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Late Intraocular Lens Subluxation in a High Myopic Eye with Missed Capsular Support: A Case Report

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ABSTRACT

Late intraocular lens (IOL) subluxation is a recognized long-term complication following cataract surgery and may present with subtle symptoms that delay diagnosis. We report a 59-year-old female with high axial myopia who presented with progressive blurred vision and monocular diplopia in the right eye over three years. She had undergone cataract surgery seven years prior. Examination revealed iridodonesis, a decentered and tilted posterior chamber IOL, and a posterior capsular defect. Axial length measurement confirmed high myopia (28.05 mm), while biometric assessment was unreliable due to IOL tilt. A diagnosis of late IOL subluxation secondary to progressive zonular insufficiency with capsular compromise was established. This case highlights high myopia as a predisposing factor for delayed IOL instability, which may be exacerbated over time in the absence of additional capsular support.

Keywords: Intraocular lens subluxation; High myopia; Zonular insufficiency; Capsular tension ring; Monocular diplopia; Cataract surgery complications

INTRODUCTION

Monocular diplopia is a visual symptom that may arise from various intraocular optical abnormalities, including corneal irregularities, lens-related pathology, and intraocular lens (IOL) malposition.[1] Among these, IOL subluxation represents an important but often underrecognized cause, particularly in pseudophakic patients presenting with relatively preserved visual acuity.[2]

In the context of prior cataract surgery, such symptoms warrant careful evaluation, as they may reflect underlying structural instability rather than refractive error alone. Late IOL subluxation is a recognized long-term complication, typically resulting from progressive zonular insufficiency that leads to gradual displacement of the capsular bag–IOL complex.[2]

Several risk factors have been associated with zonular weakness, including pseudoexfoliation, trauma, prior intraocular procedures, and high axial myopia. In highly myopic eyes, elongation of the globe may place chronic stress on the zonular fibers, predisposing them to gradual degeneration over time.[3] Despite this, zonular instability may not be clinically evident at the time of cataract surgery. In addition to patient-related factors, surgical considerations during cataract surgery with IOL implantation may influence long-term stability of the capsular bag–IOL complex. The use of capsular support devices, such as capsular tension rings (CTR), is generally reserved for eyes with suspected zonular weakness; however, their role in eyes with

predisposing but subclinical risk factors remains an area of ongoing discussion. [3,4]
This report presents a case of late IOL subluxation in a highly myopic eye, highlighting the role of underlying zonular vulnerability and the potential implications of capsular support strategies during cataract surgery in at-risk patients.

CASE PRESENTATION

A 59-year-old female presented with progressive blurring of vision over approximately three years. Initially intermittent, the visual disturbance gradually became persistent and was associated with monocular diplopia, particularly when the left eye was closed. Over the past month, the symptoms had worsened and were accompanied by intermittent headache. There were no associated complaints of ocular pain, redness, photophobia, or visual field defects. Her ocular history was significant for cataract surgery in the right eye performed seven years prior at a hospital in another city in Indonesia. She also had a longstanding history of high myopia since childhood. There was no history of ocular trauma. Her systemic history was notable for hypertension.
On examination, visual acuity was 6/38 in both eyes, improving to 6/15 with pinhole in the right eye. Refraction in the right eye revealed −4.00 diopters of astigmatism at an axis of 90°, achieving a best-corrected visual acuity (BCVA) of 6/12, with persistent shadowing. Intraocular pressure was within normal limits in both eyes. Anterior segment examination of the right eye revealed iridodonesis. A posterior chamber intraocular lens (IOL) was present and noted to be decentered inferiorly with nasal displacement (Fig. 1), accompanied by tilt of the optic (Fig. 2). Following pupillary dilation, slit-lamp examination demonstrated displacement of the IOL optic from the visual axis, with partial visualization of the haptic and a posterior capsular defect (Fig. 3). Posterior segment examination of the right eye revealed a tigroid fundus with peripapillary atrophy, consistent with high myopia.
The left eye had a BCVA of 6/9.5, with lens opacity consistent with cataract and an otherwise unremarkable posterior segment.
Biometric assessment was attempted; however, most parameters were inconsistent and of suboptimal quality, likely due to limitations of the available measurement system. Axial length measurement of the right eye was 28.05 mm, confirming high axial myopia.
Based on these findings, a diagnosis of late intraocular lens subluxation in the right eye, secondary to progressive zonular insufficiency with associated capsular compromise, was established. The patient was subsequently referred to a tertiary center for further management, as unreliable biometry could compromise the accuracy of surgical planning.

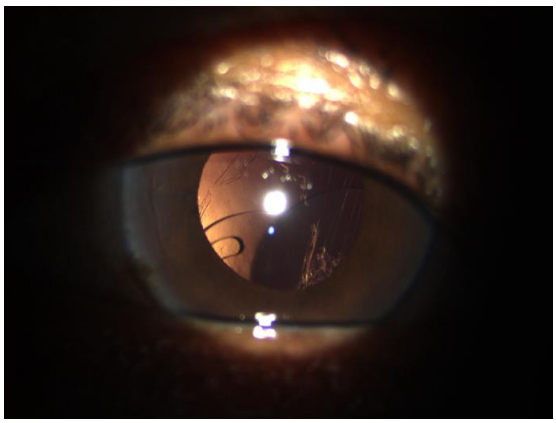

Figure 1

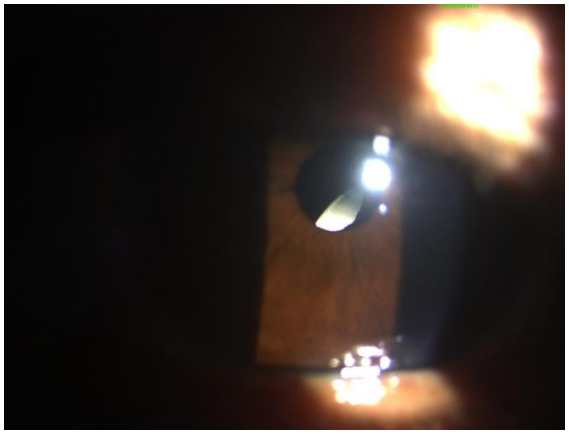

Figure 2

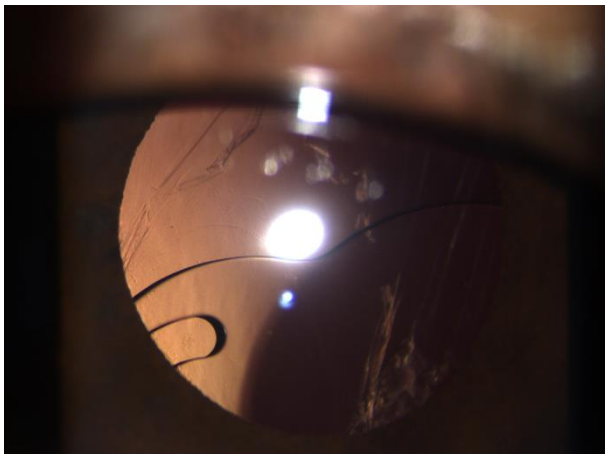

Figure 3

Figure legends:
Fig. 1. Slit-lamp photograph of the right eye (OD) demonstrating nasal decentration of the IOL.
Fig. 2. Slit-lamp image of OD showing IOL dropped.
Fig. 3. Close-up anterior segment view of the dilated OD showing partial visualization of the IOL haptic, with a posterior capsular defect.

DISCUSSION

Late IOL subluxation in this case reflects a gradual process of progressive zonular insufficiency rather than an acute structural event. The presence of iridodonesis and asymmetric IOL displacement indicates significant zonular compromise, leading to progressive instability of the capsular bag–IOL complex over time.[5] As zonular support weakens, the IOL may initially tilt before progressing to more evident decentration, resulting in optical disturbances such as monocular diplopia despite relatively preserved visual acuity.

This pattern of instability highlights the importance of distinguishing between progressive zonular insufficiency and primary capsular bag failure, commonly referred to as dead bag syndrome.[6] Zonular weakness typically results in asymmetric IOL displacement with tilt and decentration, whereas dead bag syndrome is characterized by diffuse capsular contraction or collapse with relatively preserved zonular support.[5,6] In this case, the clinical findings strongly favor a zonular mechanism. However, the presence of a posterior capsular defect suggests that secondary capsular compromise may have developed over time, likely due to repetitive mechanical stress from an increasingly unstable capsular bag–IOL complex. These processes likely act in combination, contributing to the progressive nature of the condition.

High axial myopia appears to have played a significant role in this process. With an axial length of 28.05 mm, the eye is classified as highly myopic as it is longer than 26 mm,[7] a condition associated with increased susceptibility to zonular weakness and long-term capsular instability. Structural elongation of the globe may place chronic stress on the zonular fibers, predisposing them to gradual degeneration.[7] As a result, zonular instability may not be clinically evident at the time of cataract surgery, only to manifest years later as progressive IOL instability.

Therefore, the missing additional capsular support during the initial surgery becomes a relevant consideration. Although high myopia alone does not constitute an absolute indication for CTR implantation, it is a recognized risk factor that warrants careful assessment of zonular integrity.[8] In particular, an axial length of more than 26 mm is considered a relative indication for CTR placement during IOL insertion, given the increased likelihood of zonular weakness in such eyes.[9] CTRs may enhance capsular bag stability by

redistributing zonular forces and maintaining capsular contour, particularly in eyes with compromised or at-risk zonular support. While the decision not to use a CTR may not result in immediate postoperative complications, the absence of additional stabilization may, over time, increase the susceptibility of the capsular bag and IOL complex to progressive zonular stress,[8] as reflected in this case. Furthermore, variations in surgical settings, including differences in access to adjunctive devices and evolving clinical practices, may also influence the omission of capsular support during the initial procedure in this patient.

The role of CTR is related to the underlying mechanism of IOL instability. However, its effectiveness depends on the presence of functional zonular support.[10] In contrast, in dead bag syndrome, where capsular integrity is compromised, the stabilizing effect of CTR is limited.[11] This distinction further supports a predominantly zonular mechanism in this case and suggests that earlier capsular support might have contributed to improved long-term stability.

Management of late IOL subluxation depends on the degree of zonular loss, capsular integrity, and the condition of the IOL.[12] Preservation of the existing IOL is generally preferred when the lens remains structurally intact and can be adequately stabilized, as this avoids refractive unpredictability and reduces surgical complexity.[12] Repositioning combined with iris or scleral fixation may provide satisfactory outcomes in such cases. However, IOL exchange should be considered when the existing lens is unsuitable for fixation or when adequate support cannot be achieved.[12] Accurate biometry is essential when planning IOL exchange, although measurements may be unreliable in the presence of significant IOL tilt or decentration, as observed in this patient.

At the current stage, when zonular insufficiency is developed and capsular support is compromised, the role of CTR becomes limited, as its function depends on adequate zonular support.[13] In such cases, more definitive fixation techniques, such as iris or scleral fixation, are often required to restore long-term stability.[13] In this patient, unreliable biometric measurements further complicated surgical planning, emphasizing the importance of recognizing when available diagnostic evaluation is insufficient and when referral to a tertiary center is necessary to ensure optimal management.

Another important aspect of this case is the delay between symptom onset and diagnosis. The patient experienced monocular diplopia for several years, which was likely attributed to refractive causes due to relatively preserved visual acuity. However, monocular diplopia is often an early indicator of optical misalignment and should prompt evaluation for IOL tilt or decentration in pseudophakic patients.[1] This reflects a common limitation in clinical practice, where reliance on visual acuity alone may delay recognition of underlying structural abnormalities.

Overall, this case illustrates how subtle zonular instability in high-risk eyes may progress silently over time, eventually leading to clinically significant IOL subluxation. In highly myopic eyes, where structural vulnerability may not be apparent at the time of surgery, consideration of long-term capsular stability becomes particularly relevant. While the use of capsular tension rings should remain individualized, greater awareness of zonular risk may help guide surgical planning and reduce the likelihood of delayed instability requiring more complex secondary interventions.

CONCLUSION

Late intraocular lens subluxation is an important long-term complication of cataract surgery, particularly in eyes with underlying risk factors such as high axial myopia. Subtle symptoms, including monocular diplopia, should prompt evaluation for structural abnormalities rather than being attributed solely to refractive

causes. In such high-risk eyes, consideration of capsular stability during initial surgical planning is essential. While CTRs do not prevent zonular degeneration, their use in selected myopic patients may provide additional capsular support and contribute to improved long-term stability. Once significant instability has developed, timely referral and appropriate selection of surgical techniques are critical to achieve optimal visual outcomes.

Declaration by Authors

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