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Return to the Operating Room after Macular Surgery

IRIS Registry Analysis

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Purpose: To investigate the rate of return to the operating room after vitrectomy surgery to treat macular hole or epiretinal membrane.

Design: A retrospective registry cohort.

Participants: Individuals receiving care in ophthalmology practices participating in the Academy IRIS (Intelligent Research in Sight) Registry.

Methods: Data from the IRIS Registry were analyzed for patients who underwent vitrectomy for macular holes or epiretinal membranes. Cases were identified by the combination of International Classification of Diseases, 9th revision code (362.54, 362.56) and a current procedural terminology (CPT) code for vitrectomy surgery between January 1, 2013 and June 30, 2017.

Main Outcome Measures: The eyes that underwent additional eye surgery within 1 year after initial vitrectomy for macular hole or epiretinal membrane were identified, as was the nature of the additional procedures per CPT code.

Results: A total of 41 475 eyes underwent vitrectomy for macular hole and 73 219 eyes underwent vitrectomy for epiretinal membrane during the study period. In the macular hole group, 7573 had a second surgery within 1 year, and 2827 (6.8%) had a second surgery that was not cataract related. In the epiretinal membrane group, 12 433 had a second surgery within 1 year, 4022 (5.5%) of which were not cataract related. In the macular hole group, 4.6% of eyes returned to the operating room for another macular hole repair surgery, and 2.0% returned for retinal detachment repair. In the epiretinal membrane group, 1.4% returned for a second vitrectomy with membrane stripping, and 2.5% returned for retinal detachment repair.

Conclusions: This registry-based study encompassed a large number of patients but was limited by the inaccessibility of some information and the potential for inaccurate medical records or coding, as it obtained data from multiple electronic health records entities. Excluding cataract surgery, approximately 6% of eyes that underwent vitrectomy to address macular hole or epiretinal membrane returned for a second ophthalmic procedure within a year. In the macular hole group, most secondary non-cataract surgeries were for another macular hole repair procedure. For both macular holes and epiretinal membranes, approximately 2% of eyes required retinal detachment repair surgery within 1 year. *Ophthalmology 2018;■:1–6 © 2018 by the American Academy of Ophthalmology*

Macular holes (MH) and epiretinal membranes (ERM) are relatively common macular pathologies that may cause significant vision loss for patients. Both are predominantly treated with vitrectomy surgery, and both are among the most common reasons that vitrectomy is performed. Vitrectomy is considered a generally effective means of improving patients' vision in these cases. In the case of MH, surgical hole closure has been generally reported to improve the best-corrected visual acuity (BCVA) in a majority of patients by 2 to 3 lines, depending on the duration and size of the MH, extent of myopia, presence of comorbid macular pathology, and other factors.[1–8] ERM removal with vitrectomy may improve vision by a mean of 2 to 4 lines, again depending on duration of time that the ERM has been present, preoperative acuity, and other ocular pathology.[9–13]

For MH, surgical success is typically defined by anatomic closure of the hole. A large number of series have reported anatomic success outcomes between 85% and 100% using a variety of surgical techniques, tamponade agents, and postoperative positioning regimens.[14–17] The Australian and New Zealand Society of Retinal Specialists Macular Hole Study Group reported a primary hole closure rate of 95% in 2456 eyes.[18] Other examined means of closing MH include enzymatic vitreolysis, which with ocriplasmin in clinical trials achieved a 30% closure rate on small (<400 μm) MH, and gas injection in the absence of vitrectomy, which has been reported to close up to 66% of small MH in the setting of vitreomacular traction.[19,20] Spontaneous closure of MH has also been reported but is uncommon.[21,22]

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Postoperative complications with vitrectomy for MH repair include endophthalmitis, vitreous and choroidal hemorrhage, iatrogenic macular damage, secondary ERM formation, cystoid macular edema, retinal tear, retinal detachment (RD), and cataract development or progression.[23–25] Intraoperative retinal tear has been reported in up to 6% of vitrectomies for MH, and postoperative retinal tear or RD formation in anywhere from 1% to 14% of eyes.[1,26–33] The majority of postoperative RD and reopening of MH in published series occur in the first year after the vitrectomy.[34–36]

Vitrectomy for ERM is typically defined as successful with removal of the ERM from the central or entire macula, with a corresponding improvement in macular anatomy and vision. Visual prognosis is affected by preoperative visual acuity and duration of the macular pathology, similar to MH.[10] The rate of recurrence of symptomatic ERM has been reported to occur up to 5% of the time.[2,4,8–10] Removal of the internal limiting membrane alongside the ERM removal may reduce the risk of recurrence, although this approach is not universal.[35] There is no commonly used alternative to vitrectomy for treatment of ERM at this time.

The complication profile with vitrectomy for ERM is near-identical to that for MH repair. Iatrogenic intraoperative retinal tears may occur in 1% to 6% of cases.[9,10,37–40] Postoperative RD development has been reported in 1% to 7% of eyes after ERM removal.[9–12,28,37,39] Endophthalmitis and choroidal hemorrhage are rare events.[28,41–43]

For this series, the American Academy of Ophthalmology's IRIS (Intelligent Research In Sight) Registry was utilized to examine how often and why patients required additional surgery after vitrectomy for MH or ERM. The IRIS Registry is a clinical data registry of eye care in the United States that began full operation in March of 2014 and is now used by more than 10 000 ophthalmologist members of the American Academy of Ophthalmology and their employed optometrists. Over 100 million patient visits have been logged.[44] The registry's broad pool of real-world patient care data was queried to examine the postoperative course in the context of existing literature regarding MH and ERM repair.

Methods

All cases were identified within the IRIS Registry via a combination of International Classification of Diseases, 9th revision and 10th revision (ICD-9-COM and ICD-10-COM) code and current procedural terminology (CPT) code. The ICD-9-COM codes that were applied to identify patients were 362.54 ("macular hole") and 362.56 ("macular puckering"). The ICD-10-COM codes were H35.349 ("macular hole") and H35.379 ("macular pucker"). The CPT codes were 67041 ("vitrectomy/membrane stripping") and 67042 ("vitrectomy/macular hole repair"). All patients 18 years and older with a combination of 1 each of the above ICD-9-COM and CPT codes in the selected time period (January 1, 2013 to June 30, 2017), were included in the study pool.

It was noted during the initial query that a significant number of eyes had multiple ICD-9-COM or ICD-10-COM codes linked to a surgical procedure. For instance, an eye might have the ERM and the MH ICD-9-COM codes linked to an MH repair CPT code, or the ERM and RD codes linked to an RD repair CPT code. To keep the data clean and eliminate redundancy, ICD-9-COM and ICD-10-COM codes were prioritized, and only the code determined to be of greatest pathology was used. MH was weighed to be of greater priority than ERM but less so than RD or vitreous hemorrhage (VH). ERM was prioritized over 379.24 ("vitreous opacities") and 379.21 ("vitreous degeneration"). Thus a patient with an MH and ERM coded was considered as part of the MH group only, and a patient with ERM and vitreous opacities was put in the ERM group only. A patient with VH or a tractional or rhegmatogenous retinal detachment was excluded from both MH and ERM groups.

Patients' IRIS Registry data for 1 year after the initial MH or ERM surgery was accessed. Any subsequent ophthalmic surgically related CPT codes were analyzed and included in the results, with the exception of standalone intravitreal injections. The presence or absence of additional CPT codes and the nature of the secondary CPT codes was recorded. Intraocular surgery CPT codes were included in this analysis, and codes related to in-office procedures like intravitreal injections or adnexal surgeries were excluded. Final visual acuity and final intraocular pressure (IOP) were obtained at the visit closest to 1 year after the first surgery if there was no second surgery, or closest to 1 year after the second surgery if a second surgery was performed.

All patient data were included or excluded based on the ICD-9-COM and CPT code algorithm mentioned above. The individual treating physicians or practices did not impact the process of case selection or analysis. All patients that were saved in the electronic health records of practices participating in the IRIS Registry were accessible to the investigation.

The entirety of the data in this study was obtained from the IRIS Registry. The latter identifies patient data via a combination of patient-specific identifiers such as social security number, name, and date of birth, and then assigns a unique patient identifier. Thus if a patient receives care with 2 different physicians or 2 different practices that both participate in IRIS, the patient data from both settings should be integrated. However, any care from a provider or health care entity that was not an IRIS Registry participant was not accessible. For research purposes, the IRIS Registry de-identifies all patient data when it extracts it from the electronic health record, so there was no potential for the authors of this study to personally identify any individual patients.

The IRIS Registry maintains internal identifiers for the sake of data integrity. The IRIS Registry data set has been previously qualified as Health Insurance Portability and Accountability Act (HIPAA) compliant.

Statistical analysis was performed with chi-square analyses and *t* tests as dictated by the data groups and comparison format. Visual acuity was typically recorded in Snellen lines and translated to logarithm of the minimum angle of resolution (logMAR) units for quantitative assessments.

Results

In the IRIS Registry between January 1, 2013 and June 30, 2017, 223 205 eyes in 209 915 unique patients underwent vitrectomy for MH, ERM, or vitreous opacities as defined by the prioritization process above (Fig 1). A total of 27 709 (12.4%) of those eyes underwent a second surgery in the same eye within 1 year afterward.

After the formula for prioritizing the diagnoses was applied and redundant codes were addressed (see "Methods"), there were 41 475 eyes that underwent vitrectomy for MH (Table 1). Of these, 7573 (18.3%) eyes received a second surgery within 1 year. Of these secondary surgeries, 2827 (6.8% of the total MH eyes) were non-cataract procedures. The remainder (4746, or 11.4% of the total MH eyes) underwent cataract surgery. The most