

Acquired Esotropia with High AC/A Ratio and Diplopia Following Cataract Surgery: A Case Report

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Abstract

Introduction: We report a case of acquired accommodative esotropia with binocular diplopia induced by high accommodative demand in the phakic eye following first cataract surgery.

Case Report: A 47-year-old female was referred for issues with on-going blurry vision, diplopia and strabismus following her first cataract surgery. The patient had a known diagnosis of diabetes mellitus type 2 and underwent her first cataract surgery to her left eye two years prior to this presentation. She was noted to have a cataract in her second eye and was waitlisted for right eye cataract surgery but unfortunately was lost to follow-up. Following a re-referral by her GP, the patient presented with a significantly large intermittent strabismus induced by high accommodative demand in her phakic eye which resulted in the development of a marked acquired accommodative esotropia with diplopia.

Conclusion: To our knowledge, there are few cases of acquired accommodative esotropia following cataract surgery reported in the literature. We aim to highlight the importance of ocular motility and binocular function assessments prior to cataract surgeries especially in younger age groups.

Keywords: AC/A Ratio; Accommodation; Cataract; Diabetes; Diplopia; Esotropia; Strabismus

Introduction

While there are many possible mechanisms that can cause diplopia post-cataract surgery [1,2], accommodative and binocular-related complications are often overlooked [3]. This case highlights the potential for binocular interruptions following unilateral cataract surgery, especially in younger age groups where accommodative function is still intact.

Case Report

A 47-year-old female was originally reviewed in the cataract clinic in May 2019 following referral from the Diabetic Retinal Screening (DRS) program for poor image clarity. She has a history of diabetes mellitus type 2 diagnosed in 2007. At the time of presentation, HbA1c level was 64 mmol/mol and eGFR level was > 90 mL/min/1.73m². Her best corrected visual acuity (VA) was recorded as 6/9+1 and 6/15 in the right and left eye respectively with the left eye improving to 6/12 with pinhole. She denied any previous history of childhood strabismus and did not wear glasses but was moderately hypermetropic in both eyes. Bilateral posterior subcapsular cataracts were noted and she was waitlisted for left eye phacoemulsification with an intraocular lens (IOL) insertion which was subsequently performed. The patient then failed to attend her follow-up post-op appointment due a temporary relocation overseas but was re-referred by her GP back to the DRS service in September 2020 when she returned, over a year after her first cataract surgery.

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She attended her DRS appointment and achieved unaided VAs of 6/18 and 6/12, right and left eye respectively, improving to 6/15 and 6/6 with pinhole. No diabetic retinopathy was noted and there was no sign of macula disease. Her posterior subcapsular cataract had progressed in her right eye and the patient was waitlisted for right eye cataract surgery with IOL insertion. She returned for her pre-admit appointment but was unfortunately lost to follow-up.

She was re-referred by her GP in October 2021 with reports of double vision and poor visual acuity. Unaided VAs at this time were 6/21-1 and 6/9-1 right and left eye respectively with right eye improving to 6/15+1 with pinhole. The patient reported ongoing intermittent horizontal diplopia for the previous 12 months. Orthoptic examination was performed and a moderate esophoria with delayed recovery was noted on cover test at near fixation with reading glasses. Intermittently, her strabismus became a moderate alternating esotropia at near. At this fixation distance, her deviation measured 25 dioptres base-out (BO) with reading glasses and 40 dioptres BO without reading glasses. She had no apparent deviation when fixating in the distance during cover test. Ocular movements were full and no abduction deficits were found. When investigating sensory fusion, her near Bagolini Glasses response was right eye suppression. Frisby stereopsis result was negative.

Using the gradient method, with her accommodation relaxed while fixating at a target 33 cm away, her strabismus measured 20 dioptres BO. This revealed a high accommodative convergence to accommodation (AC/A) ratio of 6.6:1 [4].

A diagnosis of dense right eye axial posterior subcapsular cataract and accommodative intermittent alternating esotropia secondary to high AC/A ratio was made. She was then waitlisted for right phacoemulsification with an IOL insertion.

The patient failed to attend her immediate post-operative examinations but was reviewed 8 months after her second cataract surgery. She no longer experienced diplopia and reported good vision in each eye. Unaided VAs were 6/7.5 in each eye individually. Near VA was 6/7.5 in each eye individually with a +3.00DS add. She had no apparent deviation on cover test on near and distance fixation. With +3.00DS add, she had a minimal exophoria with good recovery at near fixation measuring 2 dioptres base-in (BI). This resulted in a negative AC/A ratio as she was no longer exerting any excess convergence on accommodation. Convergence was to 6 cms and ocular movements were full. Prism fusion ranges were 40 dioptres BO to 16 dioptres BI on near fixation and 25 dioptres BO to 8 dioptres BI on distance fixation. Stereopsis result was 110" of arc. The patient was discharged with the advice to wear appropriate glasses correction for near vision and to continue with regular DRS reviews.

Discussion and Conclusion

The removal of ocular components involved in accommodation for younger patients who have higher levels of accommodative amplitudes can induce high AC/A ratios, bringing rise to accommodative esotropias. This is due to the demand on accommodating in the absence of one lens, resulting in over-convergence at near fixation, as was illustrated in this case. Ocular convergence is characterised by the ability to converge the eyes in order to maintain binocularity. There are four main components of convergence [5]: fusional vergence induced by diplopia; accommodative vergence driven by accommodation which is generated in response to a blurred image; proximal vergence stimulated by the perception of a near object and tonic vergence described as the vergence caused by normal extraocular muscle tonus. This patient achieved clear left eye vision following her first cataract surgery however, her lack of accommodative ability in that eye in combination with poor binocular near vision stimulated over-accommodation in her phakic right eye at near fixation thus resulting in an acquired esotropia with diplopia. Removal of the cataract in her right eye resulted in the loss of accommodation and therefore fully resolved her accommodative esotropia, relieving her of all diplopic symptoms.

While not typically performed in older age groups, it would be advisable to investigate ocular motility and binocular functions at the very least in younger patients who are to undergo unilateral lensectomies in order to determine the likelihood of inducing acquired accommodative esotropias [3]. Second eye cataract surgery should be considered sooner in such circumstances.

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