Case Report

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# Late spontaneous bilateral intraocular lens subluxation accompanied with intraocular pressure elevation in a patient with acromegaly

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**Abstract:**

A 53-year-old male with newly diagnosed acromegaly came to our clinic with the chief complaint of diplopia. He had the past ocular history of uneventful phacoemulsification cataract surgery with intraocular lens (IOL) implantation in the right eye 17 years ago and left eye 15 years ago. Postoperative examination showed remarkable improvement in visual acuity. Two years ago, he developed elevated intraocular pressure (IOP) in both eyes, which was well-controlled with the use of travoprost 0.004%/timolol 0.5%. At the clinic, slit-lamp examination revealed inferiorly subluxated IOL bilaterally. The patient received IOL repositioning with pars plana vitrectomy and scleral fixation in the left eye smoothly. We hypothesize that excess growth hormone is associated with dysregulation of fibrillin, resulting in zonular weakness, which causes late bilateral IOL subluxation. Elevated IOP may also be related to acromegaly. To the best of our knowledge, this is the first report to describe the association between IOL subluxation and acromegaly.

**Keywords:**

Acromegaly, ciliary zonule, fibrillin, growth factors, lens subluxation

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## Introduction

Intraocular lens (IOL) subluxation or dislocation is a rare complication following cataract surgery with incidence around 0.2%–3%.[1,2] It can be classified into early and late dislocation according to the timing of occurrence following surgery, or into in-the-bag and out-of-the-bag dislocation based on the integrity of the capsular bag.[3,4] Early IOL dislocation, which occurs fewer than 3 months, is often secondary to improper fixation of the IOL within the capsular bag.[3] Late IOL dislocation within the secure capsular bag generally occurs as a result of progressive zonular weakness and dehiscence rather than inadequate IOL fixation.[5] The incidence of late dislocated IOL is even lower, with an incidence of 0.032%–0.28% reported in the literature.[6,7] Risk factors for late spontaneous dislocation include pseudoexfoliation (PXF), high myopia, trauma, connective tissue disease, uveitis, retinitis pigmentosa, and previous vitreoretinal surgery.[8] In this case report, we present a patient of acromegaly and late spontaneous IOL subluxation who underwent smooth cataract surgery more than 10 years ago without any of the above predisposing factors.

## Case Report

A 53-year-old male with newly diagnosed acromegaly related to pituitary adenoma presented to the clinic with the chief complaint of diplopia in both eyes. He had a short stature with obvious features of enlarged feet, hands, nose tip and mandible at the clinic. The patient had uneventful phacoemulsification cataract surgery and



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implantation of a P359UV single-piece polymethyl methacrylate IOL (Bausch and Lomb Surgical, San Dimas, CA, USA) in the right eye 17 years ago. Two years later, he received another uneventful surgery with implantation of an MZ30BD single-piece polymethyl methacrylate IOL (Alcon, Fort Worth, Texas, USA) in the left eye with best-corrected visual acuity (BCVA) of 1.0. Before the cataract surgery, he had mild myopia around −2.0D in both eyes. The patient had a smooth postoperative course until 2 years ago when elevated intraocular pressure (IOP) was noted. His IOP was well controlled under travoprost 0.004%/timolol 0.5% FC (DuoTrav, Alcon, Fort Worth, Texas, USA). Unfortunately, this patient developed diplopia recently. At the clinic, slit-lamp examination showed inferior-temporal decentration of the IOL in the right eye [Figure 1a] and inferior-nasal displacement of the IOL in the left eye [Figure 1b]. The BCVA was 0.9 (corrected with −3.0D/−2.0D×180°) in the right eye, and 0.6 (corrected with −3.0D/−2.0D×160°) in the left eye. Bilateral IOL subluxation was diagnosed. Therefore, he received pars plana vitrectomy and IOL reposition with scleral fixation in the left eye. No postoperative complications occurred. His left eye BCVA returned to 0.9 postoperatively. In addition, the levels of growth hormone (GH) and insulin-like growth factor-I (IGF-I) returned to normal (initial GH: 6.4 ng/ml; normal GH range: <3 ng/ml; initial IGF-I: 520 ng/ml; normal IGF-I <248 ng/ml) after the patient received transsphenoid adenomectomy by a neurosurgeon.

## Discussion

Late spontaneous IOL subluxation or dislocation is an infrequent postoperative complication with increasing numbers of patients reported in the past decades.[2,8] It is characterized by an entire lens-bag decentration off the pupil center after uneventful surgery years later.[3] The IOL is usually fixed adequately in the intact capsular bag. Progressive zonular dehiscence and instability are the main causes of IOL malposition.[4] Factors that affect the zonular fiber stability include aging, epithelial atrophy, external stress or contraction of the capsular bag.[9,10] PXF is one of the most common predisposing conditions, which directly weakens the zonular fibers by the deposition of white, flaky fibrillar materials.[11,12] High myopia is also a usual cause for late IOL dislocation because the long axis in eyes leads to excessive elongation of the zonular fibers, which results in greater stress compared to eyes with normal axis.[10] In addition, some connective tissue disorders such as Marfan syndrome, Ehlers-Danlos syndrome and Weill- Marchesani syndrome are also associated with increased risk of lens dislocation.[13,14] Other reported risk factors include uveitis, trauma, prior vitreoretinal surgery, retinitis pigmentosa, diabetes mellitus, atopic dermatitis, previous acute angle closure glaucoma attack, homocystinuria, hyperlysinemia and scleroderma.[3]

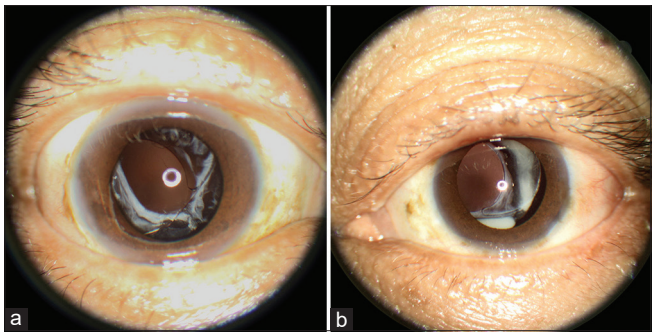


**Figure 1:** External photography showed bilateral intraocular lens subluxation with (a) inferior-temporal decentration in the right eye and (b) inferior-nasal decentration in the left eye

In the present case, acromegaly is the only underlying disease after uneventful cataract surgery. However, no literature describes the association between acromegaly and IOL subluxation or dislocation. We hypothesize that acromegaly is possibly related to zonular instability, leading to lens subluxation. The zonular fibers are structures that connect between the ciliary body and the crystalline lens. They originate from the basal laminae of the nonpigmented epithelium of the ciliary body and insert into the lens capsule at the equatorial region.[15] The zonular fibers are composed of numerous microfibrils measuring 10–12 nm in diameter with a key component of fibrillin, an extracellular matrix glycoprotein that provides strength and elasticity.[16,17] Approximately two-thirds of fibrillin-1, which is the most abundant fibrillin type in adult tissues, are comprised of epidermal growth factor domains.[18,19]

Many factors involve in the synthesis and degradation of fibrillin-1; any dysregulation of fibrillin synthesis and degradation can cause zonular weakness. For example, IGF-I has been shown to regulate the synthesis of fibrillin-1.[20] The regulation involves the IGF-I receptor and the PI3K/Akt pathway with mTOR and p70 S6K as downstream targets.[21] Inhibition of the IGF-I receptor tyrosine kinase and its downstream target impedes the synthesis of fibrillin-1.[21] Overexpression of IGF-I might also cause abnormality in the strength of zonular fibers. Patients with acromegaly are chronically exposed to GH hypersecretion. Since GH is a potent stimulator of IGF-I secretion and action, the excess GH and IGF-I concentration in the circulation, therefore, may affect the stability of fibrillin formation in zonules. Second, it was previously demonstrated that matrix metalloproteinases (MMPs) can release growth factors anchored to the extracellular matrix, which further degrades fibrillin-1 molecules.[17] MMPs were found highly expressed in human pituitary adenomas, which might explain the predisposition of zonular weakness and IOL subluxation in acromegaly

patients.[22] A more comprehensive mechanism needs to be further evaluated in the future.

In addition, high plasma GH level seems to increase IOP.[23] This might be an explanation of IOP elevation in the present case because GH has been shown to interfere with the outflow of aqueous humor in the trabecular meshwork.[24] Therefore, glaucoma is sometimes observed in patients with acromegaly, which requires close follow-up.[25]

## Conclusion

To the best of our knowledge, this is the first report to describe the association between late bilateral IOL subluxation and acromegaly. Regular postoperative follow-up is extremely crucial in the early detection of zonular dehiscence and IOL decentration, which warrants prompt surgical intervention to avoid severe ocular damage.

### Ethical approval

This study has been approved by Institutional Review Board of Changhua Christian Hospital (CCH IRB No.190913).


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### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.


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Nil.


### Conflicts of interest

The authors declare that there are no conflicts of interests of this paper.

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