



High Lenticular Myopic and Astigmatic Shift in Grade 3 Nuclear Sclerosis Cataract: A Case Report

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Abstract.

Background: Nuclear sclerosis cataract is a well-known cause of lenticular (index) myopia; however, the degree of refractive change is usually mild to moderate. Extreme myopic shift accompanied by significant astigmatism is uncommon and may lead to diagnostic confusion.

Case Presentation: We report a case of a 61-year-old patient presenting with marked myopic and astigmatic shift (−7.00 D sphere with −3.00 D cylinder at 80°) associated with grade 3 nuclear sclerosis cataract. Ocular biometry demonstrated normal axial length and corneal curvature, excluding axial or corneal causes of myopia. The refractive changes were attributed to lenticular alterations induced by nuclear sclerosis.

Conclusion: This case highlights an unusual magnitude of lenticular myopic and astigmatic shift caused by nuclear sclerosis cataract. Awareness of this phenomenon is essential to avoid misdiagnosis and refractive surprise, and to emphasize the importance of comprehensive biometry in patients with unexpected refractive changes.

Keywords: Nuclear sclerosis, lenticular myopia, myopic shift, astigmatism, cataract.

1. Introduction

Nuclear sclerosis cataract is commonly associated with a progressive myopic shift due to an increase in the refractive index of the crystalline lens, a phenomenon known as index myopia [1, 2]. In most cases, the induced refractive change is limited to a few diopters. Marked myopic shift, particularly when accompanied by significant astigmatism, is rarely reported and may mimic axial or corneal pathology [2,3]. We report a case of extreme lenticular myopic and astigmatic shift associated with grade 3 nuclear sclerosis cataract.

Case Presentation

A 61-year-old patient presented with progressive deterioration of vision and frequent changes in spectacle prescription. There was no history of previous refractive surgery, corneal disease, or ocular trauma. On examination, Best-Corrected Visual Acuity (BCVA) was reduced, and manifest refraction revealed a marked myopic and astigmatic shift of **−7.00 diopters sphere with −3.00 diopters cylinder at 80 degrees**. Slit-lamp examination showed **grade 3 nuclear sclerosis cataract**, with no other significant anterior segment abnormalities. Fundus examination was unremarkable.

Table 1: Summary of clinical evaluation, keratometry, and ocular biometry findings.

Parameter	OD	OS
UCVA	6/6 P	CF 1M
BCVA	6/6	NO CORRECTION
REFRACTION	+1.50DS/-1.0DC *87	-7.0 DS/ -3.0 DC*85
IOP (mmHg)	17	17
Axial length (mm)	23.14	23.10
K1 (D)	42.90 @26	43.16 @ 138
K2 (D)	43.36 @116	43.77 @ 48
ACD (mm)	3.16	3.42
Lens thickness (mm)	4.29	3.95
Cataract grade	NS1	NS3, PSC

Optical biometry (IOLMaster / EyeSuite, Haag-Streit) demonstrated a **normal axial length of approximately 23.1 mm** in both eyes, with **corneal keratometry values around 43.0 D**, indicating the absence of axial or corneal causes for the high myopia. Anterior chamber depth and lens thickness were within normal limits for age.

Based on clinical findings and biometry, a diagnosis of **severe lenticular myopia and astigmatism induced by nuclear sclerosis cataract** was established. The patient was counseled regarding the refractive nature of the cataract and the expected refractive outcome following cataract extraction.

Surgical Management

Under peribulbar anesthesia, phacoemulsification was done for the left eye, IOL (SA60AT) power of (23.0 D) was implanted in the posterior chamber according to SRK/T formula and the operation was uneventful.

Post-operative outcome

Table 2: Visual acuity and refractive outcomes over time following phacoemulsification and IOL implantation.

Follow-up	BCVA	Refraction
Preoperative	CF 1M	-7.0 DS/ -3.0 DC*85
1 week	6/9	+1.25 DS/ - 2.0 DC * 107
1 month	6/6	+1.0 DS / - 1.75 DC *104

Discussion

myopic shift associated with nuclear sclerosis cataract is a well-documented phenomenon resulting from increased lens nuclear density and refractive index. Most reported cases describe mild to moderate myopia, typically ranging from -1.00 to -3.00 diopters. The degree of myopic shift observed in this case is exceptional.

The presence of significant astigmatism further supports the lenticular origin of the refractive error, likely due to asymmetric nuclear sclerosis and changes in lens curvature. Normal axial length and keratometry values effectively excluded axial myopia and corneal astigmatism, reinforcing the diagnosis of lenticular-induced refractive change.

This case underscores the importance of comprehensive ocular biometry in patients presenting with unexpected refractive progression, as misattribution to axial elongation or corneal pathology may lead to unnecessary investigations or inappropriate management.

Conclusion

Grade 3 nuclear sclerosis cataract can rarely induce high myopic and astigmatic shift.

Recognition of lenticular causes of refractive change is essential for accurate diagnosis, patient counseling, and surgical planning. Cataract extraction remains the definitive treatment for restoring refractive stability in such cases.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflict of Interest

The author declares no conflict of interest.

Funding

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References

1. Duke-Elder S. *System of Ophthalmology*. London: Henry Kimpton; 1970.
2. Brown NA, Hillman JS. Cataract and changes in refraction. *Br J Ophthalmol*. 1987; 71:10-13.
3. Pesudovs K, Elliott DB. Refractive changes in nuclear cataract. *Ophthalmic Physiol Opt*. 2003; 23:22-30.

Figures

Figure 1: slit lamp photograph showing cataract.

Figure 2: preoperative refraction

Figure 3: biometry demonstrating axial length.

Figure 4: postoperative slit-lamp photograph 1 week.

Figure 5: postoperative refraction 1 week.

Figure 6: postoperative slit-lamp photograph 1 month.

Figure 7: postoperative refraction 1 month.

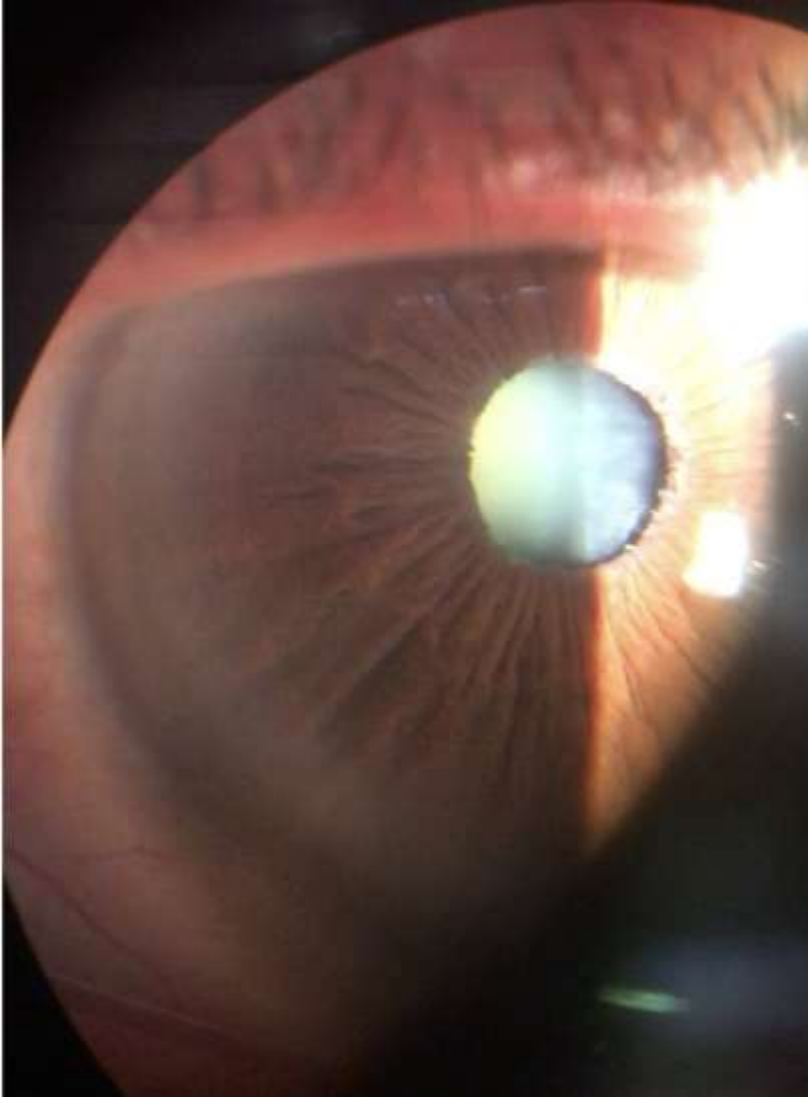


Figure 1: slit lamp photograph showing cataract.



Figure 2: preoperative refraction

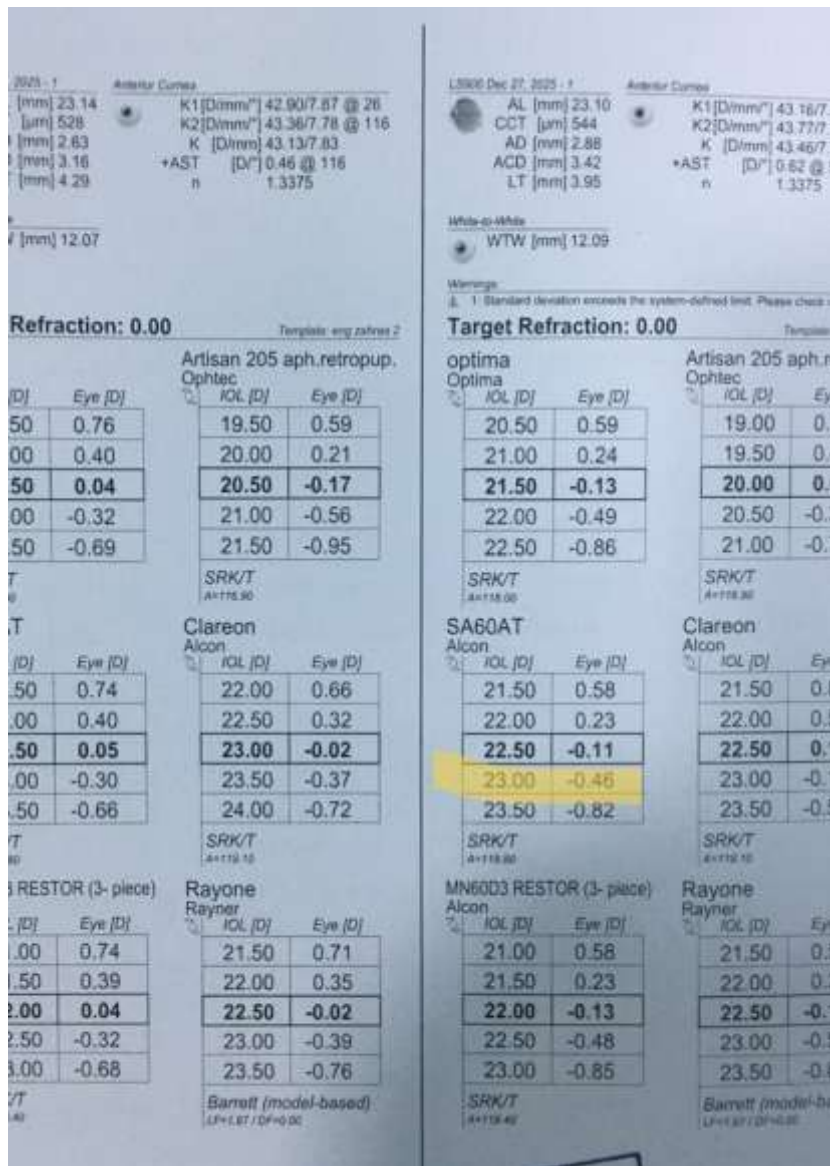


Figure 3: biometry demonstrating axial length.

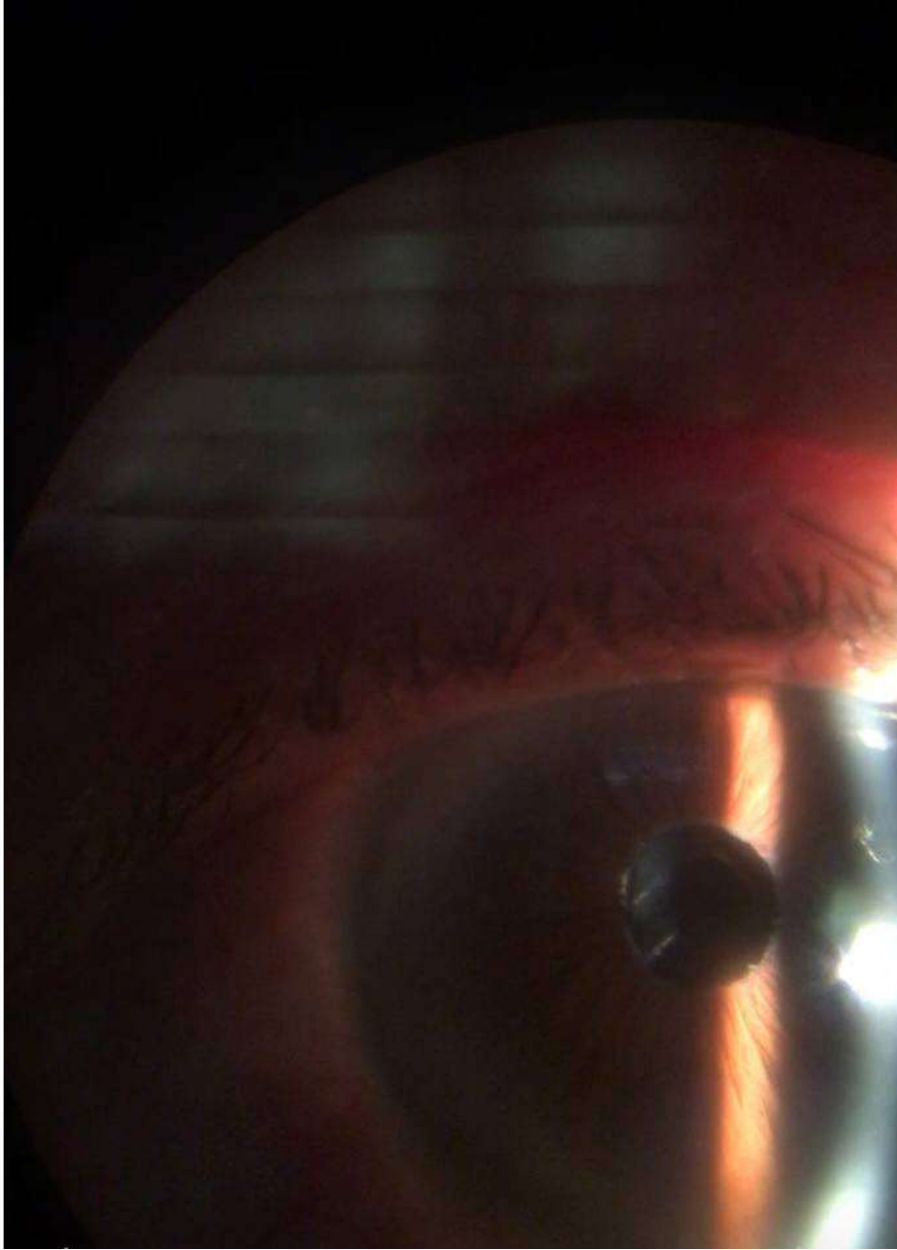


Figure 4: postoperative slit-lamp photograph 1 week.

1 w post op.

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PD : 62.0 mm
VD : 12.0 mm CYL : -

[REF RESULT]

<R>	SPH	CYL	AX
AVE	+0.75	-1.25	88
1	+0.75	-1.25	88

<L>	SPH	CYL	AX
AVE	+1.25	-2.00	107
1	+1.25	-2.00	107

[KER RESULT]

<R>	mm	D	AX
R1	7.84	43.07	0
R2	7.84	43.07	90
AVE	7.84	43.07	
CYL		0.00	0
	R1mm	R2mm	AX
1	7.84	7.84	0

<L>	mm	D	AX
R1	7.91	42.65	120
R2	7.72	43.71	30
AVE	7.82	43.18	
CYL		1.05	120
	R1mm	R2mm	AX
1	7.91	7.72	120

313 EYE CLINIC

(C) XCL = 8.5 D

Figure 5: postoperative refraction 1 week.

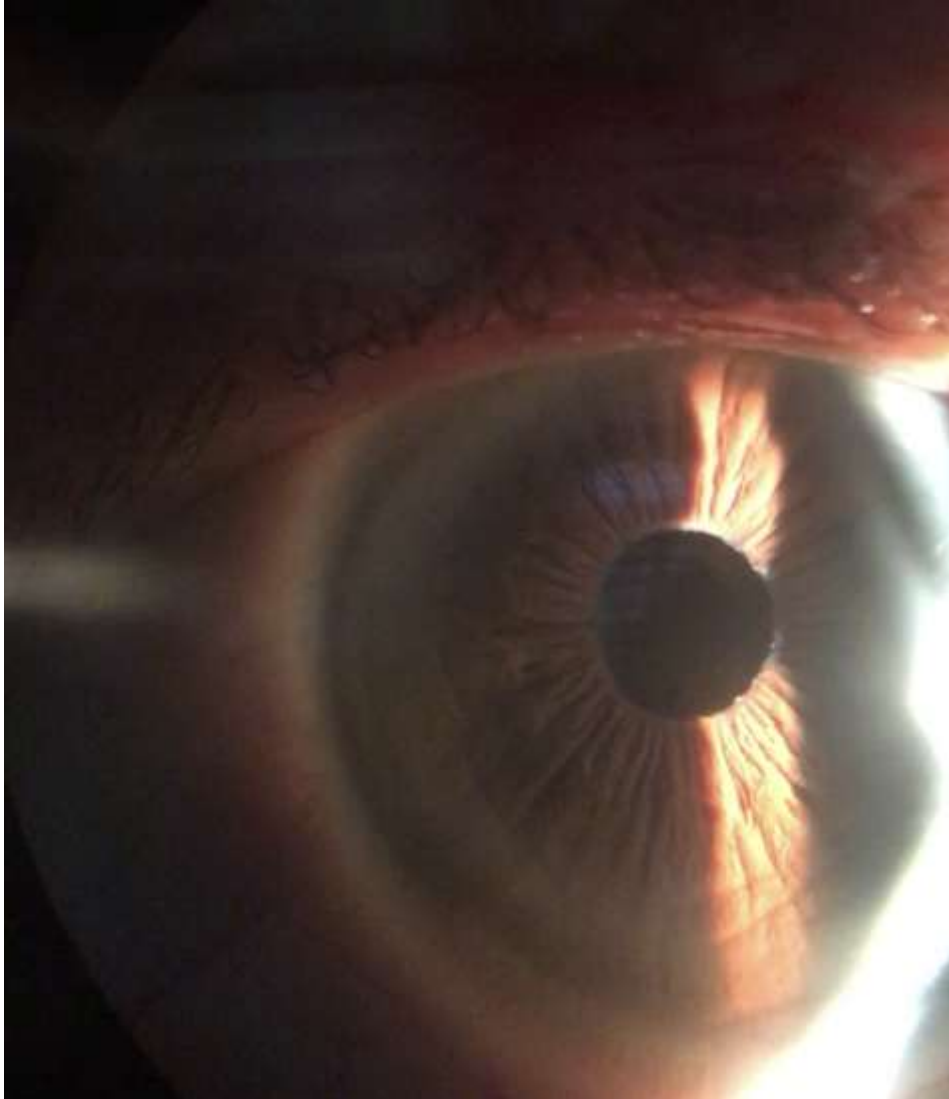


Figure 6: postoperative slit-lamp photograph 1 month.

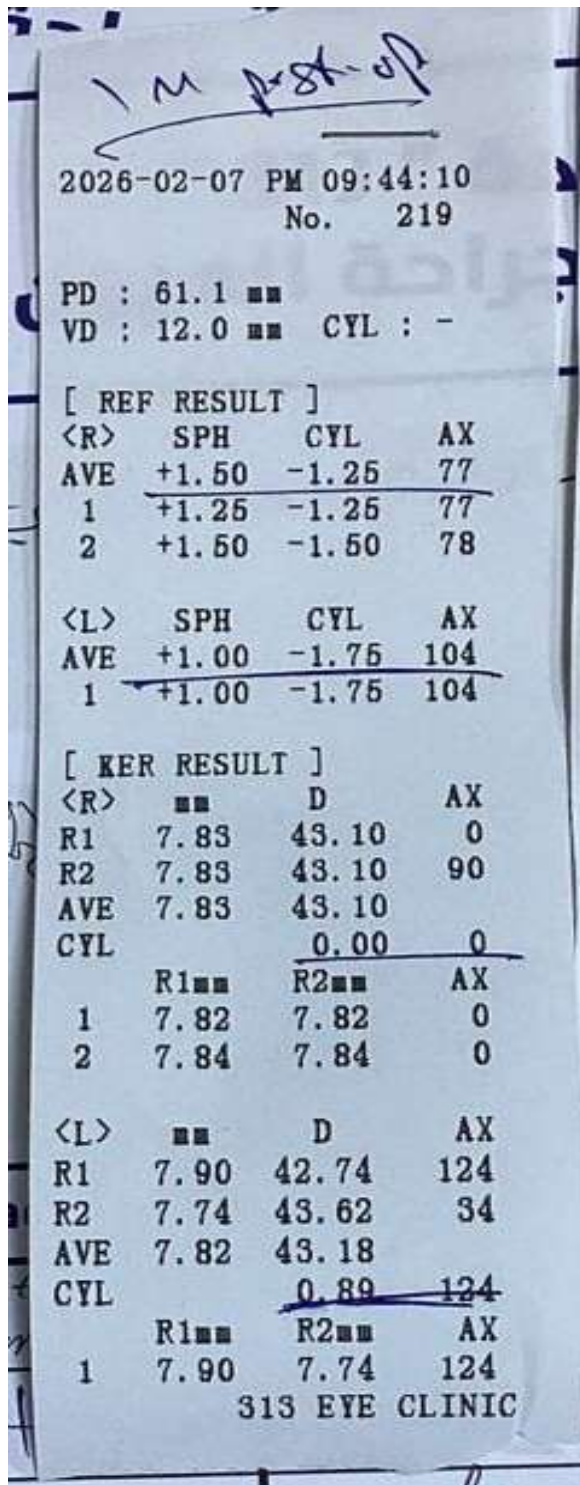


Figure 7: postoperative refraction 1 month.