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Increased Reoperation Rate in Surgical Treatment of Rhegmatogenous Retinal Detachment with Coexistent Macular Hole

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Purpose: To examine the surgical outcomes in patients with coexistent macular hole (MH) and rhegmatogenous retinal detachment (RRD).

Design: Retrospective case series.

Participants: All patients who underwent surgical repair of concomitant MH and retinal detachment (MHRD) between January 2014 and December 2016 in our facility were examined. At least 1 retinal break was noted in all MHRD cases. Exclusion criteria included MHRD related to high myopia without peripheral retinal tears.

Methods: Retrospective chart review.

Main Outcome Measures: Data collected included presence of proliferative vitreoretinopathy (PVR) and classification at time of surgical repair, details of surgical repair including whether internal limiting membrane (ILM) peeling was achieved, type of ILM staining used, presence of retinal detachment (RD) in the fellow eye, and duration of follow-up. Outcomes evaluated included visual acuity comparisons, reoperation rate, final anatomic success, and MH closure rate.

Results: Over the study period, MHRD cases accounted for 17 of 745 (2.3%) of all repaired RDs in our practice. Proliferative vitreoretinopathy was present in 53% of MHRD cases. Reoperation rates for MHRD were significantly higher than our practice average for all RD repairs (29% vs. 9.7%; $P = 0.01$). Final anatomic success with RD was achieved in 100% of patients. Internal limiting membrane peeling was performed in 15 of 17 patients. Macular hole closure rate was 71% after initial surgery. Although 82% of patients experience equal or improved vision, only 24% of patients achieved visual acuity better than 20/80. Retinal detachment in the contralateral eye was noted in 3 of 16 patients (19%) included before initial presentation or during the follow-up period.

Conclusions: Visual outcomes in MHRD cases were underwhelming because of high rates of presentation with PVR macula-off RRD, high reoperation rates, and relatively low MH closure rates. We suggest aggressive surgical techniques to repair MHRD. *Ophthalmology Retina 2017;■:1–5 © 2017 by the American Academy of Ophthalmology*

Coexisting macular hole (MH) and rhegmatogenous retinal detachment (RRD) has been reported in up to 4% of RRD cases.[1,2] The relationship between concomitant MH and retinal detachment (MHRD) has been described as idiopathic or coincidental by some studies.[3–5] Other reports suggest that tangential retinal traction secondary to posterior vitreous detachment leads to central MH in patients with MHRD.[1] This theory is supported by reports demonstrating a potential association between proliferative vitreoretinopathy (PVR) and MHRD.[1,6] However, data on the prevalence of PVR in MHRD are sparse because most previous studies of MHRD excluded patients with significant PVR on presentation.[2,4] Therefore, this association may be underreported.

The surgical success rate in MHRD has been reported to be more than 90% for both MH closure and RRD reattachment in recent studies. Ryan et al[2] reported higher success rates of MH closure with internal limiting membrane (ILM) peeling during RRD repair as compared with no ILM peeling. Shukla et al[4] reported high rates of MH closure with or without ILM peeling. However, these studies excluded MHRD cases with significant PVR on presentation, which can affect the surgical outcome for both MH closure and retinal reattachment.[3] In the current retrospective study, we evaluated patients with MHRD who underwent surgical treatment in our practice and compared them with cases of RRD without concomitant MH. We included patients with all grades of PVR and measured the surgical outcome in terms of both anatomic success and visual function.

Methods

We examined our surgical database for all surgeries performed by all 6 retina surgeons in our practice between January 2014 and December 2016. Inclusion criteria included all cases of MHRD with at least 1 peripheral retinal break identified before surgery. In all patients, the peripheral retinal break was considered the cause of the retinal detachment (RD). Exclusion criteria included patients with RDs resulting from MH secondary to degenerative high

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myopia and with no peripheral retinal breaks. Data collected included patient age, gender, location of retinal breaks and RD, macular status at time of surgery, type of surgery performed, intraoperative locations of subretinal fluid drainage, lens status, presence of PVR and its classification before surgery, preoperative and postoperative vision, reoperation dates, retinal reattachment status, MH status, presence of ILM peeling, type of ILM staining used (if any), presence of RD in the fellow eye, and duration of follow-up. Diagnosis of MHRD was performed before surgery with OCT or during surgery with high magnification direct viewing or staining with Kenalog (Bristol-Myers Squibb, Montreal, Canada).

Visual acuity data were translated into logarithm of the minimum angle of resolution units for statistical analysis. For categorical variables, numbers and percentages were reported; for continuous variables, means with standard deviations were measured. Chi-square testing was used to compare proportions of categorical variables; paired or 2-sample *t* tests were used to compare the means of continuous variables. *P* values less than 0.05 were considered statistically significant. The study was approved by our institution's institutional review board.

Results

Cases of MHRD accounted for 17 of 745 (2.3%) of all repaired RDs in our practice (Table 1). Seventeen eyes of 16 patients met inclusion criteria for this study (7 women, 9 men). The average age at surgery was 65.6 years. Fifteen MHRD cases (88%) occurred in patients with primary RD. One case occurred in a patient with a history of a previously repaired RD with a segmental scleral buckle performed 24 years previously. Another case occurred in a patient with a recurrent macula-off RD repaired with a vitrectomy 2 months previously. Sixteen of 17 patients (94%) demonstrated a macula-off RD at presentation, whereas 1 patient (6%) sought treatment with a macula-involving RD. Proliferative vitreoretinopathy was present in 9 of 17 eyes (53%) at the time of surgery. Five eyes had grade B PVR (29%) and 4 eyes had grade C PVR (24%). Retinal detachment in the contralateral eye was noted in 3 of 16 patients (19%) before initial presentation or during the follow-up. Average follow-up was 10 months, with a range of 3 to 20 months.

Table 1. Demographics and Clinical Presentation

Variable	Data
Coexistent retinal detachment and macular hole	17 of 745 (2.3)*
Gender, male/female	9/7 (56/44)
Age (yrs), mean ± SD	65.6±8.46
Lens status	
Phakic	9 (53)†
Pseudophakic	8 (47)
Type of detachment	
Primary	15 (88)
Redetachment	2 (12)
Macula involvement	
Macula off	16 (94)
Macula involved	1 (6)
Proliferative vitreoretinopathy	
Present	9 (53)
Type B	5 (29)
Type C	4 (24)
Absent	8 (47)
Retinal detachment in fellow eye	3 of 16 (19)‡
Average duration of follow-up (mos)	10.0 (range, 3–20)

SD = standard deviation.
Data are no. of patients (%), unless otherwise indicated.
*Of the total number of patients who underwent retinal detachment surgery at Retina Vitreous Surgeons of Central New York during the study.
†Percentages are based on 17 total patients unless noted otherwise.
‡Retinal detachment in the fellow eye before or after initial presentation in patients included in this study.

The presence of MH was confirmed either before surgery using macular OCT (Fig 1A) or during surgery by direct examination, and was confirmed using Kenalog staining. All patients underwent standard 23- or 25-gauge pars plana vitrectomy. Endolaser was used in all patients. Fluid–gas exchange with SF_6 or C_3F_8 was performed in 15 eyes (88%). Silicone oil was used in 2 eyes (12%). Scleral buckle was performed in 2 eyes (12%). Peeling of the ILM was performed in 15 eyes (88%). Of 15 eyes that underwent ILM peeling, 8 procedures used brilliant blue (53%), 4 used indocyanine green (ICG; 27%), and 3 used no staining (20%). Postoperative macular OCT was used to confirm MH closure (Fig 1B). Patients with RD after initial surgery or failure of MH closure (Fig 1C) were offered repeat surgery to achieve complete anatomic success.

Table 2 demonstrates the visual and surgical outcome of MHRD surgeries. Average preoperative visual acuity was 2.23±0.83 logarithm of the minimum angle of resolution (Snellen equivalent, 2/350) and improved to 1.28±0.76 logarithm of the minimum angle of resolution (Snellen equivalent, approximately 20/400) after surgery. Although improvement in average visual acuity was significant ($P = 0.01$, paired-sample *t* test), final BCVA of 20/80 or better was achieved in only 4 of 17 patients (24%).

After the initial RD repair, 5 of 17 eyes (29%) required reoperation to fix the RD (Table 2), which was significantly higher compared with 72 of 745 patients (9.7%) requiring reoperation for all primary RRD repaired at our practice ($P = 0.01$, chi-square test). Three of 8 eyes (38%) without PVR required reoperation to reattach the retina compared with 2 of 9 eyes (22%) with PVR on presentation requiring reoperation. Of the 5 eyes that required reoperation, 2 needed a second reoperation for successful retinal reattachment. Overall, final anatomic success with RD was achieved in all 17 eyes (100%).

The MH closed in 12 of 17 eyes (71%) after initial vitrectomy (Table 3). Internal limiting membrane peeling was performed in 15 of 17 eyes (88%). Eleven of 15 eyes (73%) that underwent ILM peeling achieved MH closure on initial surgery. No membrane peeling was performed in 2 of 17 eyes (12%). One eye without ILM peeling achieved MH closure after initial surgery (50%). Rate of MH closure was 7 of 8 (88%) in eyes in which brilliant blue stain was used, 1 of 4 (25%) in eyes in which ICG was used, and 2 of 2 (100%) in eyes in which no dye was used to stain the ILM.

Discussion

In this study, we observed a rate of MHRD in 2.3% of patients, which parallels the rate of MHRD of up to 4% described in the literature.[1,2] Although the ultimate retina reattachment rate was 100% in our series, we reported a reoperation rate of 29% in MHRD cases. This reoperation rate was significantly higher than our practice's reoperation rate of 9.7% in all cases of primary RD. We suspect that our high reoperation rate in MHRD cases is the result, in part, of MHRD cases sharing many similarities with PVR RD. In fact, the MHRD patients in this series showed a 53% rate of