• Letter to the Editor •

A new treatment option for the resistant spasm of accommodation: clear lens extraction and multifocal intraocular lens implantation

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Dear Editor,

We write you to present a 20-year-old man with resistant spasm of accommodation without any organic cause treated with clear lens extraction (CLE) with phacoemulsification and multifocal intraocular lens (IOL) implantation.

Spasm of accommodation is a rare condition characterized by sudden and involuntary sustained development of excess myopia without any accommodative stimulus. The etiology has not been precisely determined, but it is usually functional in origin and attributed to psychogenic factors triggered by anxiety, depression, emotional distress, or malingering. However, organic causes related to neurologic system affecting the brainstem, such as multiple sclerosis and metabolic encephalopathy or head trauma, have also been described[1-2]. The accommodative spasm is usually treated with cycloplegic or myotic eye drops, plus or minus lenses, but occluders and amytal abreaction may not respond to any treatment and could be problematic[1,3].

We aimed to present a case of a young adult with recalcitrant spasm of accommodation without any organic cause and to describe his definitive treatment with surgery. A 20-year-old man complained of frequent blurred vision attacks after extended near work for the past five years. He was suffering from severe headache and eyestrain. Prior to presenting to our clinic, the patient had been examined thoroughly by ophthalmologists, neurologists, and psychiatrists and had been diagnosed with accommodative spasm. He had no history of head trauma, and a cranial magnetic resonance imaging showed no brain lesion that could have been responsible for sustained spasm of accommodation. A detailed psychiatric evaluation of the patient was also completely normal. The patient had no systemic disease or chronic drug use in his history.

The patient had been treated with cyclopentolate 1%, one drop to each eye at bedtime, and had used bifocal glasses for the last five years. Discontinuation of this treatment resulted in recurrence of the spasm of accommodation each time. Despite of the full compliance to the treatment, the frequency and severity of his attacks worsened with time and the patient became handicapped because of the blurred vision, glare, and halo side effects of his cycloplegia. The spasm of accommodation interfered with his daily activities and school work so much that the patient had to interrupt his education.

The patient was admitted to our clinic and underwent a detailed refractive examination, which showed pseudomyopia and high astigmatism (Table 1). Slit lamp and fundus examinations were unremarkable. His intraocular pressure on applanation tonometry was 16 and 19 mm Hg in the right and left eyes, respectively. The eye position in our patient was orthophoric.

The patient's persistent pseudomyopia was considered as functional in origin and accepted as resistant to medical treatment. We reviewed the literature for alternative interventions, but we found only one case that had undergone CLE for the treatment of persistent accommodative spasm after head trauma. The authors of that paper had described a conclusive treatment for spasm of accommodation, and the only shortfall had been the need to use reading glasses[4].

CLE and multifocal IOL implantation could be an effective solution both for definitive treatment of spasm of accommodation and for provision of accurate far and near vision. We discussed the potential advantages and disadvantages of the surgery, and the patient opted for the operation and signed the informed consent.

The IOL power was calculated from repetitive and repeated biometric measurements with a swept source optical coherence

Table 1 The results of refractive examination and biometric and topographic measurements

Refractive examination findings	Right eye	Left eye
Manifest refraction	-8.00 sph -2.50 cyl×175	-6.75 sph -4.50 cyl×170
Uncorrected visual acuity	20/200	20/200
Best corrected visual acuity	20/20	20/20
Cycloplegic refraction	+0.75 sph -1.75 cyl×1	+1.25 sph -3.25 cyl×170
Cycloplegic best corrected visual acuity	20/20	20/20
Postoperative refraction	-0.50 sph -0.50 cyl×127	-0.25 sph -0.75 cyl×161
Biometric and topographic measurements[1]		
Anterior chamber depth (mm)		
Nondilated	3.64	3.70
Dilated	3.94	3.98
Postoperative	4.50	4.53
Preoperative crystalline lens thickness (mm)		
Nondilated	3.64	3.45
Dilated	3.15	3.15
Postoperative intraocular lens thickness	1.04	1.04
Axial length (mm)		
Nondilated	24.78	24.85
Dilated	24.72	24.83
Postoperative	24.73	24.81
Central corneal thickness (μm)	577	572
Total astigmatic power (D)		
Nondilated	-1.75×12	-2.75×2
Dilated	-1.75×1	-2.25×176
Postoperative	-1.50×1	-3.25×176
Corneal astigmatic power (D)		
Nondilated	-2.11×2	-3.22×3
Dilated	-2.13×2	-1.76×127
Postoperative	-2.13×2	-1.76×118

[1]The measurements were derived from IOLMaster 700 and Nidek Wavefront Analyser.

tomography (OCT) IOLMaster 700 (Carl Zeiss Meditec AG, Jena, Germany). Regular corneal astigmatism was detected by topography and wavefront analysis (Table 1). CLE with femtolaser assisted phacoemulsification and trifocal toric IOL (Zeiss AT LISA trifocal toric IOL 18.00 D/3.50 D×89 for the right eye and Zeiss AT LISA trifocal toric IOL 17.50 D/4.00 D×93 for the right eye, Carl Zeiss Meditec AG, Jena, Germany) insertion were carried out without any complications in the right and left eyes two days apart. In the third postoperative month, binocular visual acuity was 20/20 for far (6 m), 20/32 for intermediate (60 cm), and 20/25 for near (33 cm) vision.

The binocular uncorrected Defocus curve also shows good visual acuity at all distances (Figure 1). The contrast sensitivity was 1.56, 1.76, 1.65, 1.34, 0.60 for 1.5, 3, 6, 12 and 18 cycles/degree respectively preoperatively and 1.85, 2.06, 1.95, 1.78, and 1.25 postoperatively. The contrast sensitivity improved to a level which was within the normal range of healthy phakic subjects, under photopic conditions. The patient had also high levels of satisfaction with the procedure and low levels of visual disturbances due to glare or halos as evaluated by modified version of Catquest 9-SF patient outcome questionnaire[5].

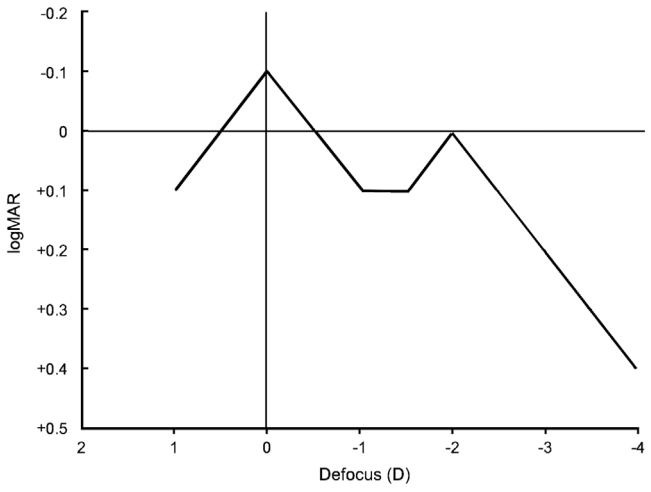

Figure 1 The binocular uncorrected visual acuity Defocus curve given in logMAR three months after surgery.

During accommodation, the contraction of the ciliary muscle causes the ciliary attachments of the zonular fibers to move forward and inwards, thereby reducing the tension in the zonular fibers. This produces a rounder shape of the lens and an increase in its refractive power, which enables focusing on near objects[6-7].

Spasm of accommodation is defined as a repetitive condition of accommodation that shows a tendency to maintain accommodation in the absence of a dioptric stimulus[8]. Its etiology is generally obscure, and most cases are considered functional, which usually show a predominance of increased fluctuations in refractive power of the eye and are considered psychogenic in origin. Less frequent causes include organic disturbances, such as head trauma, encephalitis, intracranial masses, or cerebrovascular diseases; these disturbances damage the supranuclear control areas of accommodation[4]. The neurologic basis of the condition itself is not clearly defined and the demonstrated pathways are complicated; therefore, treatment of accommodative spasm typically targets the end organ, the ciliary apparatus, and aims at reducing the symptoms[1].

Spasm of accommodation occasionally does not resolve with medical treatment modalities, and rehabilitation in these cases cannot be provided because of the visual disturbance or the side effects of the cycloplegic drops used[4]. Lens extraction with cataract surgery is a radical intervention for eliminating the accommodative process by weakening of the ciliary muscle. The lens extraction almost always results in complete loss of accommodation, so a general solution could have a beneficial outcome for those patients with recalcitrant spasm of accommodation[9].

The anatomical measurements of the anterior chamber in a patient with spasm of accommodation can change instantaneously, making accurate calculation of the planned IOL value quite challenging[10]. The improvements in optical biometry devices, especially swept source technology with the modern IOL calculation formulas, have advanced cataract surgery to yield excellent refractive results[11].

Our patient's anterior chamber parameters changed with dilatation, but the IOLMaster 700, which is the first swept source OCT-based biometry device, gave the same IOL power calculation findings for every measurement, and his postoperative refraction was at the desired level despite his high astigmatism. In addition to these technologic developments, premium IOLs have the advantage of splendid outcomes in visual rehabilitation after lens extraction in young patients.

In conclusion, multifocal IOL implantation with CLE could be an outstanding solution for the definitive treatment of spasm of accommodation and could improve accuracy in both far, intermediate and near vision.

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