

## CASE REPORT

### Long Anterior Zonules – A Challenge To Cataract Surgery: Case Report

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#### ABSTRACT

The purpose is to present a case of long anterior zonules with significant cataract without other associated ocular abnormalities. During cataract surgery great care should be taken to prevent radial extension of continuous curvilinear capsulorrhexis and subluxation or nucleus drop due to iatrogenic zonular weakness induced by severing of zonules during capsulorrhexis

**Keywords: Long Anterior Zonules, Cataract surgery, Continuous Curvilinear Capsulorrhexis**

#### INTRODUCTION

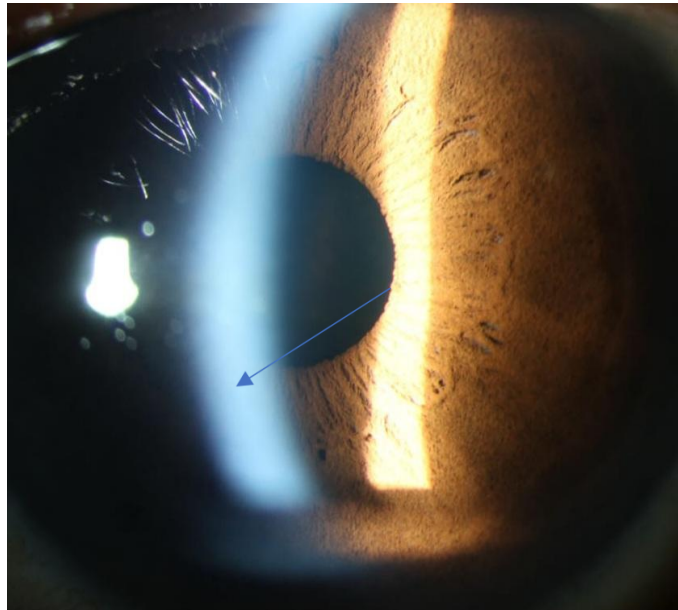
Long anterior zonules (LAZ) is a condition characterised by more than the normal anterior insertion of zonules on the lens surface. This can pose problems during cataract surgery. LAZ can be associated with angle closure<sup>5</sup> or open angle glaucoma<sup>1</sup>. Some cases can develop late onset retinal and macular degeneration (L-ORMD)<sup>8</sup>.

#### CASE PRESENTATION

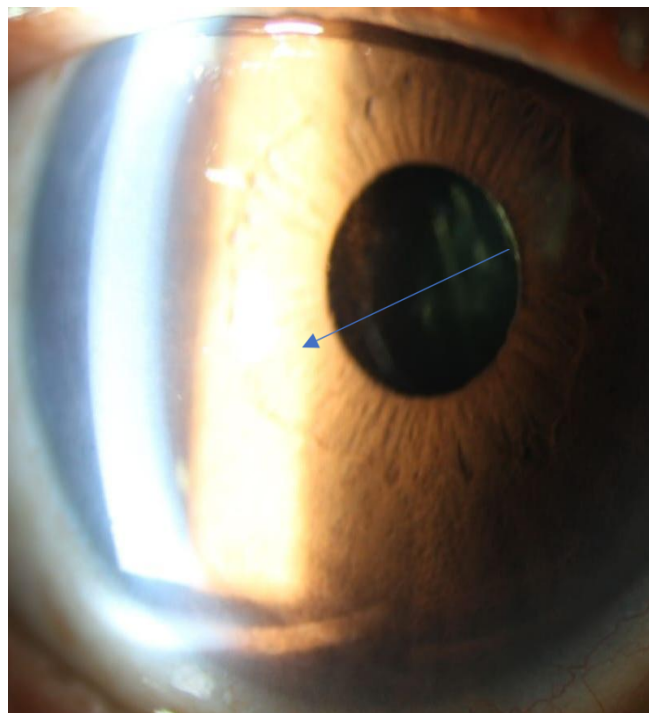
A 57 years old South Asian woman presented to our out patient department with blurring of vision of right eye of 3 months duration. She is a known diabetic (Type 2) , has Essential hypertension, Primary hypothyroidism and Dyslipidemia on medications. There was no history of ocular surgery or trauma . On examination visual acuity was 20/200 improving to 20/63 in OD and 20/125 improving to 20/32 in OS. Intraocular pressure by applanation was normal in both eyes, OD was 15 mmHg and OS was 18mmHg. Angles were open on gonioscopy in both the eyes. Slit lamp biomicroscopy showed Krukenberg's spindles (Figures 1 and 2) and cataract. Right eye had nuclear sclerosis grade 3 and there was early lens changes in the left eye. On dilated fundus examination right eye had cup disc ratio of 0.6 and left eye 0.55-0.6 with normal neuroretinal rim and nerve fibre layers in both eyes . In Optical coherence tomography, retinal nerve fibre layer analysis was normal in both the eyes. A Scan biomicroscopy showed axial length of 22.85 mm in OD, 22.77mm in OS . Lens thickness was 4.02mm in OD , 4.17 mm in OS. Anterior chamber depth was 3.57mm in OD and 3.42mm in OS.

Right eye phacoemulsification with intraocular lens implantation was planned. Intraoperatively we noticed fine pigmented and nonpigmented radially oriented lines on anterior lens capsule extending into the pupillary zone suggestive of long anterior zonules (Figure 3). During phacoemulsification ,challenge was to perform adequate size capsulorrhexis with risk of radial extension and zonular instability on tearing many zonular

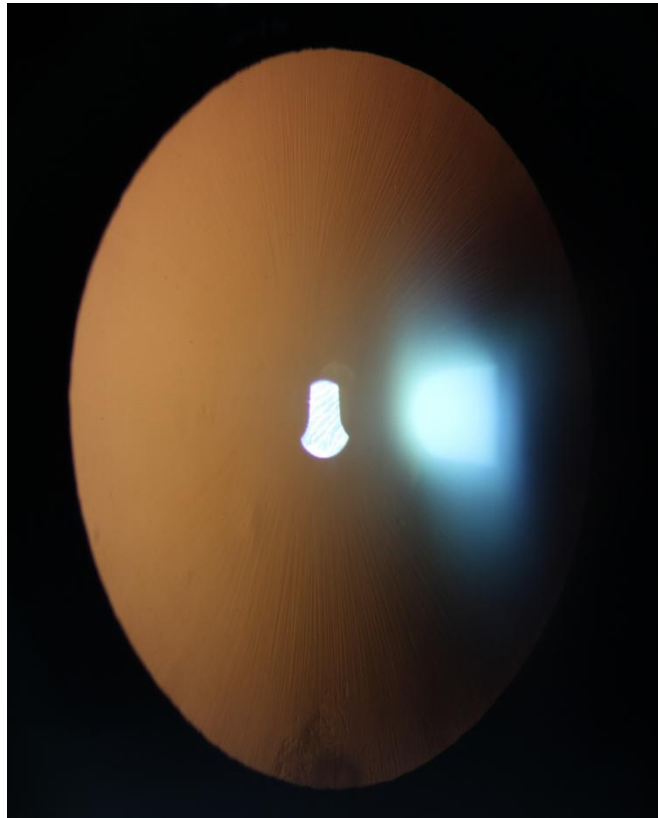
fibres. In our case ,we were able to complete the CCC without any complications and rest of the surgery went on as planned. Postoperative period was uneventful with good visual recovery of 20/20. (Figure 4). Postoperatively we specifically looked for LAZ in the fellow eye and found similar picture of 360 degree of LAZ.



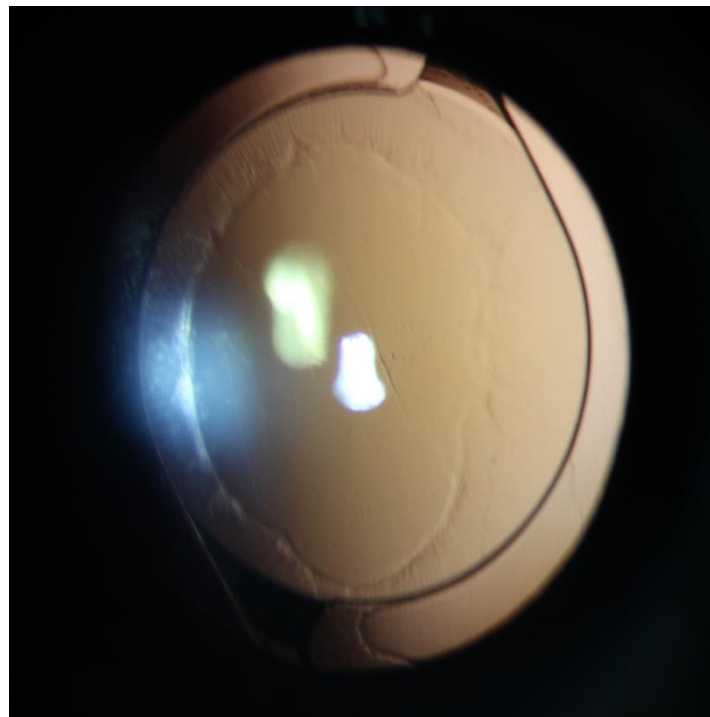
**Figure 1: Krukenberg's spindle**



**Figure 2: Krukenberg's spindle**



**Figure 3: 360 degree LAZ with small zonule free zone**



**Figure4 : 360 degree long anterior zonules after phacoemulsification and intraocular lens implantation**

#### **DISCUSSION**

Normal insertion of anterior lens zonules is  $1.42 \pm 0.24$  mm from lens equator with average zonular free zone of about  $6.8 \text{ mm}^{4,5}$ . In LAZ, the zonules are inserted more than 1 mm beyond the normal anterior zonular insertion. They are seen in 2% of general population and mostly

bilateral . They are usually observed after pupillary dilatation as radially oriented fine lines. Sometimes pigments can be seen along these fine lines which are due to rubbing against the posterior iris pigment epithelium.<sup>1,2</sup> Since these zonules are very fine, they can be missed on routine examination. LAZ should be kept in mind when radially oriented pigments are seen on anterior lens capsule. The important challenge the surgeon faces during phacoemulsification of cataract with LAZ is during continuous curvilinear capsulorhexis when the zonules can come in the way.<sup>3,4</sup> The size of the CCC may be compromised to save the zonules. Many a times the zonules have to be broken to maintain the continuity of the rhexis which can lead to radial tear of the capsule and can even extend posteriorly.<sup>5</sup> In our case the CCC was started with cystotome needle and switched to micro rhexis forceps to tear the capsule as the zonules were exerting resistance to the progression of rhexis. Rest of the surgery was uneventful with good post operative visual recovery. In some cases of LAZ where only a few zonules come in the way of CCC , they can be broken with the side of cystotome and continue CCC.<sup>6</sup> Another frequent association seen in eyes with LAZ is Glaucoma. Signs of Pigment dispersion may be seen in eyes with LAZ like Krukenberg's Spindle<sup>3,6</sup>, loss of pupillary ruff and trabecular meshwork pigmentation. Our case had Krukenberg's Spindle in both eyes. LAZ may also be a risk factor for angle closure glaucoma. It is also seen that KS presence had its strongest relationship to the LAZ trait and advancing age<sup>9</sup>. Late onset retinal and macular degeneration (L-ORMD) has also been reported in which there is night blindness and decreased central and peripheral visual fields.<sup>8,9</sup>

## CONCLUSION

Surgeon has to be very cautious while doing capsulorhexis in eyes with LAZ. Well planned surgery can prevent complications like radial capsular tear and intraoperative lens dislocation. Long term follow up is required to rule out retinal and macular degeneration and development of glaucoma .

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Human subject informed consent: Consent was obtained or waived by all the participants in this study.

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## ABBREVIATIONS

LAZ-Long Anterior Zonules, CCC- Continuous Curvilinear Capsulorhexis, KS-Krukenberg's Spindle

## REFERENCES

1. Roberts DK, Yang Y, Morettin CE, et al. Morphologic patterns formed by the anomalous fibers occurring along the anterior capsule of the crystalline lens in people with the long anterior zonule trait. *Anat Rec*. 2017;300(7):1336–47. <https://doi.org/10.1002/ar.23570>.
2. Khurana M, Shah DD, George RJ, et al. Phacoemulsification in eyes with long anterior zonules. *J Cataract Refract Surg*. 2020;46(2):209–14. <https://doi.org/10.1097/j.jcrs.000000000000046>
3. Newman TL, Roberts DK, Morettin CE, et al. Krukenberg's spindles strongly suggest long anterior zonule associated pigment dispersion mechanism in older patients. *Invest Ophthalmol Vis Sci*. 2020;61(8):8. <https://doi.org/10.1167/iovs.61.8.8>.
4. Roberts DK, Yang Y, Morettin CE, et al. Quantification of long anterior lens zonules and their resulting zonule-free zone sizes. *Clin Exp Ophthalmol*. 2015;43(8):773–5. <https://doi.org/10.1111/ceo.12554>.

5. [Mona Khurana](#)<sup>1</sup>, [Nagalekshmi Ganesh](#), [Ashutosh G Jaiswal](#), [Lingam Vijaya](#), [Ronnie J George](#), [Shantha Balekudaru](#). Long Anterior Zonules and Angle Closure Disease J Glaucoma . 2022 Jan 1;31(1):41-47.
6. Roberts DK, Yang Y, Wilensky JT. Cataract surgery in African Americans with long anterior lens zonules. Clin Exp Ophthalmol. 2014;42(9):898–900. <https://doi.org/10.1111/ceo.12341>.
7. Ayyagari R, Mandal MN, Karoukis AJ et al. Late-onset macular degeneration and long anterior lens zonules result from a CTRP5 gene mutation. Invest Ophthalmol Vis Sci 2005; 46: 3363–71.
8. Mona Khurana Clinical Associations of Long Anterior Zonules: A Review <https://journal.ppcr.org/index.php/ppcrjournal/issue/view/5>
9. Roberts DK, Newman TL, Roberts MF, Teitelbaum BA, Winters JE. Long Anterior Lens Zonules and Intraocular Invest Ophthalmol Vis Sci. 2018 Apr 1;59(5):2015-2023. doi: 10.1167/iovs.17-23705. PMID: 29677364