AMERICAN ACADEMY
OF OPHTHALMOLOGY®

Long-Term Safety and Efficacy of Limited Vitrectomy for Vision Degrading Vitreopathy Resulting from Vitreous Floaters

J. Sebag, MD, FARVO, Kenneth M.P. Yee, BS, Justin H. Nguyen, BA, Jeannie Nguyen-Cuu, BS

Purpose: Vitreous floaters can lower visual acuity (VA) and degrade contrast sensitivity function (CSF). Limited vitrectomy improves VA and normalizes CSF, but long-term results in a large series with objective quantitative outcome measures are lacking.

Design: Case series.

Participants: One hundred ninety-five eyes of 145 patients (87 men, age = 57.6 ± 4.3 years; 58 women, age = 61.5 ± 12.0 years) reporting bothersome vitreous floaters were compared to 70 age-matched controls. Posterior vitreous detachment (PVD) alone was the cause in 96/195 (49.2%), myopic vitreopathy alone was the cause in 30/195 (15.4%), PVD with myopic vitreopathy was the cause in 56/195 (28.7%), and asteroid hyalosis was the cause in 13/195 eyes (6.7%).

Methods: Limited vitrectomy with 25-gauge instruments was performed without surgical PVD induction, preserving 3 to 4 mm of retrolental vitreous in phakic eyes. Follow-up averaged 32.6 ± 23.5 months (range, 3–115 months), with 2 years or more in 144 eyes, 3 years or more in 69 eyes, 4 years or more in 51 eyes, and 5 years or more in 24 eyes.

Main Outcome Measures: Visual acuity, 39-item National Eye Institute Visual Function Questionnaire (VFQ) results, CSF (Weber index), and quantitative ultrasonography results.

Results: After surgery, vitreous echodensity decreased by 94.1% ($P < 0.0001$) and VFQ results improved by 19.3% ($P < 0.0001$). Preoperative VA was 0.68 ± 0.21, improving to 0.77 ± 0.19 after surgery ($P < 0.0001$). Preoperative CSF was degraded by 91.3% compared with controls ($P < 0.0001$), normalizing at 1, 3, 6, 12, 24, 36, and 48 months after surgery ($P < 0.00005$ for each). There were no cases of endophthalmitis. There were 3 retinal tears and 3 retinal detachments that underwent successful repair. Clinically significant vitreous hemorrhage developed in 2 patients, clearing spontaneously. Two macular puckers and 4 recurrent floaters from new PVD were cured by re-operation. Cataract surgery occurred in 21 of 124 patients (16.9%; mean age, 64 ± 7 years; none younger than 53 years), an average of 13.1 ± 6.8 months after vitrectomy.

Conclusions: Limited vitrectomy for Vision Degrading Vitreopathy decreases vitreous echodensity, improves patient well-being, improves VA, and normalizes CSF. The long-term efficacy and safety profiles suggest this may be a safe and effective treatment for clinically significant vitreous floaters, warranting a prospective randomized trial. *Ophthalmology Retina 2018;■:1–7 © 2018 by the American Academy of Ophthalmology*

Vitreous opacities cause floaters, which can significantly disturb some patients.[1,2] The most common causes for vitreous floaters are age-related posterior vitreous detachment (PVD),[3,4] and myopia-related vitreous gel liquefaction with collagen aggregation, known as myopic vitreopathy.[5–9] Asteroid hyalosis is an infrequent cause of significantly bothersome vitreous floaters.[10–12]

Not only have previous studies shown that patients with vitreous floaters report a significantly lower quality of life,[1,2,13] but have also shown that these patients are psychologically distressed, and the degree of psychological distress is associated significantly with the severity of floater symptoms.[14] A likely cause for dissatisfaction with vision and distress is the significant reduction in contrast sensitivity function (CSF) that has previously been detected in these patients,[15–18] probably because of scattering of incident light.[19,20]

Thus, treating vitreous floaters is increasingly considered for many patients. Current therapeutic options are observation without intervention, Neodymium:yttrium–aluminum–garnet (Nd:YAG) laser,[9,21,22] and vitrectomy surgery.[23,24] Preliminary studies have shown that vitrectomy can remove vitreous opacities safely and improve visual acuity (VA)[25] and CSF,[3,8,9,18] but long-term studies in large numbers of participants using objective quantitative outcome measures are lacking.

This study examined the long-term safety and efficacy (both structural and functional) of limited vitrectomy in a large cohort followed for 32.6 months, on average, with at least 2 years follow-up in 144 patients, at least 3 years of follow-up in 69 patients, and at least 4 years of follow-up in

https://doi.org/10.1016/j.oret.2018.03.011
ISSN 2468-6530/18

51 patients. All participants continue to be followed, and the exact duration of follow-up (to date) for all patients is demonstrated in Figure 1. Objective quantitative outcome measures were used to evaluate efficacy prospectively.

Methods

Institutional review board/ethics committee approval from St. Joseph Hospital, Orange, California was obtained and all described research adhered to the tenets of the Declaration of Helsinki. Informed consent was obtained from each participant and all study-related records were maintained according to Health Insurance Portability and Accountability Act compliance rules. Eyes with a history of previous vitrectomy, active diabetic retinopathy, age-related macular degeneration, or intravitreal injections were excluded. In patients with bilateral vitreous floaters (n = 50), each eye was considered separately. Patient satisfaction or dissatisfaction with vision was quantified using the 39-item National Eye Institute Visual Function Questionnaire, administered before and at least 1 month after surgery.

Participants

Originally, 202 eyes were enrolled, but 5 participants moved out of the area shortly after surgery, never returned for follow-up, and therefore were excluded. Two hypertensive men 69 and 73 years old chose not to return for follow-up care after developing post-op central retinal artery occlusion that was unrelated to surgery. Thus, this series consists of 195 eyes in 145 patients (87 men with a mean age of 57.6 ± 14.3 years and 58 women with a mean age of 61.5 ± 12.0 years) undergoing limited vitrectomy for vitreous opacities who had a minimum follow-up of 3 months. As reported by the patients, the average duration of coping from onset of bothersome symptoms until the time of surgery was 35 ± 14.7 months. The average post-operative follow-up was 32.6 ± 23.48 months (range, 3−115 months), with at least 1 year of follow-up in 160 eyes, 2 years or more in 144 eyes, 3 years or more in 69 eyes, 4 years or more in 51 eyes, and 5 years or more in 24 eyes (Fig 1). One participant was diagnosed with choroidal melanoma 22 months after surgery and chose not to continue in the study. No other problems have arisen, and the remaining 194 participants continue to be followed.

Demographics are presented in Table 1. Pseudophakia was present in 71 of 195 eyes (36.4%). Prophylactic cryopexy or laser retinopexy for peripheral retinal breaks was performed at least 2 months before vitrectomy surgery in 42 eyes (21.5%; 19 atrophic holes (9 with slight pigmentation) and 23 retinal tears). The most common cause of vitreous floaters was PVD alone (96/195 [49.2%]), followed by combined myopic vitreopathy with PVD (56/195 [28.7%]). Myopic vitreopathy alone was the cause in 30 of 195 eyes (15.4%). The average degree of myopia was −5.3 ± 3.4 diopters (D), with a range of −1.25 to −15 D. Asteroid hyalosis was the cause in 13 of 195 eyes (6.7%). There were 70 age-matched controls without vitreous floaters whose contrast sensitivity function was measured as a control group for this test of vision.

Objective Testing

To diagnose PVD, ultrasonography (AVISO; Quantel Medical, Clermont-Ferrand, France) was performed in each patient. SD-OCT (OPTOS, Marlborough, MA) was also performed and provided confirmation of ultrasonography results when the posterior vitreous cortex was close enough to the retina to image. Long-term effects on vision were studied prospectively by measuring VA in all 195 eyes and CSF testing in the last 139 consecutive eyes before and after surgery. Best-corrected VA was measured by a certified tester using a standardized Early Treatment Diabetic Retinopathy Study chart.

Contrast sensitivity function was measured with the computerized Freiburg Acuity Contrast Testing.[3,26−28] The Freiburg Acuity Contrast Testing test uses a light-emitting diode computer display monitor with a spatial resolution of 218 pixels per inch. Luminance calibration was performed before each evaluation by manually entering the observer distance from the display and the

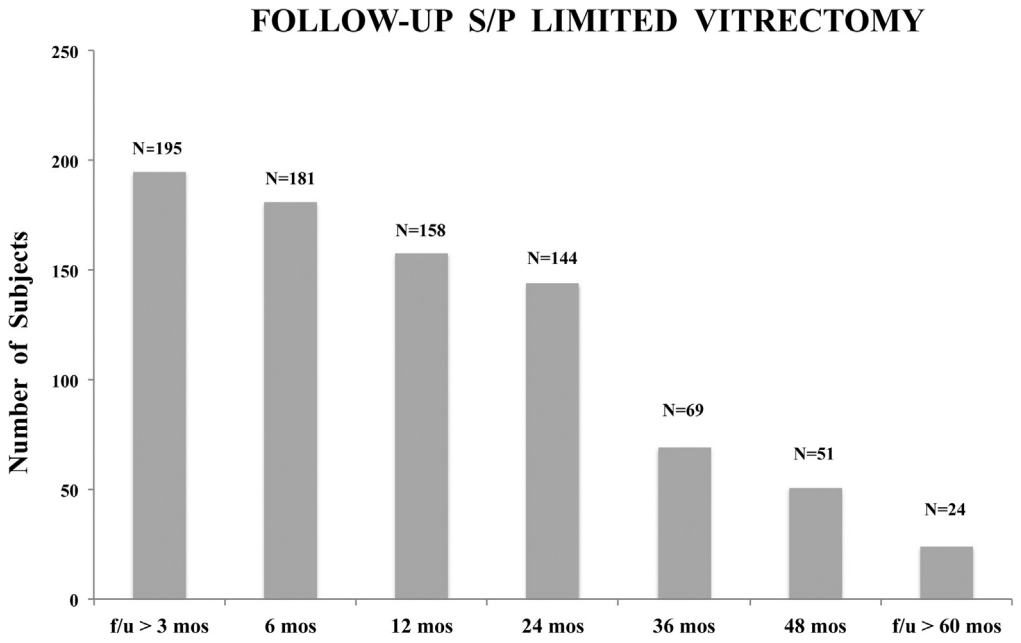

Figure 1. Duration of follow-up (f/u). S/P = status-post.