheimpflug imaging to characterize the anterior ocular segment and the IOL. No patient had had a posterior Nd:YAG laser capsulotomy.

The slitlamp examination combined with the Scheimpflug camera photograph showed 7 patients (6%) to have distended posterior capsular bags, with an accumulation of a more or less milky homogeneous substance between the IOL and the distended capsular bag. The IOL was well centered and did not appear to be pushed anteriorly. There were no signs of inflammation in the vitreous cavity.

The Scheimpflug photography was performed using the “25 pictures program” under standardized mesopic light conditions. Figures 1 and 2 show Scheimpflug photographs of 3 eyes with capsular bag distension of various severity. Using the Scheimpflug camera images, measurements included the distance from the posterior IOL surface to the distended posterior capsule. Only images displaying perpendicularity to the corneal surface and IOL were used to obtain the measurements (Table 1).

After the examination (10 years after surgery), the records of the 7 patients with capsular bag distension were studied another 5 years to determine whether and when an Nd:YAG laser capsulotomy had been performed, thus extending the follow-up to 15 years.

Table 1 shows the characteristics of the 7 patients with capsular bag distension. The 4 patients with corrected distance visual acuity (CDVA) worse than 20/25 (Cases 1, 4, 5, and 7) had other significant ocular comorbidities. The difference between low-contrast visual acuity 10% and high-contrast CDVA was within normal limits (0.30 to 0.45 logMAR units) for all patients except the one with cornea guttata, who had depressed low-contrast visual acuity; ie, relatively worse acuity for low-contrast letters compared with high-contrast letters. The 4 patients with opaque milky fluid had borderline significantly higher low-contrast visual acuity 10% values compared with patients with clear fluid (P = .059).

The CDVA was logMAR 0.32 (20/38) to −0.18 (20/17). The distance between the IOL and the posterior capsule was between 300 μm and 740 μm with generally larger

| Case | Age (Y) | Sex | CDVA 10 Years After Surgery (Snellen) | LCVA 10%–CDVA (logMAR)* | Comorbidity | Nd:YAG Capsulotomy After 10-Year Examination | Distance Between Posterior Capsule and IOL Posterior Surface (μm)**/ Clear or Milky Fluid |
|------|---------|-----|--------------------------------------|--------------------------|-------------|---------------------------------------------|----------------------------------------------------------------------------------|
| 1    | 70      | F   | 20/26                                | 0.38                     | PDR         | 11 mo                                       | 740/milky                                                                        |
| 2    | 73      | M   | 20/17                                | 0.44                     | None        | 47 mo                                       | 550/milky                                                                        |
| 3    | 87      | F   | 20/19                                | 0.40                     | Background DR | 26 mo                                      | 360/milky                                                                        |
| 4    | 87      | F   | 20/30                                | 0.38                     | Glaucoma, ARMD | Died 40 mo after exam                        | 340/clear                                                                        |
| 5    | 80      | F   | 20/38                                | 0.50                     | Cornea guttata | 20 mo                                       | 740/milky                                                                        |
| 6    | 73      | M   | 20/20                                | 0.32                     | None        | Died 6 mo after exam                        | 300/clear                                                                        |
| 7    | 71      | M   | 20/29                                | 0.30                     | Background DR | No Nd:YAG 15 years after exam               | 360/clear                                                                        |

ARMD = age-related macular degeneration; CDVA = corrected distance visual acuity; DR = diabetic retinopathy; IOL = intraocular lens; LCVA = low-contrast visual acuity; PDR = proliferative diabetic retinopathy

*Difference between the logMAR values for LCVA 10% and high-contrast CDVA. This indicates whether the visual function for low-contrast items is depressed relative to high-contrast items. For instance, posterior capsule opacification gives high values.

**Distance between the posterior capsule and the posterior surface of the IOL measured from the Scheimpflug photograph.
distances in the patients with opaque milky fluid than in those having clear fluid (Table 1). Fifteen years after surgery or 5 years after the examination, all patients except 1 had an Nd:YAG capsulotomy. The patients with larger distance between the IOL and the posterior capsule had less time to Nd:YAG laser capsulotomy than those with small distances ($r = -0.79; P = .11$).

Measurements using the Scheimpflug camera revealed a mean anterior chamber depth (ACD) of 4.08 mm (range 3.62 to 4.83 mm) at 10 years after surgery. Anterior chamber depth was defined as the distance from the endothelium to the anterior surface of the IOL. The ACD was also recorded 15 years after surgery for 4 of the patients who had a posterior Nd:YAG capsulotomy. No ACD increase was found.

**DISCUSSION**

In capsular bag distension syndrome, a dramatic distension of the posterior capsule, as well as anterior chamber shallowing with unplanned postoperative myopia, is characteristic. A slightly turbid colloidal suspension develops over time and is observed between the IOL and the posterior capsule. If the capsular bag distension is untreated, the eye may develop PCO, acute angle-closure glaucoma, or chronic inflammation with posterior synechias. Spontaneous resolution has also been observed.

Capsular bag distension syndrome has been considered uncommon, occurring in between 0.3% and 1.6% of cases. This may be true regarding the full-blown syndrome, but the present case series found that 6% of the patients examined had fluid behind their IOLs 10 years after surgery.

The findings in the present case series agree with those of Theng et al. in that there is an asymptomatic timespan and late capsular bag distension is probably subclinical in the initial stages. Another study reports a distended posterior capsule without anterior IOL displacement and refractive change in an asymptomatic patient. If the capsular bags distend posteriorly without causing forward IOL displacement, the patient seldom presents until PCO develops. Capsular bag distension syndrome presents later when PCO or anterior IOL displacement, caused by the fluid behind the IOL, develops. One millimeter in anterior IOL displacement correlates to 2.00 D of induced myopia. It may be possible for the eye to have capsular bag distension syndrome for several years before the 10-year postoperative examination, but as patients with more capsular bag distension present earlier to Nd:YAG capsulotomy than those with less distension, the hypothesis of successive distension until the patients need Nd:YAG laser is probable.

In the present case series, the patients with opaque milky fluid had lower low-contrast visual acuity than patients with clear fluid ($P = .059$). This suggests there might be a progression from clear to milky fluid, possibly caused by the developing PCO. In this case series, there was no tendency toward an ACD increase, which may explain why the examined patients were asymptomatic. Previous reports have described capsular bag distension syndrome observed 5 to 7 years after surgery. However, to my knowledge, there is no published study of patients examined 10 to 15 years after phacoemulsification.

Several factors contribute to the difficulty diagnosing capsular bag distension syndrome. Recognition of its occurrence prevents unacceptable results or mismanagement of the patients. It is important to be aware of this syndrome when meeting patients who had cataract surgery many years previously and no posterior capsulotomy. If there is an accumulation of fluid behind the IOL and the distance to the posterior capsule is more than 500 μm, most patients will need a posterior capsulotomy within a few years.

**REFERENCES**

1. Miyake K, Ota I, Ichihashi S, Miyake S, Tanaka Y, Terasaki H. New classification of capsular block syndrome. J Cataract Refract Surg 1998; 24:1230–1234
2. Namiki I, Miyake K, Ota I, Miyake S. Localized liquefied after-cataract. J Cataract Refract Surg 2003; 29:207–209
3. Elfrig DE. Capsulorhexis-related lacteocrumenasia. J Cataract Refract Surg 1997; 23:450–454
4. Sorenson AL, Holladay JT, Kim T, Kendall CJ, Carlson AN. Ultrasonicographic measurement of induced myopia associated with capsular bag distension syndrome. Ophthalmology 2000; 107:902–908
5. Miyake K, Ota I, Miyake S, Horiguchi M. Liquefied after-cataract: a complication of continuous curvilinear capsulorhexis and intraocular lens implantation. Am J Ophthalmol 1998; 125:429–431
6. Morgan-Warren P, Manna A. Late-onset capsular bag distension syndrome following cataract surgery. JRSM Short Rep 2011; 2:53. Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3127498/pdf/SHORTS-11-053.pdf. Accessed April 18, 2014
7. Qu J, Bao Y, Li M, Zhao M, Li X. Surgical management of late capsular block syndrome. J Cataract Refract Surg 2010; 36:1687–1691
8. Agrawal S, Agrawal J, Agrawal TP. Incomplete capsular bag distension syndrome after neodymium:YAG capsulotomy. J Cataract Refract Surg 2006; 32:351–352
9. Mönestam E, Lundqvist B. Extended long-term outcomes of cataract surgery. Acta Ophthalmol 2012; 90:651–656. Available at: http://onlinelibrary.wiley.com/doi/10.1111/j.1755-3768.2011.02138.x/pdf. Accessed April 18, 2014
10. Theng JTS, Jap A, Chee S-P. Capsular block syndrome: a case series. J Cataract Refract Surg 2000; 26:462–467
11. Holtz SJ. Postoperative capsular bag distension. J Cataract Refract Surg 1992; 18:310–317
12. Davison JA. Capsular bag distension after endophacoemulsification and posterior chamber intraocular lens implantation. J Cataract Refract Surg 1990; 16:99–108
13. Wendrix G, Zeyen T. Late-onset capsular bag distension syndrome after cataract surgery: 2 case-reports. Bull Soc Belge Ophtalmol 2006; 301:67–69. Available at: www.ophthalmologia.be/download.php?dof_id=378. Accessed April 18, 2014

14. Nishi O, Nishi K, Takahashi E. Capsular bag distention syndrome noted 5 years after intraocular lens implantation. Am J Ophthalmol 1998; 125:545–547

First author:
Eva Mönestam, MD, PhD
Department of Clinical Sciences/Ophthalmology, Faculty of Medicine, Umeå University, Umeå, Sweden