Adult Amblyopia Reversed by Contralateral Cataract Formation

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ABSTRACT

Two adult patients are presented whose childhood amblyopia improved markedly when the sound eye became cataractous. In each case, the amblyopic eye became the preferred eye for fixation, allowing each patient to temporarily delay cataract surgery. Most remarkably, the acuity improvement has been sustained for greater than 2 years in each patient after full visual rehabilitation of the sound eye by cataract extraction.

INTRODUCTION

Amblyopia can be defined as a reduction in visual acuity that is due to abnormal visual experience early in life.\textsuperscript{1} It represents one of the most common causes of vision loss, affecting 2% to 4% of the population.\textsuperscript{1} The treatment of amblyopia consists of partial or complete exclusion of the sound eye from visual activity.\textsuperscript{2} This treatment is usually stated to be effective only during infancy and childhood.\textsuperscript{3} It is well known, however, that loss of the sound eye in adulthood may result in spontaneous improvement of vision in the amblyopic eye.\textsuperscript{3} Sustained improvement in amblyopic vision after temporary rather than permanent vision loss in adulthood has not, to my knowledge, been previously documented.

CASE REPORTS

Case 1. A 57-year-old woman was noted to have an intermittent esotropia at age 3 years for which she was

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given glasses. Occlusion therapy was utilized to treat amblyopia of the left eye from age 4 through age 6 years. The patient recalls having poor visual acuity in the left eye since that time. The patient stopped wearing glasses as a teenager. Oral steroids were taken for 6 to 12 months in the 1950s for systemic allergies. Documented optometric examinations in 1971, 1975, and 1981 (ages 39 to 49 years) revealed best corrected visual acuity of 20/20 in the right eye and 20/200 in the left. The lens in each eye was clear. Refractions subjectively and by retinoscopy revealed a refractive error of +1.25 in the right eye and +0.25 - 4.00 x 030 in the left eye. An optometric examination in 1982 (age 50 years) revealed a posterior subcapsular (PSC) cataract of the right eye. The left lens was clear. Visual acuity was recorded as 20/20 in the right eye. Visual acuity was not measured in bright illumination. Visual acuity in the amblyopic left eye was recorded as 20/400 uncorrected but had apparently improved to 20/60 - wearing a plano -4.00 x 015 lens. This same lens had been worn in the past without improvement of visual acuity.

In 1983, at age 51 years, a follow-up optometric examination revealed a dense PSC cataract in the right eye with visual acuity of 20/30. The left eye continued to have a clear lens with a recorded visual acuity of 20/50 – 2. The patient was referred to our ophthalmology department, where in 1984 the dense PSC cataract was again noted in the right eye. Vision had decreased to 20/50 in the cataractous right eye. The amblyopic left eye had now improved to 20/40 without an additional change of glasses and was preferred for fixation. By February 1985, visual acuity had decreased to 5/400 in the right eye but had improved to 20/30 in the left eye. The patient did not desire cataract surgery. In June 1985, visual acuity was recorded as hand movements in the right eye and 20/25 + 2 in the amblyopic left eye. A right extracapsular cataract extraction with placement of a posterior chamber intraocular lens implant was performed in July 1985. Postoperative examinations in 1985, 1986, 1987, and 1989 all revealed 20/20 vision in the pseudophakic right eye and 20/30 vision in the left eye using the same refractive correction prescribed when 20/200 amblyopia was present.

A full examination by the author in December 1989 and again in March 1990 revealed visual acuity of 20/20 in the right eye corrected with – 1.50 – 0.50 x 075 and 20/30 – 2 in the left eye corrected with + 0.25 – 4.00 x 022. Visual
acuity improved to 20/20-1 in the left eye when isolated letters were used. Slit-lamp and fundus findings were unremarkable. A 2-prism-diopter esotropia was present during distance viewing. Fusion of the Worth 4-dot was demonstrated at near. Stereopsis was present at 200 arc seconds by the Titmus test and 100 arc seconds by the Randot test. Polarized vectograph viewing revealed deletion of letters projected to the left eye. Bagolini striated lens testing verified a macular scotoma in the left eye during binocular viewing. Neutral density filters degraded acuity equally in the two eyes. Figure 1 summarizes the visual acuity recordings of each eye over time.

**Case 2.** A 67-year-old woman was noted to have an intermittent esotropia at age 3 years for which she was given glasses at age 4 years. Occlusion therapy was utilized for amblyopia of the left eye from age 4 to 5 years. The patient's father and sister also wore glasses for childhood esotropia. The patient recalls having poor vision in the eye since childhood. However, the eyes were well aligned when she wore glasses. A documented optometric examination in 1975 at age 53 years revealed a best corrected visual acuity of 20/20 in the right eye with +1.00 -1.50 x 103 and 20/100 in the left eye with +3.25 -1.25 x 075. The next documented optometric examination was in May 1985 at age 63 years. A dense cataract was documented in the right eye with a mild cataract in the left eye. Visual acuity was recorded as 20/80 in the right eye in dim illumination, which reduced to 20/400 with the room lights on. The amblyopic left eye had improved to 20/50+ without a change in refraction. The patient was referred to our ophthalmology department where, in July 1985, vision was recorded as 20/100 in the right eye and 20/40+ in the amblyopic left eye. A dense posterior subcapsular and nuclear sclerotic cataract was present in the right eye. A mild nuclear sclerotic cataract was present in the left eye. The patient preferred the amblyopic left eye for fixation and did not desire cataract surgery. In January 1986 (age 64 years), visual acuity in the right eye was recorded as 20/200 in dim light and 20/400 with the room lights on. Visual acuity in the left eye was 20/80+ using linear letters and 20/50+ with isolated letters. Again, the patient did not desire cataract surgery. By November 1987 (age 65 years), vision was reduced to 20/400 in the right eye and 20/200 in the left eye. With room lights on, vision decreased to hand movements in the right eye and counting fingers in the left eye. A right extracapsular cataract extraction with placement of a posterior chamber intraocular lens implant was performed in December 1987. Postoperatively, vision returned to 20/20 in the right eye. The cataract in the amblyopic left eye continued to worsen.

Visual acuity was recorded as 20/400 in March 1988, hand movements in June 1988, and light perception with projection in November 1988. A left extracapsular cataract extraction with placement of a posterior chamber intraocular lens (PC-IOL) implant was performed in November 1988. The patient was counseled that the visual result in this ambyopic eye from the cataract extraction might be disappointing. Postoperatively, however, vision in the left eye improved to 20/20-2. A full examination by the author in January 1990 revealed best corrected visual acuity of 20/15 in the right eye and 20/25-2 in the amblyopic left eye. Acuity in the left eye improved to 20/20 when isolated letters were used. A left esotropia of 8° was present at distance and near. The Worth 4-dot was fused at a distance of 3 ft. Preferred fixation with the right eye and the presence of a macular scotoma in the left eye during binocular viewing was verified using a polarized vectograph, Bagolini striated lenses, and the 4-prism-diopter base-out prism test. No stereopsis was demonstrated on Titmus testing. Neutral density filters reduced visual acuity equally in the two eyes. Figure 2 summarizes the visual acuity recordings of each eye over time.

**DISCUSSION**

Two adult patients, ages 57 and 67 years, had well-documented childhood amblyopia (to 20/200 and 20/100—

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**FIGURE 1:** Case 1. Visual acuity recordings of each eye over time. **RECCE**—right extracapsular cataract extraction.

**FIGURE 2:** Case 2. Visual acuity recordings of each eye over time. **RECCE**—right extracapsular cataract extraction. **LECCE**—left extracapsular cataract extraction. Dotted lines leading to additional visual acuity recordings represent acuity reduction when room lights were turned on.
respective). Cataract formation in the sound eye of each patient, at ages 51 and 63 years, respectively, stimulated improvement in visual acuity of the amblyopic eye. In each case, the amblyopic eye became the preferred eye for fixation, allowing each patient to temporarily delay cataract surgery. Most remarkably, the improvement has been sustained at 20/30 and 20/25 – 2, respectively, after the sound eye was rehabilitated by cataract extraction to 20/20 visual acuity.

Amblyopia represents the most frequent cause of vision loss in children and young adults. Even in the elderly, it remains an important cause of vision loss. The healthy adult with amblyopia is at much greater risk of developing significant visual disability, usually as a result of trauma to the sound eye, than is the general population. It is well known, however, that spontaneous improvement may occur in the amblyopic eye after loss of the sound eye. The frequency and quality of this spontaneous improvement does not seem to be related to the age at the moment of loss of the sound eye. Pleoptic treatment has been reported by some investigators to aid this improvement. If the vision loss in the sound eye were to be temporary rather than permanent, it is unclear whether the improved acuity of the amblyopic eye would be sustained. Amblyopic treatment is not commonly prescribed after age 10 years. However, Birnbaum and coworkers, in their review of the amblyopia literature, found that reported success rates in amblyopic therapy for all ages under age 16 years were quite similar. In patients ages 16 years and older, the success rate was lower but still approached 42% of the those treated when success was defined as a sustained improvement of four or more lines on the Snellen chart.

Our patients both presented at a young age with intermittent esotropia. Both were treated with glasses and did not need strabismus surgery. An anisometric refraction was documented later in life in each patient. Presumably, these patients have the anisometric form of amblyopia. The response to neutral density filters during clinical examinations would support this. France emphasized that anisometric amblyopia is not as severe as the strabismic form, implying easier reversibility.

In each of the two patients reported here, the amblyopic eye became the preferred eye for fixation, allowing for a delay in cataract surgery. This is quite remarkable in light of all that has been written about the nature of amblyopic vision. Disturbances such as the shimmer effect of hot air over a highway, continuous wavy motion in the environment, and parts of a target fading in and out are often described when an amblyopic eye is used for fixation.

Kushner documented a dramatic example of a patient who was so disturbed by these visual phenomena in her 20/30 amblyopic eye that she preferred to fixate with the fellow eye which had a full-thickness macular hole. Our patients recall no such disturbances when fixating with their amblyopic eye. The sound eye, however, again became the preferred eye for fixation after visual rehabilitation with extracapsular cataract extraction and PC-IOL implant placement. Most of the visual improvement in the amblyopic eye has been sustained despite return of fixation preference to the sound eye.

In addition, visual improvement in the amblyopic eye of our patients began very early in the development of the contralateral cataract. This was probably due in part to the posterior subcapsular portion of the cataract which characteristically reduces vision dramatically in bright illumination even when visual acuity recorded in a dim examination room is near normal. Also, the diffusion of light produced by cataract is well known to reduce low as well as high frequency contrast sensitivity. Amblyopic visual loss, however, may produce contrast sensitivity lost only at higher frequencies, with a relative sparing of the low frequencies.

Contralateral cataract formation, it seems, can produce the partial or complete exclusion of the sound eye from visual activity necessary as a treatment for amblyopia. The cases reported here demonstrate that this “treatment” can be effective even in the elderly, producing not just temporary but longstanding reversal of some of the visual deficit.

REFERENCES