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Late-onset capsular bag distension syndrome 33 years after cataract surgery

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ABSTRACT

Purpose: Describe the clinical features and management of this uncommon case of late-onset Capsular bag distension syndrome that occurred 33 years after cataract surgery.

Observation: An 87-year-old male was referred to our clinic complaining of blurred and gradual, painless reduction in vision in his left eye over the past year. A complete ophthalmological examination, Ultrasound biomicroscopy (UBM), anterior segment optical coherence tomography (AS-OCT), and optical biometry were performed to confirm the diagnosis. A 25-gauge pars plana vitrectomy combined with posterior capsulotomy was performed. The aspirated fluid was sent for microbiological analyses. After surgery, the patient's visual acuity returned to previous values, and anterior chamber depth slightly deepened. Samples taken were negative for bacteria.

Conclusions and Importance: Late-onset Capsular bag distension syndrome may occur up to 33 years following cataract surgery. A surgical approach offers the advantage of complete clearance of the turbid fluid, also removing the residual cortical material and enabling microbial and pathological testing.

1. Introduction

Capsular bag distension syndrome (CBDS) is a rare complication following phacoemulsification and intraocular lens (IOL) implantation for cataract surgery. It was first described by Davison[1] as the presence of turbid fluid between the IOL and the posterior capsule. Miyake et al.[2] classified CBDS based on its onset as intraoperative, caused by high irrigation pressure during hydrodissection maneuvers, early post-operative, due to osmotic gradient accumulation and late-onset originated from residual lens epithelial cells. We present a case of very late-onset capsular bag distension syndrome treated with pars plana vitrectomy.

2. Case report

In October 2023, an 87-year-old Caucasian male was referred to our clinic complaining of blurred and gradual, painless reduction in vision in his left eye over the past year. The patient underwent uneventful cataract surgery on both eyes 33 years before this presentation. The best-corrected visual acuity (BCVA) using a Snellen chart was 20/25 in the right eye (OD) and CF in the left eye (OS). Refractive error was +0.75–1.50/105 in OD, and +1.00–2.00/90 in OS. In September 2022 the BCVA in OS was 20/25 with the same refractive error. Slit-lamp biomicroscopic examination of the OD was unremarkable, but upon examining the OS, we noticed a turbid, milky opacity between the left well-centered IOL and the posterior capsule, as well as retained cortical material, limiting its visualization (Fig. 1). In both eyes, intraocular pressure was 18 mmHg. The fundus oculi was not visualizable in OS, so a B-scan and Ultrasound biomicroscopy (UBM) were performed due to the inability to visualize it. The B-scan reported a normoconformed bulb with a flat retina, and UBM showed a hyperechoic collection of turbid fluid behind the IOL with a distended capsular bag, confirming the presumed diagnosis of CBDS. AS-OCT imaging with Cirrus Zeiss 5000 (Zeiss Meditec AG, Jena, Germany) and optical biometry with IOL-Master® 700 (Zeiss Meditec AG, Jena, Germany) were also performed, showing distension of the posterior capsule and hyperreflective material between it and the IOL(Fig. 2). Anterior chamber depth (ACD) as measured by optical biometry was 4.40 mm in OD and 4.25 mm in OS. Since the posterior capsule was not visible, considering the presence of cortical material in the back of the capsular bag and that late-onset CBDS could be associated with Propionibacterium acnes,[3,4] surgical intervention was proposed, explained, and accepted by the patient through

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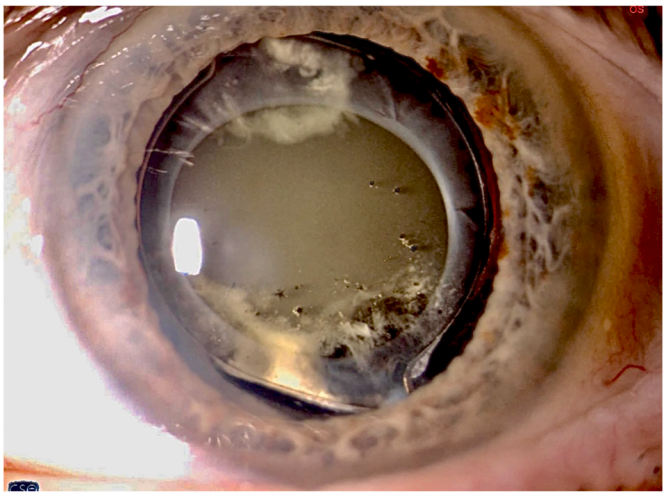

Fig. 1. Slit-lamp photograph of the left eye showing retained cortical material and a turbid milky fluid behind the intraocular lens (IOL).

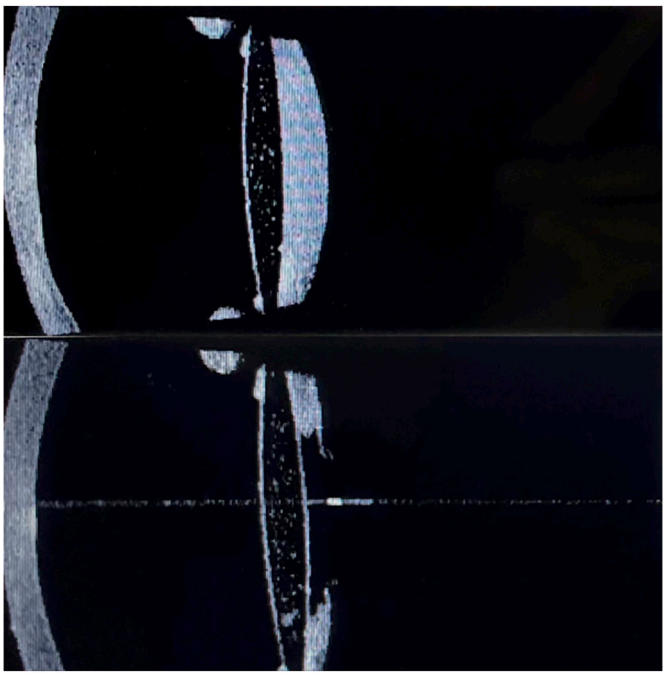

Fig. 2. Optic biometry image scan pre and post-operative showing the resolution of the Capsular bag distension syndrome (CBDS).

written informed consent. A 25G pars plana vitrectomy (PPV) with a posterior capsulotomy was performed. Initially, three 25G trocars were placed 3.5 mm away from the limbus, and without infusion, a posterior capsulotomy was performed, and the milky substance was aspirated with a 2 mL syringe through the vitrector. This was sent to histopathology for gram stains and cultures. Some masses firmly attached to the capsule, not involving the visual axis, were left to avoid excessive stress on the zonular fibers and possible subsequent dislocation of the IOL (Fig. 3). A complete vitrectomy was performed, and intravitreal vancomycin (1 mg/0.1 mL) was injected at the end of the procedure due to the possibility of associated P. acnes endophthalmitis. Microbiological examination of the specimen resulted negative for bacteria or growth after 15 days. The post-operative period was uneventful, and no signs of intraocular inflammation were detected. At six months, the vision improved to 20/25 BCVA with the same refractive error, and ACD was 4.31 mm, slightly deepened from baseline.

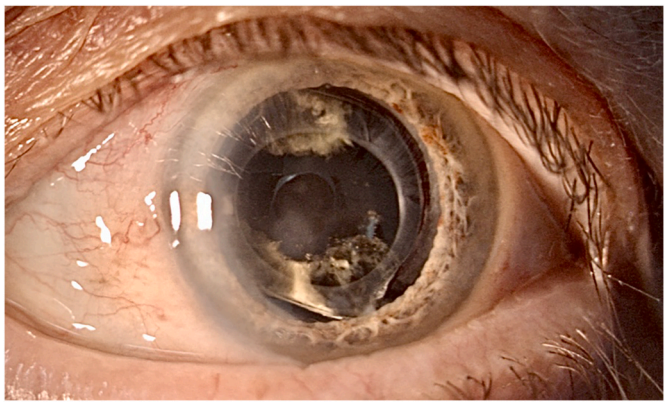

Fig. 3. Post-operative slit-lamp photograph of the left eye showing retained cortical material, complete resolution of the entrapped fluid with opened posterior capsule.

3. Discussion

Late-onset Capsular Bag Distension Syndrome, according to Miyake et al.,[2] is generated by metaplasia of residual lens epithelial cells or by osmotic forces. These formations occur due to an osmotic gradient between the hyperosmolar content (comprising residual lens epithelial cells and lens cortex) within the capsular bag and the hypoosmolar aqueous humor, leading to the distention of the capsular bag.[2] The time of onset after primary surgery is usually described with an average of 3.8 years, with case reports of late presentations even up to 20 years after surgery.[4–7] Our case report presents the uniqueness of presentation 33 years after surgery. After conducting a literature review on March 20th, 2024, utilizing PubMed and Google Scholar using the keywords (Capsular bag distension syndrome, late-onset, capsular block syndrome, cataract surgery), we did not find any prior reports of CBDS developed later than our case. Our patient had no signs of inflammation and cellularity in the anterior chamber, normal ocular pressure, and stable refractive error, as reported in literature for late-onset CBDS cases.[3,8] Diagnosis is mainly clinical, with the assistance of integrated imaging such as AS-OCT, UBM, and optical biometry.[5] The onset of pathology is generally described within a year,[4,5] as occurred in our patient.

From the available evidence, we do not know the specific trigger of this syndrome. Almost all cases have cortical remnants as a common factor,[1–5,7,9,10] which is therefore critical in the development of late-onset CBDS. It is conceivable that at some point a disruption of homeostasis occurs, leading to the metaplasia of residual lens epithelial cells or the development of osmotic forces as Miyake et al. postulated[2] and to the quick development of the syndrome. Further studies in this regard would be needed. Traditionally, Neodymium: yttrium-aluminum-garnet (Nd: YAG) laser posterior capsulotomy treatment has been the first choice treatment, a simple and safe procedure able to solve the syndrome draining the fluid into the vitreous cavity.[2,6,8] However, it carries the risk of spreading proteins, which can cause intraocular inflammation, and bacteria, which can lead to endophthalmitis, into the vitreous cavity. In particular, Propionibacterium Acnes has been cultured in other cases of late-onset CBDS,[3,4] and delayed endophthalmitis might evolve. In case the posterior capsule is not visible, Nd: YAG laser anterior capsulotomy has also been proposed, allowing fluid to drain into the anterior chamber.[2,6,8] However, this procedure can cause an elevation of intraocular pressure and is not always resolving, as a case of recurrence has also been reported in the literature.[8,9] As described before, we chose a surgical approach to this late-onset CBDS with a 25-gauge capsulotomy combined with PPV over Nd:YAG laser anterior or posterior capsulotomy. The main reasons were that the posterior capsule was not visualizable, making it difficult to

perform the Nd:YAG laser posterior capsulotomy, moreover, we wanted to remove the cortical material present in the back of the capsular bag and all the potentially infectious fluid. Surgery represents the only procedure capable of removing as many cortical remnants as possible, a result not achievable with Nd:YAG laser posterior capsulotomy. Specimens may be collected during surgical procedure for microbiological identification in the event of chronic endophthalmitis. The surgical approach itself leads to a theoretically lower risk of intra-ocular inflammation or endophthalmitis as the entire vitreous contents are removed. Finally, intracameral antibiotics can be administered at the time of surgery. This procedure is, however, more invasive, with risks associated with vitrectomy surgery and greater cost and time. All authors that managed their late-onset CBDS cases by PPV with posterior capsulotomy, similar to our surgical approach, showed excellent outcomes with complete resolution in all cases.[3–5,7,10] Our patient also recovered well, restoring his best visual acuity. Yang et al.[8] described that a deep ACD is associated with the development of late postoperative CBDS, a feature found in our patient. ACD in OS was shallower than in OD and after surgery slightly deepened by 0.06 mm, within the range of widening previously described by the authors after Nd: YAG laser capsulotomy.[8] Bacteriological analysis of the extracted material showed no bacteria even after 15 days of culture, as P. acnes, related to low-grade endophthalmitis, could need a prolonged period of up to 14 days to grow.[3]

4. Conclusions

In summary, our case highlights that CBDS can occur unexpectedly and up to 33 years after cataract surgery. The surgical approach proved safe, allowing the resolution of the syndrome, the removal of residual cortical material and the collection of specimen for microbiological analysis, in potential bacterial contamination.

Patient consent

The patient consented to publication of the case in writing and verbally.

Claims of priority

After conducting a literature review on March 20th, 2024, utilizing PubMed and Google Scholar using the keywords (Capsular bag distension syndrome, late-onset, capsular block syndrome, cataract surgery), we did not find any prior reports of capsular bag distension syndrome developed later than our case.). The time of onset after primary surgery is usually described with an average of 3.8 years, with case reports of late presentations even up to 20 years after surgery. Our case report presents the uniqueness of presentation 33 years after surgery.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

CRediT authorship contribution statement

Rosario Alfio Umberto Lizzio: Writing – review & editing, Writing – original draft, Validation, Methodology, Data curation, Conceptualization. **Francesco Polimeni:** Writing – review & editing, Methodology, Data curation, Conceptualization. **Andrea Dellavalle:** Writing – review & editing, Conceptualization. **Fabrizio D'Ancona:** Writing – review & editing, Conceptualization. **Martina Colombo:** Writing – review & editing, Data curation. **Stefano Mattioli:** Writing – review & editing, Supervision, Investigation, Conceptualization. **Paolo Nucci:** Writing – review & editing, Supervision, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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