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CASE SERIES

Scheimpflug imaging of ultra-late postoperative capsular block syndrome

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Abstract

Purpose **To report the clinical findings of three cases with ultra-late postoperative capsular block syndrome (CBS) by Pentacam Scheimpflug imaging.**
Methods **Case series.**
Results **Three cases of ultra-late postoperative CBS are presented.**
Discussion **This report highlights the importance of conducting Pentacam Scheimpflug imaging in late CBS. Each case either enhanced our understanding or improved our differential diagnosis of late CBS.**
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Introduction

Capsular block syndrome (CBS) is a rare complication of cataract removal.[1,2] It is categorized into three types depending on the time of onset: intraoperative, early postoperative, and late postoperative.[3] Late postoperative CBS is typified by the accumulation of a milky-white liquefied substance between the IOL and posterior capsule and capsular bag distention.[4,5] Possible treatments include neodymium:YAG (Nd:YAG) laser capsulotomy[6] or surgical lysis of adhesions. Scheimpflug imaging has shown advantages in detecting changes in the anterior segment caused by CBS.[7,8] We present clinical findings in three cases with ultra-late postoperative CBS.

Case reports

Each patient underwent uneventful cataract surgery at our hospital. Anterior segment photography (SL-D7W/DC-3 camera system; Topcon Corporation, Tokyo, Japan) and Pentacam Scheimpflug imaging (Pentacam HR; OCULUS Optikgeräte GmbH, Wetzlar, Germany) were performed before and after Nd:YAG laser posterior capsulotomy. The clinical features of the patients are summarized in Table 1.

Case 1

A 66-year-old man presented with blurry vision in the left eye lasting 5 months. He had undergone phacoemulsification with IOL (Sensar AR40e; Abbott Medical Optics Inc., Santa Ana, CA, USA) implantation in the left eye 12 years earlier. His best-corrected visual acuity during the early postoperative stages was 20/20. At presentation, slit lamp (Figure 1a) and Pentacam (Figure 1b) examinations demonstrated CBS in the left eye. After laser capsulotomy, capsular bag distension was resolved.

Case 2

A 72-year-old woman presented with blurry vision in the right eye lasting 5 years. She had undergone phacoemulsification with IOL (KS-3Ai; STAAR Surgical Co., Monrovia, CA, USA) implantation in the right eye 7 years earlier. Her uncorrected visual acuity gradually decreased from 20/30 to 20/50 after cataract surgery. At presentation, the contour of the IOL in front of the milky-white fluid was better visualized by Pentacam imaging (Figure 1e) than by slit lamp examination (Figures 1c and d). After laser treatment, the patient's visual acuity significantly improved.

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Table 1 Clinical features of three ultra-late capsular block syndrome cases

Clinical features	*Case 1*	*Case 2*	*Case 3*
Size of CCC (mm)	4.5	4.5	5
Intraocular pressure (mm Hg)	12	14	13
UCVA and BCVA			
Pretreatment[a]	20/80 and 20/30	20/100 and 20/60	FC/30 cm and 20/400
Post-treatment[a]	20/40 and 20/20	20/50 and 20/20	20/100 and 20/80
Refraction			
Pretreatment[a]	$-1.00/-1.50\times75$	$-2.00/-1.25\times105$	$-1.50/-1.00\times170$
Post-treatment[a]	$-0.25/-1.50\times80$	$-1.00/-1.00\times90$	$-0.75/-1.00\times112$
Posterior distention of capsule (mm)[b]	1.12	1.07	1.22
ACD (mm)			
Pretreatment[a]	4.71	3.95	4.38
Post-treatment[a]	5.16	4.27	4.58
Change in ACD (mm)	0.45	0.32	0.20
Other oculopathy	High myopia		High myopia (B scan)

Abbreviations: ACD, anterior chamber depth; BCVA, best corrected visual acuity; CCC, continuous curvilinear capsulorhexis; IOL, intraocular lens; PC, posterior chamber; UCVA, uncorrected visual acuity.
[a] UCVA, BCVA, refraction, and ACD changes of capsular block syndrome cases before and after Nd:YAG laser capsulotomy.
[b] Data detected by Pentacam Scheimpflug imaging before Nd:YAG laser capsulotomy.

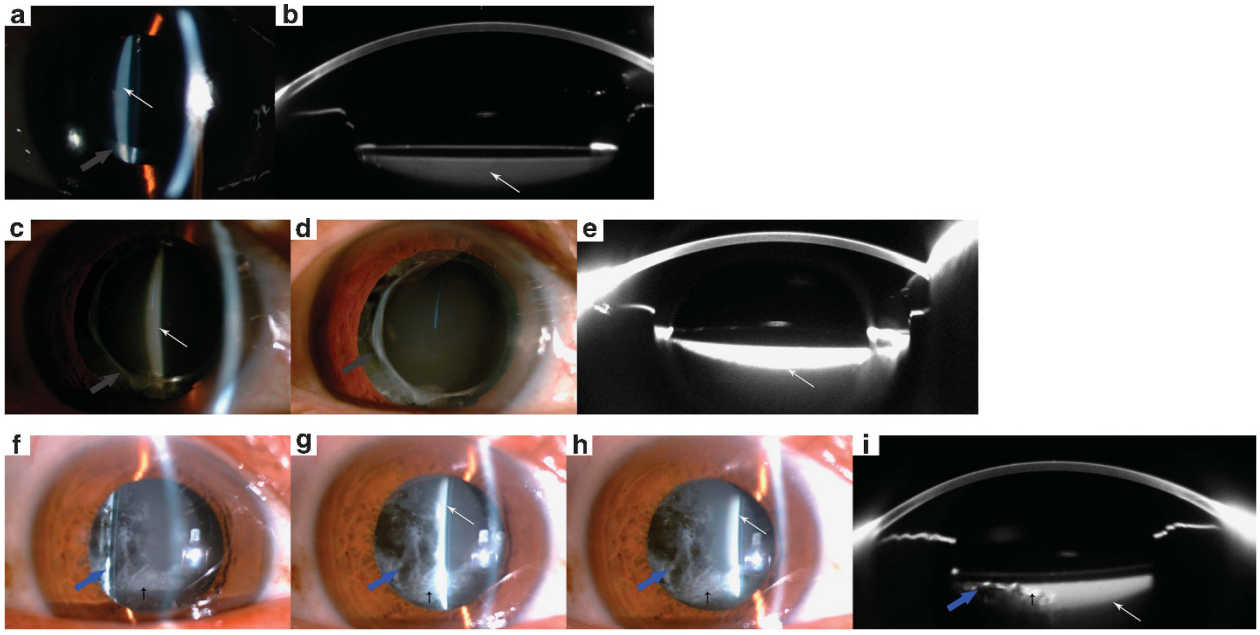

Figure 1 Slit lamp and Pentacam Scheimpflug images of ultra-late capsular block syndrome in three cases. Case 1: (a) Slit lamp photograph showing the backward extension of the posterior capsule and the presence of milky-white fluid between the intraocular lens (IOL) and the posterior capsule (white arrow). After maximal dilation, fibrosis of the capsulorhexis opening was visible on the lower nasal side (gray arrow). The IOL was in place. (b) Pentacam Scheimpflug image locates the distended zone before laser treatment. Case 2: (c) Slit lamp photograph showing a curved light band filled with grayish-white opacities (white arrow). However, the IOL was difficult to identify. (d) After maximal dilation, the complete margin of the continuous curvilinear capsulorhexis opening was visible and exhibited significant fibrosis on the temporal side (gray arrow). (e) Pentacam Scheimpflug image showing the contour of the IOL and the underlying milky-white fluid. Case 3: (f) Opacification and fibrosis of the posterior capsule from 7 to 11 O'clock along the temporal side (blue arrow). (g) Boundary of fibrosis and liquefaction. (h) Distention of the capsular bag caused by milky-white liquid on the nasal side (white arrow). Residual cortex was observed inferiorly within the pupillary zone (black arrow). The IOL was in position. (i) Pentacam Scheimpflug image showing the coexistence of residual lens material, liquefied products, and posterior capsular opacification.

Case 3

A 60-year-old man presented with blurry vision in the right eye lasting 3 months. He had undergone extracapsular cataract extraction with a can-opener-type capsulorhexis and IOL (Akreos Adapt; Bausch + Lomb Inc., Rochester, NY, USA) implantation in the right eye 9 years earlier. Slit lamp examination revealed opacification and fibrosis of the posterior capsule along the temporal side (Figures 1f–h, blue arrow), and distention of the capsular bag and accumulation of milky-white liquid on the nasal side (Figures 1g and h, white arrow). Residual cortex was observed inferiorly within the pupillary zone (Figures 1f–h, black arrow). Slit lamp examination and Pentacam imaging (Figure 1i) demonstrated CBS and posterior capsular opacification (PCO) in the right eye, which were successfully resolved after laser treatment.

Discussion

All cases of ultra-late CBS reported in this case series occurred >7 years after cataract removal by either continuous curvilinear capsulorhexis or can-opener-type capsulorhexis. The longest time from cataract surgery to CBS onset was 12 years (Case 1): this is much longer than the intervals reported in previous case series,[9–11] which ranged from 2 to 92 months. Two cases exhibited high myopia in accordance with Kim and Shin,[12] who identified longer axial length as a risk factor for postoperative CBS.

Capsular bag extension and fibrosis of the capsulorhexis margin were evidently observed in our cases. Late postoperative CBS has been described as liquefied after-cataract[13] with remarkable posterior capsule distention filled with milky-white, opaque fluids. It contains proteinaceous products of residual lens epithelial cells (LECs),[14] producing extracellular matrix and leading to fibrosis. Substances trapped within the capsular bag cause an increase in osmotic pressure and trigger chronic fluid accumulation. The blurring and occlusion of vision caused by opacities and myopia induced by the gradual distension of the capsule finally lower the quality of the visual outcome. With the assistance of Pentacam imaging, Case 3 was presented as a good example of ultra-late CBS, with the coexistence of residual lens material, PCO, and liquefied products (Figure 1i), indicating a possible relationship between the proliferation of LECs, fibrosis, and subsequent liquefaction. Residual LECs of the cortex are not only the reason for PCO but also the source of the milky-white substance,[15] and late CBS is most likely a process involving PCO and liquefaction.

In addition to locating and analyzing the distended zone before treatment, Pentacam imaging is also useful in differentiating late CBS from IOL opacification.

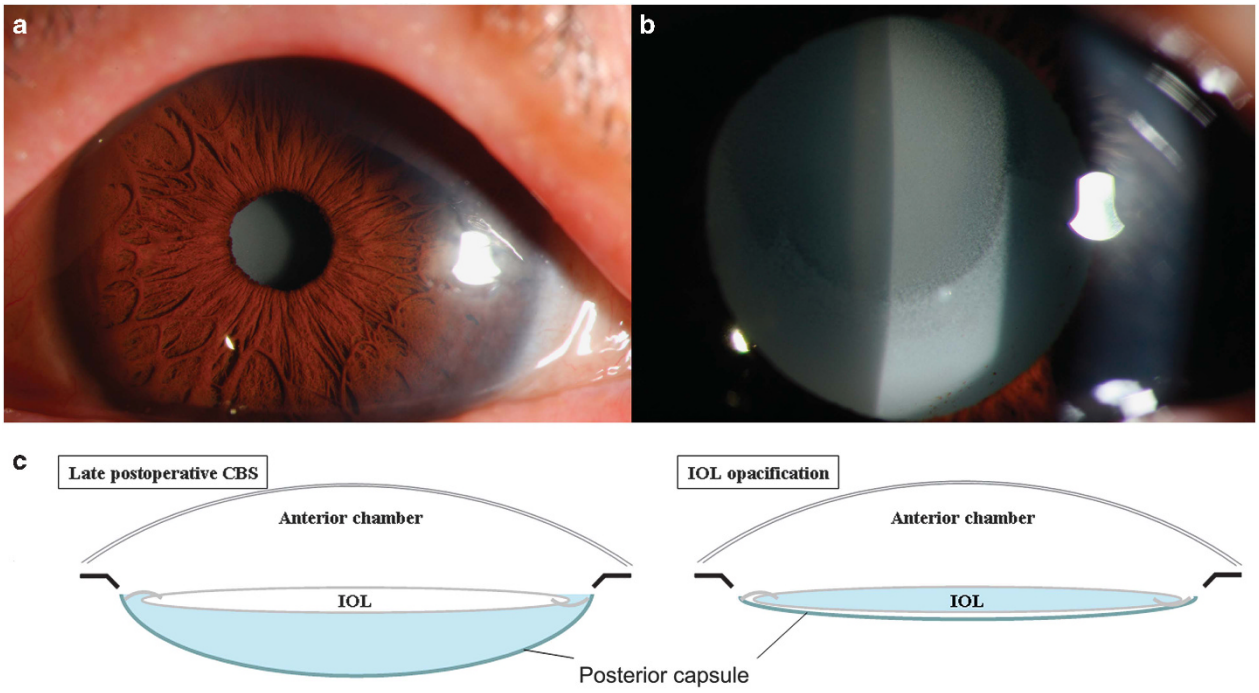

Figure 2 Late postoperative capsular block syndrome and intraocular lens opacification. (a) Anterior segment photos of an opacified intraocular lens case before pupil dilation. (b) Anterior segment photos of an opacified intraocular lens case after pupil dilation. (c) Comparison of late postoperative capsular block syndrome and intraocular lens opacification.

As shown in Case 2, it is difficult to differentiate IOL opacification from liquid accumulated behind the IOL only by slit lamp examination. Figures 2a and b presents the anterior segment photographs of one of our patients with an opacified IOL, demonstrating its similarity to CBS at first sight. Fortunately, Pentacam imaging facilitates easy identification of where the opacification has occurred (Figures 1e and 2c), thereby assisting doctors in making better clinical and differential diagnoses.

Limited research has been conducted on the changes of ACD in late CBS. Some studies[16,17] found small changes in ACD after laser treatment, as measured by anterior segment OCT. In our three cases, however, an increase in ACD after laser treatment was evident, ranging from 0.20 to 0.45 mm. It is consistent with the case report of Kucukevcilioglu *et al*.[18] We also noted a reduction in myopia after Nd:YAG capsulotomy ranging from -0.75 diopters (D) to -1.00 D (average: -0.83 D). A reduction in myopia after Nd:YAG laser capsulotomy is considered a typical finding in patients with early-onset postoperative CBS,[10] while it is not constant in late-onset forms,[16,18] especially in patients with a very delayed onset. Therefore, studies of larger numbers of patients with late CBS are still required.

In conclusion, Pentacam Scheimpflug imaging proved a useful noninvasive technique for diagnosis and follow-up in ultra-late CBS cases.

Summary

What was known before

- Late postoperative CBS is typified by the accumulation of a milky-white liquefied substance between the IOL and posterior capsule, capsular bag distention, and occasionally, fibrosis of the capsulorhexis margin.
- Possible treatments for this unusual complication include neodymium:YAG (Nd:YAG) laser capsulotomy or surgical lysis of the adhesions between the IOL and anterior capsule.
- Scheimpflug imaging, optical coherence tomography (OCT), and ultrasound biomicroscopy (UBM) have been used to diagnose CBS.

What this study adds

- We report the cases of three patients with ultra-late postoperative CBS after cataract removal, the onset of which was significantly later than in previous reports.
- A reduction in myopia after Nd:YAG capsulotomy was also noted, which is not constant in late-onset forms, especially in patients with a very delayed onset.
- Observation in our cases suggested a possible relationship between the proliferation of LECs, fibrosis, and subsequent liquefaction in the development of late CBS.

Conflict of interest

The authors declare no conflict of interest.

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