

Imaging of Posterior Lenticonus Using High Resolution Anterior Segment Optical Coherence Tomography

Posterior Lentikonusun Yüksek Çözünürlüklü Ön Segment Optik Koherens Tomografi ile Görüntülenmesi

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Case Report

Olgu Sunumu

ABSTRACT

This paper reports the capability of high resolution anterior segment optical coherence tomography (AS-OCT) in visualizing the posterior lens surface in patients with posterior lenticonus. The study involved three patients. Two patients with anisometropic amblyopia were pre-diagnosed with posterior lenticonus by slit-lamp examination. The third patient was being followed-up due to unilateral posterior polar cataract in another clinic. All patients were further evaluated by AS-OCT. In patients with suspected posterior lenticonus, high-resolution AS-OCT demonstrated a conical protrusion of the posterior lens surface. Furthermore, in the patient with posterior polar cataract an accompanying posterior lenticonus that could not be visualized in biomicroscopy was imaged by AS-OCT. AS-OCT imaging is a rapid and noninvasive examination tool for the evaluation of posterior lenticular changes.

Key Words: Anterior segment optical coherence tomography, cataract, posterior lenticonus.

ÖZ

Bu çalışmada Posterior lentikonus bulunan hastalarda yüksek çözünürlüklü ön segment optik koherens tomografinin (ÖS-OKT) lens arka yüzeyi görüntülenmesindeki etkinliğini bildirmeyi amaçladık. Çalışma üç hastayı içermekteydi. Anizometropik ambliyopisi bulunan iki hastaya biyomikroskopik muayenede posterior lentikonus ön tanısı konuldu. Üçüncü hasta başka bir klinikte tek taraflı posterior polar katarakt tanısıyla takip edilmekteydi. Tüm olgular ÖS-OKT ile değerlendirildi. Posterior lentikonustan şüphelenilen hastalarda, yüksek çözünürlüklü ÖS-OKT lens arka yüzeyinde bulunan koni şeklindeki çıkıntıyı gösterdi. Buna ilave olarak, posterior polar kataraktlı olguda biyomikroskopik muayenede görülemeyen posterior lentikonus ÖS-OKT ile görüntüledi. ÖS-OKT görüntülemesi, arka lens yüzeyindeki değişikliklerin değerlendirilmesinde hızlı ve invaziv olmayan bir inceleme yöntemidir.

Anahtar Kelimeler: Katarakt, ön segment optik koherens tomografi, posterior lentikonus.

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INTRODUCTION

Posterior lenticonus is a conical protrusion of the posterior lens capsule towards the anterior vitreous. It is associated with thinning of the lens capsule and deficiency of epithelial cells in the affected region.¹ It may be mild and remain undiagnosed but it frequently causes an unexpected opening of the posterior capsule during cataract surgery.^{2,3}

In this case series, high resolution anterior segment optical coherence tomography (AS-OCT, Visante, Carl Zeiss Meditec) was utilized to demonstrate the lenticular changes associated with posterior lenticonus.

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MATERIAL AND METHODS

For all 3 cases, a comprehensive ophthalmic examination was performed including uncorrected visual acuity (UCVA) and best spectacle-corrected visual acuity (BSCVA) using the Snellen chart, manifest refraction, intraocular pressure (IOP) measurement, dilated fundus examination and topography.

To confirm our diagnosis, each eye was imaged using AS-OCT with the "high resolution corneal" scan type (scan length 10 mm, scan depth 3 mm) in four quadrants while the patient fixated on an internal fixation target.

CASE REPORTS

Case 1

A 35-year-old female diagnosed as right ametropic amblyopia in her previous ophthalmologic examinations referred to our clinic for routine control. In the right eye, the best spectacle-corrected visual acuity (BSCVA) was 20/40 and the manifest refraction was $+2.50 -0.5 \times 10^\circ$. The non-cycloplegic autorefractometer reading was $+5.75 -8.25 \times 10^\circ$. The BSCVA was 20/20 in the left eye. The refractive examination was prolonged and the discordance between the manifest refraction and the autorefractometer readings in the right eye raised the question whether there was any other pathology involving the optical axis other than refractive error. Topography and the pachymetry maps showed no signs of corneal pathology including forme fruste keratoconus. After pupil dilation, the slit-lamp examination revealed a very small intralenticular opacity in the right eye. Posterior to this opacity, a discrete bulging of the posterior capsule towards vitreous was observed (Figure 1). It was slightly paracentral, round in shape, somewhat refractile and appeared like a small oil droplet in retroillumination. This condition was prediagnosed as posterior lenticonus. In high resolution AS-OCT images, the intralenticular

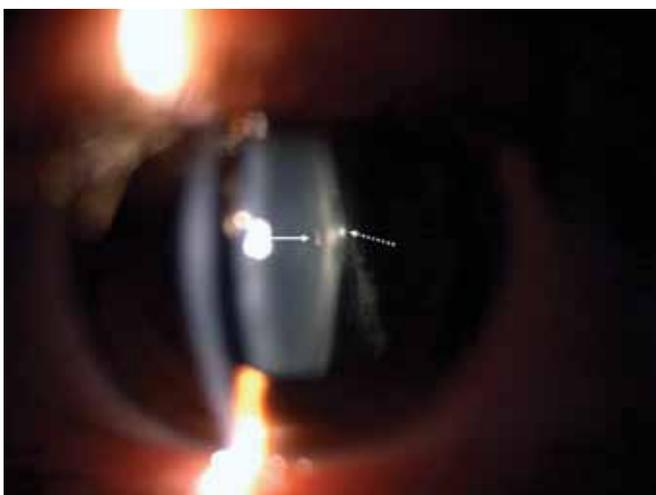


Figure 1: Anterior segment photography of case 1 pointing the intralenticular opacity (white arrow) and the posterior lenticonus (dotted arrow).

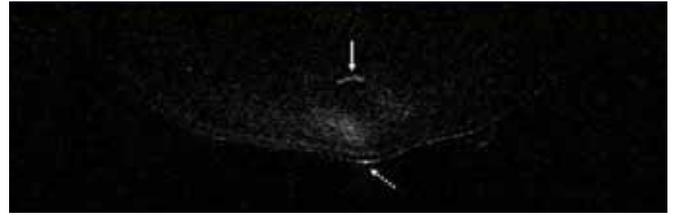


Figure 2: High resolution anterior segment optical coherence tomography (AS-OCT) image of case 1 showing intralenticular opacity in the posterior part of the lens (white arrow) and bulging towards the anterior vitreous (dotted arrow).

opacity as well as the outpouching of the posterior lens surface towards the anterior vitreous was demonstrated (Figure 2). The slit-lamp examination of the left eye, the intraocular pressure (IOP) measurement and the fundus examination of both eyes were normal.

Case 2

A 20-year-old woman presented to our clinic with a history of cataract and amblyopia in the left eye. The BSCVA was 20/20 and 20/50 and the manifest refraction was -2.25 and $+2.50 -1.50 \times 15^\circ$ in the right and left eyes respectively. The non-cycloplegic autorefractometer reading was $+6.75 -7.50 \times 15^\circ$ in the left eye. After pupil dilation, the slit lamp examination revealed posterior polar cataract in the left eye. The IOP measurement, the slit-lamp examination of the right eye and the fundus examination of both eyes were unremarkable. When the left eye was imaged by high resolution AS-OCT, posterior polar cataract was visualized as an hyperintense area. Moreover, there was an outward pouching of the posterior lens capsule just behind the polar cataract that we could not observe in the slit-lamp examination due to blockage of the cataract (Figure 3).

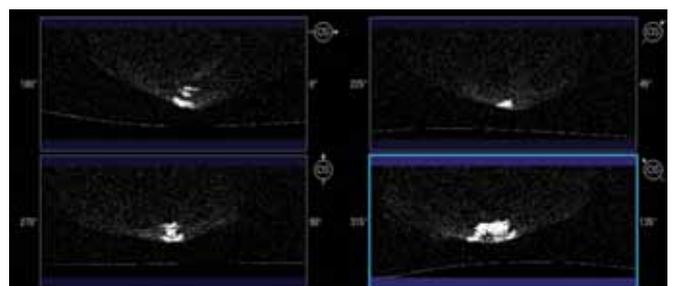


Figure 3: High resolution four-quad AS-OCT images of case 2 showing increased reflectance associated with posterior polar cataract. The outward pouching of the lens due to posterior lenticonus is also visible.

Case 3

A 28-year-old woman presented with complaints of blurred vision in the right eye. The BSCVA was 20/40 and the manifest refraction was $-4.50 \times 10^\circ$. The autorefractometer readings were unsteady for the right eye. The topography of both eyes did not reveal any pathology. After pupil dilation, the slit-lamp examination revealed a small posterior lenticular opacity in the right eye. Behind this opacity, there was a hardly visible bulging of the

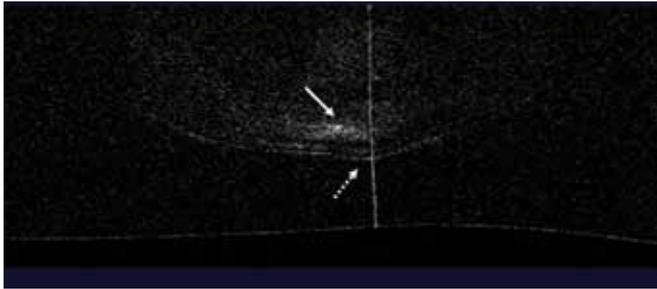


Figure 4: High resolution AS-OCT image of case 3 demonstrating the intralenticular hyperreflective area corresponding to the intralenticular opacity (white arrow) as well as the posterior lenticonus (dotted arrow).

posterior capsule towards vitreous. She was diagnosed as posterior lenticonus and high resolution AS-OCT was performed to demonstrate the lenticular changes (Figure 4). The BSCVA was 20/20 in the left eye with a completely normal ophthalmological examination.

DISCUSSION

Posterior lenticonus is a rare disorder of the posterior portion of the lens that occurs unilaterally in most of the cases. Its etiology is unknown and appears in infancy that frequently progresses with age. Although the diagnosis of posterior lenticonus is not difficult, it may easily be overlooked in mild cases if only slit-lamp examination is performed.^{3,4} Our two patients have also been diagnosed and followed up as anisometropic amblyopia elsewhere.

Lenticonus may cause lenticular myopia with irregular astigmatism.¹ The axial refraction is often markedly myopic, whereas the refractive error peripheral to the lenticonus is often hyperopic.³ Two of our patients were found to be hyperopic probably due to the measurement peripheral to the lenticonus by autorefractometer. The retinoscopic reflex in patients with posterior lenticonus is often distorted, making optical correction of refractive errors difficult. We have experienced a prolonged examination of refraction in all of our patients and found a discordance between the autorefractometer readings and the manifest refraction. A careful look for posterior lenticonus is suggested in cases where there is highly asymmetric refractive error with variable refractive results and normal corneal topography.

In eyes without cataract or with mild cataract, retinoscopy can aid the diagnosis. But if the cataract is advanced, ultrasound can be an alternative way for the visualization of posterior lenticonus.⁴ The cataract surgery of eyes with posterior lenticonus may be challenging because there is greater risk for posterior capsule tear. Therefore it is important to identify the problem before surgery in order to avoid unexpected complications. Although in our second case the posterior polar cataract was diagnosed during slit-lamp examination, the lenticonus could only be identified via high resolution AS-OCT.

AS-OCT is a noninvasive, non-contact high resolution imaging technique that allows 2-dimensional, cross-sectional, detailed visualization of the anterior segment. Visante OCT uses a 1310 nm wavelength and acquires images at a rate of eight frames (2000 A-scans) per second with a transverse resolution of 60 μm and an axial resolution of 10-20 μm , making it ideal for imaging and measuring small eye structures. Various studies have used AS-OCT to evaluate the ectatic disorders, Laser In Situ Keratomileusis (LASIK) flaps, and anterior chamber structures.⁵ Recently, Wong et al. reported quantitative assessment of lens opacities with AS-OCT and concluded that this technique is clinically useful for evaluation and measurement of lens opacities.⁶ In our case series, we were able to visualize the posterior lenticonus and confirm our diagnosis by AS-OCT. We believe that high resolution AS-OCT can be used to demonstrate lenticular pathologies in an easy, fast and safe way.

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