

“Ultra-Late Onset Capsular Bag Distension Syndrome: Risk Factors and Characteristics on Scheimpflug Imaging”

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Abstract

Background: To provide insights into the characteristic of ultra-late onset capsular bag distension syndrome (CBDS) after phacoemulsification. Design: An interventional, retrospective case series at a tertiary care institute.

Participants: 5 Post-cataract surgery patients who presented with the retrolenticular fluid collection.

Methods: This is an interventional, retrospective case series of 5 cases who presented with clinical signs of ultra-late CBDS > 7 years after uneventful phacoemulsification with in-the-bag posterior chamber intraocular lens implantation at a tertiary care institute. Scheimpflug imaging was used in all cases in addition to slit lamp biomicroscopic examination to assess and diagnose the condition. Neodymium:Yttrium Aluminium Garnet (Nd:YAG) posterior capsulotomy was performed in all to treat the condition.

Main outcome measure: Results: All 5 patients presented with a milky fluid collection within the distended capsular bag without raised intraocular pressure or a shallow anterior chamber. Scheimpflug imaging confirmed the diagnosis in all cases and all eyes revealed a hyper-reflective space between the intraocular lens optic and the posterior capsule. Nd:YAG posterior capsulotomy was performed in all patients, with resolution of fluid and improvement of visual acuity.

Conclusion: Our case series showed that Scheimpflug imaging is a useful modality to diagnose ultra-late onset CBDS and to differentiate this condition from intraocular lens opacification and posterior capsule opacification (PCO). Nd:YAG posterior capsulotomy proved to be successful treatment for ultra-late CBDS with no significant change in biometric or refractive parameters.

Keywords: Ultra-late capsular bag distension syndrome; Post-cataract complication; YAG capsulotomy

Introduction

Capsular bag distension syndrome (CBDS) is a well-known entity with the reported incidence in clinically examined eyes of 0.73% in post cataract surgery patients [1]. Recently use of Scheimpflug imaging showed a higher incidence of 26% in the early post-operative period but most of the patients were asymptomatic [2]. Depending on the time of onset, Miyake et al. classified CBDS as intraoperative, early and late postoperative [3]. In the early post-operative period, detection of CBDS is easier as patient presents with clinical signs like reduced vision and myopic shift with forward displacement of the posterior chamber intraocular lens (IOL) and accumulation of retrolenticular fluid [4-6]. Zhu described characteristic Scheimpflug imaging in 3 ultra-late onset CBDS cases that presented after 7 years of phacoemulsification surgery [7]. In our case series, we documented the characteristics of ultra-late onset CBDS and analyzed their risk factors.

Materials and Methods

Institutional approval was taken for the publication of this interventional, retrospective case series. In this case series, we reviewed

the records of the patients that presented to us because of clinical suspicion of ultra-late onset CBDS. All cases had undergone standard phacoemulsification with posterior chamber IOL implantation. Two cases had diabetes mellitus, two were uveitis and one was myope. Hydrophobic acrylic IOL and similar viscoelastic (Healon-GV, 1.4% Sodium Hyaluronate) were used in all cases. With the standard ophthalmic examination, anterior segment photography was performed in these patients. Scheimpflug imaging (Oculus Pentacam HR) examination was undertaken, and the data collected by the Scheimpflug device were used only if the data-quality statement reading was “OK”. For each subject, the Scheimpflug Image Overview function was used to examine the 25 images obtained during one measurement to evaluate the overall morphologic characteristics of the posterior chamber. The anterior chamber depth, defined as the distance between the posterior corneal surface and the anterior IOL surface, was measured manually after adjusting the contrast of Scheimpflug images.

Results

In this case series, we reviewed the characteristics of the five eyes of five patients that were diagnosed as ultra-late onset CBDS during 2013-14 period. As these patients were also having other ocular morbidities so they were on regular follow up at our institute.

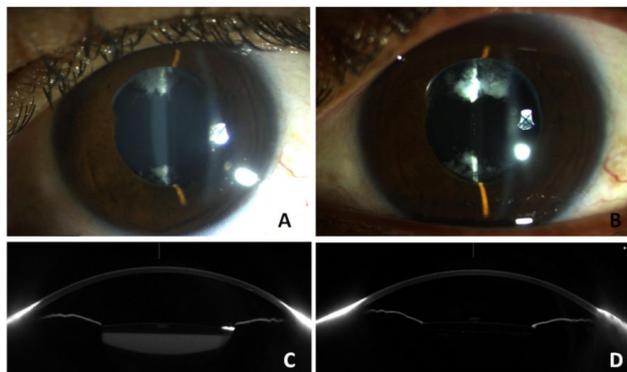


Figure 1: A. Clinical picture of a 58 year old male status post phacoemulsification. Note space between the Intraocular lens(IOL) optic and posterior capsule filled with milky fluid. B. Status post Neodymium: Yttrium Aluminium Garnet (Nd:YAG) laser capsulotomy showing disappearance of fluid in the visual axis. C. Scheimpflug imaging before Nd:YAG laser capsulotomy showing space between the IOL optic and posterior capsule filled with uniform density material. D. Status post Nd:YAG laser capsulotomy showing disappearance of space between the IOL optic and posterior capsule due to disappearance of fluid.

chamber intraocular lens implantation and use of similar viscoelastic at the time of surgery. After one month of the surgery, all the patients achieved emmetropia. All patients were referred to our refractive clinic on clinical suspicion during the postoperative follow up between seven to eight years after surgery. Four eyes had myopic shift and one was emmetropic on presentation. All the patients underwent an uneventful Nd:YAG laser posterior capsulotomy which lead to resolution of fluid present between IOL optic and posterior capsule (Figure 1) as well as improvement in the visual acuity (Table 1).

Discussion

Continuous curvilinear capsulorhexis (CCC) is an important step to perform an uneventful cataract surgery whether done manually or during femtosecond laser assisted cataract surgery (FLACS). CBDS may also be associated with can-opener type capsulotomy and sulcus-implanted intraocular lens [8,9]. In the presence of the predisposing conditions, during the long follow up, when CCC margins adhere to the IOL optic and occludes it; CBDS can occur as a disturbing equilibrium phenomenon [10]. Ultra-late onset CBDS is recently described term that presents after 7 years of cataract surgery lacking the classical features of CBDS i.e. shallow anterior chamber, elevated intraocular pressure, and induced myopia from the anterior shift of the intraocular lens [2,7]. Literature shows very few cases that were detected after such a long duration; may be asymptomatic in nature or clinically difficult to diagnose but without any characteristic documentation.

Age of the patients ranges from 41-60 years. Records of these patients showed uneventful phacoemulsification with posterior

	Case 1 M	Case 2 F	Case 3 M	Case 4 M	Case 5 M
Presenting complaint	Reduced vision	Glare/halos	Reduced vision	Reduced vision	Reduced vision
Time of presentation after surgery	8 years	7 years	7 years	7 years	8 years
Significant history	Vogt-Koyanagi-Harada disease	Diabetes mellitus	Myopia	Acute Anterior Uveitis	Diabetes mellitus
PCIOL Type	AcrySof MA60AC	AcrySof MA60AC	AcrySof MA60AC	Tecnis ZA9003 (AMO)	AcrySof MA60AC
OVD use at the time of Surgery	Healon-GV	Healon-GV	Healon-GV	Healon-GV	Healon-GV
Clinical sign	Retrolenticular fluid	Retrolenticular fluid	Retrolenticular fluid	Retrolenticular fluid, shallow anterior chamber	Retrolenticular fluid, shallow anterior chamber
BCVA (pre-treatment)	6/18	6/9	6/12	6/12	6/12
BCVA (post-treatment)	6/6	6/6	6/9	6/6	6/9
Myopic shift (pre-treatment)	-1.75DS	Plano	-1.0DS	-1.50DS	-1.25DS
Refractive status (post-treatment)	Plano	Plano	-0.50DS	-0.50DS	-1.00DS
Posterior capsular distension(μ m)	1180	760	1380	1600	940
Axial length	22.63 mm	22.47 mm	26.10 mm	23.59 mm	22.10 mm
White to white diameter	11.6 mm	11.7 mm	11.8 mm	11.6 mm	11.6 mm
AC depth (pre-treatment)	3400 μ	4060 μ	4310 μ	2620 μ	4190 μ
AC depth (post-treatment)	3450 μ	4080 μ	4420 μ	3520 μ	4340 μ
Residual lens matter/liquefied milky fluid	Yes	Yes	Yes	Yes	Yes

Anterior capsular opacification	Yes	no	no	Yes	no
Abbreviations: M: Male; F: Female; PCIOL: Posterior Chamber Intraocular Lens; OVD: Ophthalmic Viscoelastic Device; BCVA: Best Corrected Visual Acuity; AC: Anterior Chamber					

Table 1: Characteristics of the patients diagnosed as ultra-late onset capsular bag distension syndrome.

Different factors but similar mechanism appears the cause for late onset CBDS as in our cases. Presence of fibrous capsular opacification due to residual lens epithelial proliferation in these cases supported the theory of late fibrotic reaction for CBDS [11]. Proliferation of lens epithelial cells causes accumulation of protein and oncotic material leading to fluid collection in the retrolenticular space. Along with this, predisposing conditions like disruption of the blood aqueous barrier in uveitis (case 1, 4) and diabetes (case 2, 5); myopia resulting in large capsular bag were the other major risk factors present in our case series. Common characteristics seen in our cases were the relatively small continuous curvilinear capsulorhexis in all cases, hydrophobic acrylic intraocular lens implantation and use of similar viscoelastic (Healon-GV, 1.4% Sodium Hyaluronate).

Scheimpflug imaging in these cases showed change in the anterior chamber depth and also distention of the capsular bag due to accumulation of fluid in the retrolenticular space. Previous reports also supported our imaging findings that ultra-late presentation usually doesn't show significant change in the refraction or the anterior chamber depth clinically [7].

Other imaging modalities like anterior segment optical coherence tomography (AS-OCT) or ultrasound biomicroscopy (UBM) have also been described for the detection of CBDS, but less sensitive than Scheimpflug imaging [11]. Scheimpflug imaging has advantages like non-contact, easy to perform and more sensitive to locate posterior capsular status to look for distention [11]. Although skilled slit lamp examination can detect CBDS but recently Zhu showed asymptomatic CBDS almost 1 in every four patients in the same way ultra-late onset CBDS can be easily confused with posterior capsular opacification (PCO) because of asymptomatic in nature and can lead to misdiagnosis [2]. Scheimpflug imaging facilitates easy identification of capsular distension thereby helping in making better clinical and differential diagnoses.

Possible treatments in symptomatic patients of CBDS are Nd: YAG laser capsulotomy or surgical lysis of adhesions [12-14]. Nd:YAG posterior capsulotomy was performed in all the cases safely and yielded excellent visual results in all cases, with minimal biometric or refractive changes. Few reports demonstrated that in CBDS, distended capsular bag due to trapped milky fluid poses technical difficulty in focusing of the Nd:YAG laser on the posterior capsule, hence leading to failure, which may then require surgical drainage of the trapped fluid [15]. In all our cases, Nd:YAG laser assisted posterior capsulotomy was done in mid-periphery in the inferior part, as distension of bag leads to backward displacement of posterior capsule and therefore, center of posterior capsule cannot be visualized and focused. All cases had good postoperative visual gain and complete resolution of symptoms with improvement in myopic shift and relieving distension of bag, which can be easily visualized on Scheimpflug imaging.

In conclusion, this case series showed the common predisposing conditions present in all five patients. Our case series also highlighted

the predisposing risk factors that caused the development of ultra-late onset CBDS.

Declaration

There is no proprietary interest in any of the products/ drugs mentioned in this manuscript

No conflict of interest among the authors.

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