Spontaneous Resolution of Retinal Detachment Occurring After Macular Hole Surgery

Levent Akduman, MD; Lucian V. Del Priore, MD, PhD; Henry J. Kaplan, MD

Objective: To document the spontaneous resolution of retinal detachment developing after macular hole surgery.

Methods: We identified all patients who developed a postoperative retinal detachment after undergoing macular hole surgery at Washington University School of Medicine, St Louis, Mo; the surgery was performed by one of us (L.V.D.P. or H.J.K.) between 1991 and 1996.

Results: Six of 73 eyes developed a postoperative retinal detachment; the retinal detachment was inferior in all cases. Two eyes that had inferior retinal breaks underwent further surgery to repair the retinal detachment. Retinal breaks could not be identified in the other 4 eyes; the retinal detachment resolved without further surgery in all 4 of these eyes.

Conclusion: The recognition that retinal detachment occurring after macular hole surgery can resolve without additional surgery may result in the avoidance of further surgical intervention in some eyes.


REPORT OF CASES

CASE 1

In 1991, a 71-year-old white woman with a 4-week history of visual loss in the right eye had a best-corrected visual acuity of 20/40 OD and 20/25 OS. Her intraocular pressure was 14 mm Hg OD and 12 mm Hg OS. The slit-lamp examination revealed bilateral mild nuclear sclerosis. The results of the fundus examination revealed a stage 3 (Gass' classification) macular hole in her right eye. She underwent pars plana vitrectomy with peeling of the posterior hyaloid from the posterior pole to the equator with a soft-tip silicone catheter under active suction, as previously described, and pneumatic tamponade with 30% sulfur hexafluoride.

Ten days after the surgery, the patient developed a bullous inferior retinal detachment after macular hole surgery that either resolved spontaneously (1 eye) or after the administration of periocular (2 eyes) or oral (1 eye) corticosteroids. Patients were maintained in strict facedown positioning for 7 (patients 1 and 2) or 14 (patients 3 and 4) days. These cases were derived from a total of 6 cases of retinal detachment (2 rhegmatogenous detachments requiring surgery and 4 detachments resolving without surgery) occurring among 73 patients who underwent macular hole surgery at Washington University School of Medicine, St Louis, Mo, between 1991 and 1996.
CASE 2

In 1991, a 72-year-old white man complained of an 8-month history of distorted and blurred vision in his left eye. His best-corrected visual acuity was 20/25 OD and 20/80 OS. Her intraocular pressure was 21 mm Hg OD and 22 mm Hg OS. She had mild nuclear sclerosis bilaterally. The results of the fundus examination revealed a stage 3 macular hole in her left eye, with no peripheral retinal breaks. He underwent pars plana vitrectomy, peeling of the posterior hyaloid from the posterior pole to the equator with a soft-tip silicone catheter under active suction, and intravitreal tamponade with air.

Two weeks after the surgery, he developed a bullous inferior retinal detachment extending from the 5-o’clock position to the 7-o’clock position, without involvement of the macula. There was no gas in the vitreous cavity then, and no peripheral retinal breaks were seen with careful scleral depression. The patient received topical 1% prednisolone acetate 4 times daily and a single sub-Tenon injection of 40 mg of triamcinolone acetonide; the patient was monitored twice per week. The retinal detachment resolved within 3 weeks. His final visual acuity was 20/200 OS.

CASE 3

A 72-year-old white woman complained of decreased visual acuity and a black spot in her central vision for approximately 6 months in the left eye. The results of her ocular examination revealed a best-corrected visual acuity of 20/25 OD and 20/80 OS. Her intraocular pressure was 21 mm Hg OD and 22 mm Hg OS. She had mild nuclear sclerosis bilaterally. The results of the fundus examination revealed a stage 3 macular hole in her left eye. She underwent a pars plana vitrectomy, peeling of the posterior hyaloid from the posterior pole to the equator with a soft-tip silicone catheter under active suction; fluid-air exchange; and application of autologous serum to the macular hole, followed by pneumatic tamponade with 20% perfluoropropane.

One week after the surgery, she developed a bullous inferior retinal detachment with shifting subretinal fluid extending from the 5-o’clock position to the 7-o’clock position, without involvement of the macula. Eighty-five percent of the vitreous cavity was filled with gas then. There were no peripheral retinal breaks seen with careful scleral depression. She was given 80 mg of prednisone per day, and the prednisone was tapered within 2 weeks. She was monitored twice per week, and the retinal detachment resolved within 2 weeks. The macular hole was closed 3 months after surgery, and the retina remained reattached with no intravitreous gas 9 months after surgery. Her final visual acuity was 20/40 OS.

CASE 4

A 69-year-old white woman complained of seeing a black spot in her central vision for 2 years in the right eye and for 6 months in the left eye. Her ocular history was notable for laser iridotomies for glaucoma in both eyes 7 years previously and cataract extraction with implantation of a posterior chamber intraocular lens in both eyes 5 years previously. The results of the ocular examination revealed a best-corrected visual acuity of 20/200 OD and 20/60 OS. Her intraocular pressure was 19 mm Hg OU. There were patent peripheral iridotomies superiorly and well-centered posterior chamber intraocular lenses in both eyes. The results of the fundus examination revealed a stage 4 macular hole with a rim of subretinal fluid in her right eye and a stage 3 macular hole in her left eye. She underwent pars plana vitrectomy in the left eye with peeling of the posterior hyaloid from the posterior pole to the equator with a soft-tip silicone catheter under active suction; fluid-air exchange; and application of autologous serum to the macular hole, followed by pneumatic tamponade with 17% perfluoropropane.

One day after the surgery, the patient had a bullous inferior retinal detachment with shifting subretinal fluid extending from the 4-o’clock position to the 7-o’clock position, without involvement of the macula. Eighty-five percent of the vitreous cavity was filled with gas then. There were no peripheral retinal breaks seen with careful scleral depression. She was given 80 mg of prednisone per day, and the prednisone was tapered within 2 weeks. She was monitored twice per week, and the retinal detachment resolved within 2 weeks. The macular hole was closed 3 months after surgery, and the retina remained reattached with no intravitreal gas 9 months after surgery. Her final visual acuity was 20/40 OS.

Comment

Senile macular hole is an idiopathic condition that typically affects women more frequently than men in the sixth or seventh decade of life. Although the pathogenesis of macular hole is not completely understood, tangential traction from the prefoveal cortical vitreous may play a role in macular hole formation. In 1991, Kelly and Wendel reported the use of pars plana vitrectomy, peeling of the cortical vitreous, and intravitreal gas tamponade for the treatment of idiopathic macular hole. Since this initial report, this group and other workers have reported macular hole closure rates in the range of 90%. The use of transforming growth factor β1, thrombin, autologous serum, or other adjuvants may improve the success rate and the visual prognosis in patients with macular holes.

The formation of iatrogenic retinal tears with or without postoperative retinal detachment is a possible complication of macular hole surgery. The incidence of retinal detachment and peripheral retinal breaks after pars plana vitrectomy for macular hole may be as high as 14%. Surgeons often assume that a retinal detachment that develops after vitreous surgery is rhegmatogenous in nature, as peripheral retinal breaks and rhegmatogenous retinal detachment are well-recognized complications of vitreous surgery performed for other indications, including macular pucker and proliferative diabetic retinopathy. However, our series demonstrates that postvitrectomy retinal detachments in patients with macular holes may resolve without further surgery, as 4 of our patients with retinal detachment had no peripheral retinal tears and had resolution of the retinal detachment without further surgery.

The mechanism of formation and subsequent resolution of inferior retinal detachments after macular hole surgery is unknown, but there are several hypotheses that may
explain our observations. First, some or all of these patients had small peripheral breaks that escaped detection because of the difficulty of examining the periphery in a gas-filled eye. Although peripheral breaks are usually treated with laser photocoagulation or cryopexy to induce a chorioretinal scar, it is clear that some retinal holes, including macular holes themselves, can be closed by intraocular tamponade without the creation of a chorioretinal adhesion. In fact, the presence of an intraocular gas bubble may exert traction on the vitreous base and thereby open a small, occult break that closes spontaneously as the gas resolves. Second, removal of the cortical vitreous may increase fluid flow from the vitreous cavity through the macular hole. The role of the vitreous in restricting posterior fluid flow was reviewed previously by Pederson. In the phakic, nonvitrectomized eye, there is little fluid flow from the vitreous posteriorly, but there is substantial fluid flow from the vitreous into the subretinal space in experimental animals in the presence of a retinal hole and detachment. The injection of fluorescein isothiocyanate–dextran or India ink into the vitreous cavity of primates or rabbits with a rhegmatogenous retinal detachment leads to rapid subretinal accumulation of this tracer. Experimental evidence suggests that a normal vitreous offers some resistance to fluid flow. Intravitreal hyaluronidase liquifies vitreous and accelerates clearance of tritiated water from the vitreous cavity. In addition, the state of vitreous over retinal holes is important in determining the exchange rate of fluid through the hole in patients with a retinal detachment. After scleral buckling surgery, fluid resorption may begin before the break actually settles on the scleral buckle, because the vitreous occludes the retinal hole. Localized neurosensory detachments created in primates and rabbits will resolve spontaneously unless the vitreous overlying the retinal hole is removed carefully. Thus, cortical vitreous acts as a barrier to posterior fluid flow preoperatively in the eye with a macular hole and that removal of the cortical vitreous increases fluid flow from the vitreous through the macular hole, especially if the patient is not strictly compliant with facedown positioning. Third, the retinal detachments that we observed may have been exudative. This is supported by the fact that patients 1, 3, and 4 had shifting subretinal fluid (patient 2 was not checked). However, shifting of the subretinal fluid may not be a reliable sign of exudation in a gas-filled eye because the large intravitreal gas bubble will push against the inferior retinal detachment when the patient is supine and, thus, push the subretinal fluid posteriorly. None of the eyes had excessive postoperative intraocular inflammation.

Regardless of the mechanism of retinal detachment formation, some retinal detachments that develop after macular hole surgery may resolve without further surgical intervention. Retinal detachments occurring after macular hole surgery can be observed, or they can be treated with oral or sub-Tenon corticosteroids if no retinal tears can be identified by careful examination of the peripheral retina. Because the macula will receive tamponade for many weeks after surgery, patients who develop an inferior retinal detachment postoperatively without an identifiable peripheral retinal tear can be observed, as long as the patients remain in the proper facedown position. Strict facedown positioning should be emphasized to tamponade the macular hole and to prevent the retinal detachment from spreading into the macula. Patients with postoperative retinal detachments should be monitored at least twice per week, and further surgical intervention can be considered if the macula is threatened or the retinal detachment does not resolve spontaneously.

Accepted for publication January 5, 1998.

This study was supported by an unrestricted grant from Research to Prevent Blindness, New York, NY (Department of Ophthalmology and Visual Sciences, Washington University School of Medicine, St Louis) and core grant EY 02687 from the National Institutes of Health, Bethesda, Md.


Reprints: Henry J. Kaplan, MD, Department of Ophthalmology and Visual Sciences, Washington University School of Medicine, 660 S Euclid Ave, Box 8096, St Louis, MO 63110-1096 (e-mail: kaplan@um.seer.wustl.edu).

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