

Unilateral spontaneous lens absorption and dislocation of the empty capsular bag into the anterior chamber

Bo Hee Kim¹, Deoksun Cha², Sunmin Yim¹, Ji-Won Kwon³, Won Ryang Wee¹, Young Keun Han^{1,2}

¹Department of Ophthalmology, Seoul National University College of Medicine, Seoul 03080, Korea

²Department of Ophthalmology, Seoul Metropolitan Government Seoul National University Boramae Medical Center, Seoul 07061, Korea

³Department of Ophthalmology, Myongji Hospital Seonam University College of Medicine, Goyang 10475, Korea

Correspondence to: Young Keun Han. Department of Ophthalmology, Seoul Metropolitan Government Seoul National University Boramae Medical Center, 20, Boramae-Ro 5-Gil, Dongjak-Gu, Seoul 07061, Korea. eye129@paran.com

Received: 2015-10-17 Accepted: 2016-09-25

DOI:10.18240/ijo.2017.01.26

Kim BH, Cha D, Yim S, Kwon JW, Wee WR, Han YK. Unilateral spontaneous lens absorption and dislocation of the empty capsular bag into the anterior chamber. *Int J Ophthalmol* 2017;10(1):161-164

Dear Editor,

Cases involving spontaneous aphakic change in the visual axis are rare in Outpatient Clinics. However, we can often ascertain the past events affecting the patient's eye by examining its current status. The placement of the dislocated internal material of the lens, the remnant lens capsular bag status, lens and zonular status of the contralateral eye, concurrent systemic diseases, and the patient interview can all be helpful. However, if the patient visits the clinic a long time after the onset of visual symptoms and the dislocated internal material of the lens is absent, the logical pursuit of historical events in the patient's eye can sometimes be challenging.

Here in this case report, we describe a unilateral spontaneous lens absorption with displacement of the empty capsular bag into the anterior chamber and hypothesize a logical mechanism for the dislocation of the capsular bag into the anterior chamber.

A 62-year-old woman who was alert and oriented presented with a complaint of a long duration and progressive course of decreasing vision in her left eye. She explained that her visual acuity had gradually decreased for several years until she could only roughly differentiate the color of an object. Before visiting our clinic, she reported perceiving a sudden bright light in her left eye. There was no pain, and she denied having

experienced trauma or previous eye problems. She also denied any history of visiting an ophthalmology clinic. There was no family history of eye disease, and the patient did not have any systemic diseases.

On initial examination, uncorrected visual acuity was 20/20 in her right eye and 20/800 in her left eye. Intraocular pressure (IOP) was 14 mm Hg in her right eye and 22 mm Hg in her left eye. Slit-lamp examination showed a triangular shaped translucent membrane with a rolled up margin in the left anterior chamber. The crystalline lens and lens capsule were absent in the left eye (Figure 1). There was no inflammatory reaction (cell-) in the left anterior chamber. Fundus examination and ultrasound B-scan of the left eye revealed a normal posterior segment without remarkable findings such as a dislocated crystalline lens or lens capsular materials. Macular imaging by optical coherence tomography was normal in the left eye. Gonioscopy was normal with a typical open angle measurement, and there was an absence of peripheral anterior synechiae in both eyes. Endothelial cell counts measured by specular microscopy were 3115 cells per mm² in the right eye and 2590 cells per mm² in the left eye. Axial length and anterior chamber depth of the left eye were measured as 23.49 mm and 2.47 mm, respectively using IOL Master. White-to-white distance measured by Orbscan IIz was 11.3 mm in the left eye. The patient had no improvement in visual acuity with +10.00 diopter glasses because the membrane obscured the visual axis. The patient underwent membrane removal and intraocular lens (IOL) scleral fixation with the ab-externo method using an Akreos® four haptic IOL (Figure 2). The triangular membrane in the anterior chamber appeared to be a lens capsule and was sent for pathological analysis. Intraoperatively, there was no evidence of the dislocated crystalline lens, nucleus fragments or any cortical materials. At the one-week post-operative follow-up, the patient had a best-corrected visual acuity of 20/30 with normal IOP.

Microscopically, the specimen was an oval ring-like structure measuring 1.0×0.8×0.1 cm. The specimen was composed of degenerated eosinophilic material only. No viable cellular component was observed (Figure 3). The surgical pathologist suggested a possibility that it might represent degenerated lens capsule due to its presentation and anatomic location. However, owing to contraction and deformation of the lens capsule, it was not possible to identify the origin of the capsular



Figure 1 Preoperative photographs showing a membranous foreign body that forms a triangular shaped translucent membrane with a rolled up margin.

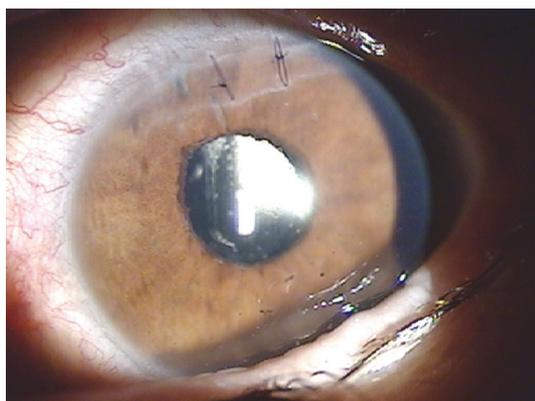


Figure 2 Postoperative photograph 8d after surgery.



Figure 3 Hematoxylin and eosin staining of suspicious lens capsule without lining epithelial cell measuring 1.0×0.8×0.1 cm (LM ×200).

material (anterior or posterior), or the actual site of any capsular tear.

In 2011, Ahmad *et al*^[1] reported a case of bilateral spontaneous lens absorption and published very similar anterior segment photos to those obtained in our case. Despite extensive laboratory testing, they could not identify a cause for the event, as in our case. However, unlike in the case reported by Ahmad, in our patient this condition was observed in only one eye and the patient had no cataract formation in her contralateral eye. Furthermore, she showed healthy zonules, and completely normal fundus findings, whereas their patient showed a pale optic disc with sheathed vessels. Moreover, their patient had progressive visual disturbance since her childhood, unlike this case. Although anterior segment findings were very similar in both patients, differences in the patients' reported history make it possible that our patient had a different clinical course than Ahmad's patient.

In spontaneous aphakic change with an absence of lens material, the status of the remnant lens capsular bag status can generally be classified into three conditions. In cases of only anterior capsular attachment or only posterior capsular

attachment in the original site of capsular bag insertion, we can easily assume the mechanism leading to the current clinical status to be spontaneous posterior capsular bag rupture or spontaneous anterior capsular bag rupture, respectively^[2-7]. Additionally, in cases where the empty capsular bag is attached in its entirety at its original site of insertion, we can deduce that the spontaneous absorption of the internal material of the lens is the mechanism leading to the current status^[8-12].

According to our patient's stated history at presentation, she might have had a dense anterior or posterior polar cataract or hypermature cataract opaque enough to explain her low visual acuity before the more significant ocular event.

If the pre-existing condition was a polar cataract, spontaneous capsular rupture and drop-out of the dense polar cataract could have caused the sudden light flash reported by the patient. However, if only the dense opaque portion of the crystalline lens had dropped, the remaining crystalline lens would be hydrated and rapidly lose translucency. Therefore, lens capsular rupture at the site of weak polar cataract area and consecutive drop-off of the internal crystalline lens through the rupture site possibly could have been responsible for the event. There are several previous reports of spontaneous posterior capsule rupture and dislocation of the crystalline lens into the vitreous cavity in posterior polar cataract patients^[4-5,13]. Moreover, spontaneous anterior capsule rupture with anterior polar cataract was reported by Gaviria *et al*^[6]. Usually a dislocated crystalline lens triggers inflammation in the ocular cavity, but if the dislocated crystalline lens is absorbed over a long period, it may not cause any noticeable inflammatory reaction, as in the case reported by Mohan and Bartholomew^[10].

If our patient had a hypermature cataract, the sudden light flash could have been caused by spontaneous capsule rupture (either anterior or posterior), and opaque lens material spilling into the intraocular cavity. Since 1955, spontaneous rupture of the lens capsule in hypermature cataracts has been reported several times^[14-16]. In addition, spontaneous absorption of a hypermature cataract could also have caused the event in question. In 1988, Uemura *et al*^[12] reported two cases of spontaneous lens absorption of hypermature cataracts in patients with Fuchs' heterochromic cyclitis and phacolytic glaucoma.

In our case, the empty capsular bag was found in the anterior chamber. However, we did not immediately conclude that the initial event was anterior dislocation of the crystalline lens because the anterior dislocation of the crystalline lens and/or spillage of lens material expected to occur in that case would have led to an inflammatory process. We assume this did not occur since the patient did not complain of symptoms associated with leukocoria, or pain due to a sudden increase in IOP and inflammatory reaction in the anterior chamber^[17-19]. In addition, total dislocation of a large crystalline lens into the anterior chamber does not transmit light to the retina. By analyzing these clues, we assumed that the direction of the rupture and lens dislocation was more likely to be posterior rather than in the anterior direction, despite the fact that the folded capsular bag was found in the anterior chamber.

There is a plausible mechanism for empty capsular bag migration from the posterior to the anterior chamber. In several previous reports of spontaneous lens capsular rupture, the intact unruptured side of the capsule is in place with zonular attachment^[4-5,7]. In our case, the patient's capsular bag was totally dislocated from its original site like in Ahmad *et al's*^[1] case. In the latter case, they did not propose a mechanism underlying the capsular bag dislocation.

A possible hypothesis that could explain an empty capsular bag dislocation from the posterior into the anterior chamber is as follows: eyelid squeezing can produce a 90 mm Hg increase in pressure, and subsequent lid opening could cause hypotony^[20]. Thus, one of the possible mechanisms of late spontaneous anterior prolapse of the residual capsular bag is a temporary increase in pressure caused by squeezing and then subsequent hypotony causing an induction of a pressure gradient across the pupil. This could cause disinsertion of the zonule and propel the residual capsular bag from the posterior chamber through the pupil (Figure 4).

However, according to our experience, many surgical aphakic eyes with residual lens capsular bag after cataract extraction do not experience this kind of an event. Therefore, we suggest that this hypothetical event be confined to eyes with weak zonular structure, as encountered in cases of pseudoexfoliative syndrome, historical trauma, or an intumescent cataract.

Since the patient visited our clinic after the event, this retrospective analysis is largely hypothetical which was divided into three possible scenarios as discussed above. To summarize, the first is that the patient had a ruptured dense posterior polar cataract that led to the dislocation of internal lens material into the posterior vitreous cavity. The second scenario is that she had a spontaneous absorption of hypermature cataract and the empty capsular bag dislocated into the anterior chamber. In both of these first two scenarios, the capsular bag was propelled into the anterior chamber by check valve action. The final scenario is that she may have had a hypermature cataract, which was

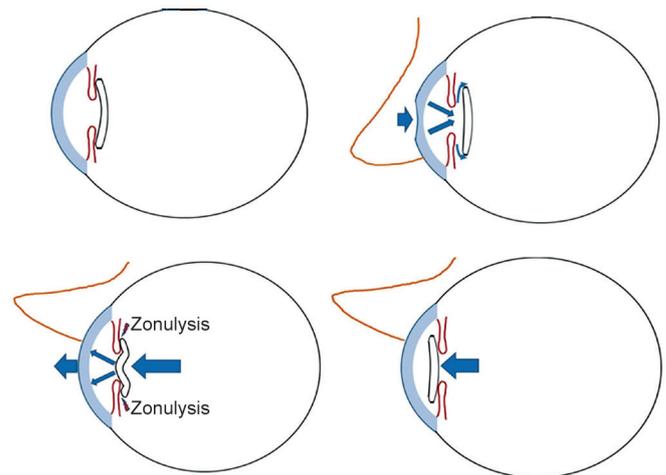


Figure 4 Schematic drawing of the empty capsular bag dislocation Squeezing of eyelid makes large pressure gradient (top right), subsequent lid opening makes consecutive hypotony (bottom left), migration of empty capsular bag from posterior to anterior chamber (bottom right).

dislocated into the posterior vitreous cavity and later migrated to the anterior chamber.

Although it is impossible to ascertain the exact scenario in this case, the two first hypotheses are the most probable.

ACKNOWLEDGEMENTS

Conflicts of Interest: Kim BH, None; Cha D, None; Yim S, None; Kwon JW, None; Wee WR, None; Han YK, None.

REFERENCES

- 1 Ahmad SS, Rahim AA, Ghani SA. A case of bilateral, spontaneous absorption of lenses. *Digit J Ophthalmol* 2011;17(1):3-5.
- 2 Scott JG. Spontaneous rupture of the lens capsule. *Br J Ophthalmol* 1953;37(1):58-60.
- 3 Sukhija J, Ram J, Brar GS, Bandhyopadhyaya S. Spontaneous rupture of the anterior lens capsule. *Indian J Ophthalmol* 2006;54(3):216-217.
- 4 Ho SF, Ahmed S, Zaman AG. Spontaneous dislocation of posterior polar cataract. *J Cataract Refract Surg* 2007;33(8):1471-1473.
- 5 Kumar V, Goel N, Piplani B, Raina UK, Ghosh B. Spontaneous posterior dislocation of nucleus with synchysis scintillans. *Cont Lens Anterior Eye* 2011;34(3):144-146.
- 6 Gaviria JG, Johnson DA, Scribbick FW 3rd, Gallardo MJ. Spontaneous anterior capsular rupture associated with anterior polar cataract. *Arch Ophthalmol* 2006;124(1):134-135.
- 7 Takkar B, Mahajan D, Azad S, Sharma Y, Azad R. Spontaneous posterior capsular rupture with lens dislocation in pseudoexfoliation syndrome. *Semin Ophthalmol* 2013;28(4):236-238.
- 8 Ferrer H. Spontaneous resorption of juvenile cataract. *Am J Ophthalmol* 1928;11(11):886-887.
- 9 Rathinam SR, Namperumalsamy P, Cunningham ET Jr. Spontaneous cataract absorption in patients with leptospiral uveitis. *Br J Ophthalmol* 2000;84(10):1135-1141.
- 10 Mohan M, Bartholomew RS. Spontaneous absorption of a cataractous lens. *Acta Ophthalmol Scand* 1999;77(4):476-477.

Unilateral spontaneous lens absorption and dislocation of capsular bag

- 11 Smith GT, Shun-Shin GA, Bron AJ. Spontaneous reabsorption of a rubella cataract. *Br J Ophthalmol* 1990;74(9):564-565.
- 12 Uemura A, Sameshima M, Nakao K. Complications of hypermature cataract: spontaneous absorption of lens material and phacolytic glaucoma-associated retinal perivasculitis. *Jpn J Ophthalmol* 1988;32(1):35-40.
- 13 Ashraf H, Khalili MR, Salouti R. Bilateral spontaneous rupture of posterior capsule in posterior polar cataract. *Clin Exp Ophthalmol* 2008; 36(8):798-800.
- 14 Ballen PH, Hughes WL. Spontaneous rupture of lens capsule in hypermature (morgagnian type) cataract. *Am J Ophthalmol* 1955;39(3): 403-405.
- 15 Mortada A. Soft traumatic or hypermature congenital cataract with rupture of posterior lens capsule and anterior hyaloid face. *Ann Ophthalmol* 1981; 13(7):839-840.
- 16 Ming AL. Spontaneous rupture of the anterior capsule of a hypermature lens. *Singapore Med J* 1963;3:127-130.
- 17 Evereklioglu C. Shifting crystalline pseudohypopyon secondary to lens absorption with spontaneous openings in the anterior lens capsule. *J Cataract Refract Surg* 2006;32(11):1971-1973.
- 18 Kwon YA, Bae SH, Sohn YH. Bilateral spontaneous anterior lens dislocation in a retinitis pigmentosa patient. *Korean J Ophthalmol* 2007; 21(2):124-126.
- 19 Kawashima M, Kawakita T, Shimazaki J. Complete spontaneous crystalline lens dislocation into the anterior chamber with severe corneal endothelial cell loss. *Cornea* 2007;26(4):487-489.
- 20 Coleman DJ, Trokel S. Direct-recorded intraocular pressure variations in a human subject. *Arch Ophthalmol* 1969;82(5):637-640.