CASE REPORT

Journal of Pre-Clinical and Clinical Research 2024, Vol 18, No 4, 365-367
www.jpccr.eu

Myopic retinal separation in the macular fovea – case report

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Kocjan A, Papachristoforou N, Kozłowski J, Gołojuch K, Major P, Żaczek B, Alsoubie I, Kozak M. Myopic retinal separation in the macular fovea – case report. J Pre-Clin Clin Res. 2024; 18(4): 365–367. doi: 10.26444/jpccr/196583

Abstract

Myopic retinoschisis in the macular fovea is a rare eye condition that affects individuals with high myopia. The article describes the case of a 41-year-old patient with a significantly elongated axial length of the eyeball and a rich history of eye diseases and multiple ophthalmic procedures, The patient underwent successful cataract extraction with monofocal IOL implantation, demonstrating significant visual improvement without postoperative complications. Special attention was given during the procedure to avoid worsening the existing astigmatism. The procedure required precise execution to avoid further corneal damage and to ensure optimal visual quality. In cases of myopic traction maculopathy, surgical intervention remains a cornerstone of effective management, particularly when paired with OCT imaging to accurately diagnose and track retinal changes.

Key words

foveoschisis, Myopic retinoschisis in the macular fovea, astigmatism, Foveal retinal myopia, Myopic macular retinoschisis, myopia

INTRODUCTION

Myopic macular retinoschisis is a rare disease subtype, predominantly affecting patients with high myopia [1]. Approximately 2 billion people worldwide are affected by pathologic myopia (PM) [2], with 8–34% of this population developing myopic traction maculopathy. Women are significantly more affected than men, with a ratio of 3:1. The progression of myopic retinoschisis is gradual, worsening over time, with onset possible at any stage of life [3]. Currently, myopia is the most common refractive error seen in children and young adults, resulting from structural abnormalities in the eye that cause light rays to focus in front of the retina, leading to blurred vision of distant objects. Myopia arises from multiple factors, making it difficult to pinpoint a single specific cause. High myopia (HM) is defined as a refractive error of at least -6 diopters (D) or an axial length exceeding 26 mm [4,5,6]. HM may progress to PM, characterized by significant elongation of the eye. Outdoor physical activity is considered as a protective factor against PM development [7]. Pathologic myopia is a term often used when referring to myopia-related complications, such as myopic macular retinoschisis, which is typically driven by pathological vitreoretinal traction.

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Received: 18.10.20224; accepted: 28.11.2024; first published: 11.12.2024

Research has shown that the morphological changes in the central retina of patients with HM and myopic foveoschisis (MF) are associated with functional alterations. Advanced technologies, such as spectral-domain optical coherence tomography (SD-OCT) and MP-1 microperimetry, allow for more precise management of macular retinoschisis complications [8].

In individuals affected with myopia, the eyeball enlarges to compensate for the aberrant light focus, leading to progressive collagen remodeling in the sclera. Due to the eye's pathological structure, the sclera, choroid, and retina experience bi-directional forces within their layers. This anterior-posterior stretching ultimately leads to macular retinoschisis [2,3], a condition frequently misdiagnosed as macular edema. OCT imaging plays a pivotal and definitive diagnostic role [9].

CASE REPORT

A 41-year-old male with advanced nuclear cataract and myopic macular retinoschisis was admitted to the Provincial Ophthalmology Hospital in Krakow. His medical history included premature cataract, right eye exotropia, high axial myopia, astigmatism, amblyopia, macular retinoschisis, and secondary cystoid macular edema in both eyes.

The patient had undergone two strabismus surgeries (at the ages of 8 and 25) and implantation of anterior chamber lenses

at the age of 24 in Venezuela. He did not have any chronic diseases and was not taking any ophthalmic medications.. He has been scheduled for cataract surgery. Preoperative diagnostics included slit-lamp examination, OCT, tonometry, optical biometry, and autorefractometry.

Visual acuity results were as follows: for distance vision in the right eye, 0.04 sc (0.2c, sph -3.25, cyl -1.50, axis 95), and in the left eye, 0.125 (-1) sc (0.32c, sph +2.50, cyl -0.75, axis 96). For near vision, the patient could read with the right eye 1.5c, cyl -1.50, axis 95, and with the left eye 1.5c, sph +4.50, cyl -0.75, axis 95. Intraocular pressure (IOP) was 15 mmHg in the right eye and 13 mmHg in the left eye. Autorefractometry findings were -3.25, cylinder -1.50, axis 96 in the right eye, and +2.50, cylinder -0.75, axis 95 in the left eye. Keratometry results for the right eye were Master K1 41.97 D, K2 42.83 D, delta K -0.86 D; for the left eye, Master K1 42.26 D, K2 42.63 D, delta K -0.37 D. A refractive error qualifying for a diagnosis of high myopia is defined as a refractive error below -6.0 D or an axial length greater than 26 mm. Biometric analysis of this patient revealed an axial length of 29.75 mm in the right eye and 29.10 mm in the left eye, confirming the diagnosis of high myopia. The refractive parameters were not fully objective due to previous corrective surgery (iris-claw lens implantation) and subsequent nuclear cataract development.

Anterior segment examination of both eyes revealed a clear and transparent cornea, medium-depth anterior chambers, an iris-claw type intraocular lens attached to the iris, clear aqueous humor, a calm iris with a vertical, long iridotomy in the superior part, round, reactive pupils, and nuclear cataract. Fundoscopy revealed a transparent vitreous body, a pale pink, myopic optic nerve with a distinct oblique margin, a grayish posterior pole without reflex, and vessels narrow for the patient's age, with a pink and attenuated retina. OCT of the macula displayed a dome-shaped elevation of the retina, RPE atrophy, macular retinoschisis, and pronounced cystoid macular edema in the left eye.

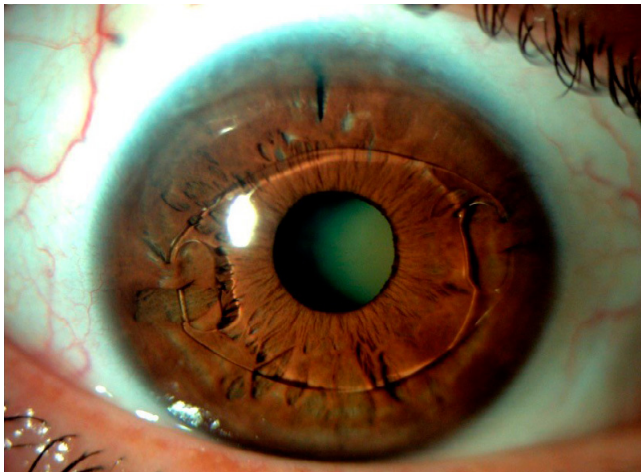

Figure 1. OCT imaging of the macula – visible myopic retinoschisis in the macular region of both eyes

Treatment. The patient underwent phacoemulsification cataract surgery on both the right and left eye, with the implantation of an intraocular lens (IOL) within the capsular bag. Simultaneously, the iris-claw lenses were intentionally removed through scleral tunnels to achieve the best, most predictable, and safest refractive outcome. Initially, a secondary stage posterior vitrectomy was considered if the cataract surgery did not sufficiently improve visual acuity.

In standard cataract procedures, a 2.2 mm incision is typically made. However, in this case, a larger incision would have been required to safely extract the iris-claw lens, increasing the risk of significant astigmatism, potentially exacerbated by the need for suturing such a wound. In contrast, standard cataract incisions are usually left unsutured. Post-cataract surgery, the patient demonstrated a clear improvement in visual acuity, eliminating the need for posterior vitrectomy. The patient will remain under continued ophthalmologic monitoring and observation. The patient's best-corrected visual acuity (BCVA) in the right eye was 0.9 (UCVA 0.7), while the UCVA and BCVA in the left eye were both 0.7. Autorefractometry readings were as follows: right eye +0.5 / -1.25D at 75°, left eye +1.0 / -1.25D at 65°.

For tractional myopic maculopathy, surgical intervention is considered the most effective therapeutic approach. Vitrectomy, combined with peeling of the internal limiting membrane (ILM), has shown promising results in treating this condition. Studies indicate that ILM peeling reduces recurrence and alleviates macular traction [10,11].

An alternative surgical method for symptom relief is scleral buckling, which provides an external compressive force. This technique reduces the risk of cataract formation and iatrogenic retinal breaks.

In patients with maculopathy and vitreous changes, vitrectomy often yields the desired improvement in visual acuity. Prognosis following surgery has been shown to depend significantly on preoperative visual acuity, with lower preoperative acuity associated with poorer therapeutic outcomes [3].

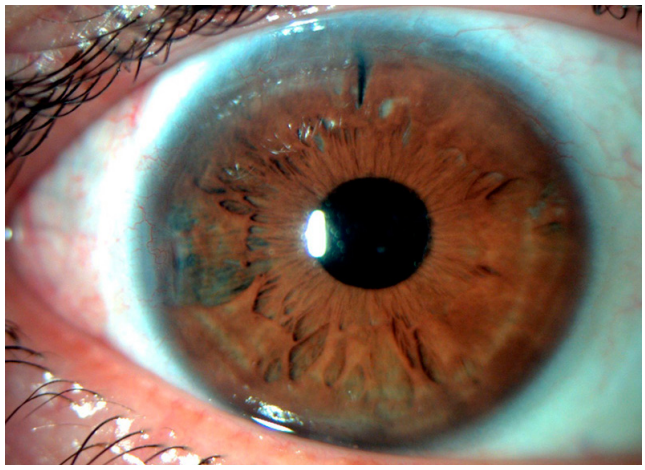

Figure 2. Right eye with the presence of an iris-claw lens and a nuclear cataract

DISCUSSION

In the described case, the patient also underwent cataract extraction. A critical aspect of this procedure is the precise implantation of the intraocular lens (IOL). Any incorrect manipulation of the cornea can lead to complications, such as increased astigmatism. It is important to note that astigmatism is a refractive error caused by an irregular curvature of the cornea, resulting in blurred images on the retina.

Myopic macular retinoschisis can be accurately described as a disease spectrum due to the diverse presentation of clinical symptoms. Optical coherence tomography (OCT) is the most accurate diagnostic tool for this condition. This non-invasive diagnostic technique uses light waves to

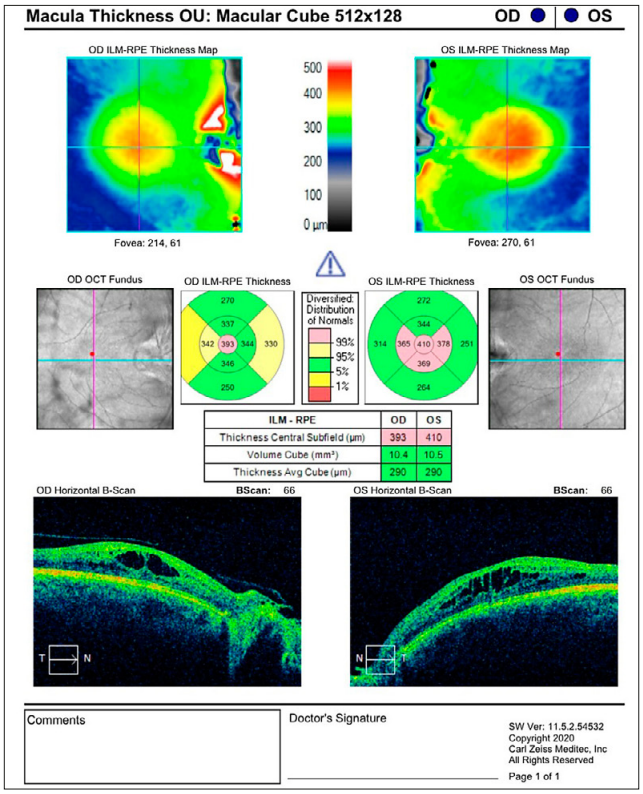

Figure 3. Right eye: post-cataract surgery, with the explantation of iris-claw lens and implantation of an intraocular lens within the capsular bag via a temporal scleral tunnel

create detailed images of retinal structures [12]. OCT allows for the comprehensive assessment of structural changes occurring in the various retinal layers, enabling physicians to monitor disease progression and detect potential changes or complications within the retina

Advancements in OCT technology allow increasingly precise information gathering about this disease. Optical coherence tomography enables a detailed assessment of structural changes in various retinal layers, allowing the physician to monitor disease progression and detect any changes or complications within the retina [13].

Myopic retinoschisis can be categorized into five groups based on the extent of retinoschisis and the area affected. In type S0, no retinoschisis is present; in S1, changes occur outside the fovea; S2 is characterized by retinoschisis within the fovea; in S3, retinoschisis involves the foveola but does not occupy the entire macula, whereas in type S4, retinoschisis affects the entire macular surface [12,14].

To aid in disease description, diagnosis, and monitoring, a structured histological classification has been introduced. This classification has revealed that retinoschisis may affect the outer layer, inner layer, or include the internal limiting membrane [14].

Progressive thinning of the choroid in the macular region is a significant element in the pathogenesis of myopic maculopathy. These changes are markedly more visible in images obtained via OCT than in standard fundoscopic examination [15].

Ueda et al. (2023) demonstrated an inverse relationship between choroidal thickness and the risk of myopic retinoschisis, suggesting that measuring choroidal thickness, along with assessing the axial length of the eyeball, could be a valuable tool for evaluating the risk of developing this condition [16].

Myopic retinoschisis in the fovea has a highly variable course. Prognosis is highly individualized and depends significantly on patient-specific factors and medical history. Another key factor influencing the disease progression is the extent of macular area affected by the schisis [2].

CONCLUSIONS

The patient diagnosed with cataract, high myopia, astigmatism successfully underwent cataract extraction with the implantation of a monofocal lens, without any significant postoperative complications. A personalized approach was key in this treatment, adjusting the procedure to the patient's complex ocular history. The primary objective of the surgery was to prevent the worsening of the pre-existing astigmatism. The procedure required precision to avoid compromising the corneal condition and to ensure optimal visual quality.

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