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REVIEW

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Update on surgical management of complex macular holes: a review

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Abstract

Modern surgical interventions effectively treat macular holes (MHs) more than 90%. Current surgical treatment for MHs is pars plana vitrectomy with epiretinal membrane, internal limiting membrane (ILM) peeling, gas endotamponade, and prone posturing postoperatively. However, a small subset of MHs imposes challenges to surgeons and frustrations on patients. A narrative review was performed on the surgical treatment of challenging MHs including large and extra-large MHs, myopic MHs with or without retinal detachment, and chronic and refractory MHs. There are robust data supporting inverted ILM flap as the first-line treatment for large idiopathic MHs and certain secondary MHs including myopic MHs. In addition, several studies had shown that ILM flap manipulations in combination with surgical adjuncts increase surgical success, especially in difficult MHs. Even in eyes with limited ILM, surgical options included autologous retinal graft, human amniotic membrane, and creation of a distal ILM flap that can assist in MH closure even though the functional outcome may be affected by the MH chronicity. Despite relative success anatomically and visually after each technique, most techniques require a long-term study to analyze their safety profile and to establish any morphological changes of the MH plug in the closed MHs.

Keywords: Macular hole, Vitrectomy, Vitreoretinal disease, Internal limiting membrane peeling

Introduction

Macular holes (MHs) were once considered non-treatable and an MH was first described in 1869 from a traumatic origin [1]. MH is characterized by a vertical defect in the neurosensory retinal anatomy particularly in the foveal region that extends from the internal limiting membrane (ILM) to the retinal pigment epithelium (RPE) and it affects the central vision and causes metamorphopsia [2]. MHs are predominantly idiopathic (primary) with higher prevalence with increasing age and in females. Its estimated annual incidence is up to 8.69 eyes in 100, 000 population [3, 4]. Secondary MHs are attributed to but not limited to high myopia, trauma, proliferative diabetic retinopathy, and various retinal pathologies.

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Current surgical techniques successfully close majority MHs greater than 90% with remarkable visual acuity gain; however, small percentages of MHs have a higher risk of initial surgical failure [5, 6]. Large MHs, MHs with a basal diameter of > 400 µm, are likely to have a flat-open closure or flat MH margins with bare RPE configuration with unsatisfactory visual prognosis despite closure [7–10]. The 5-Year Manchester Large Macular Hole Study found a higher success rate between 91 and 98% of surgical closure for large MHs with diameter in the range of 400–649 µm while MHs with diameter 650–1416 µm only achieved 76% [11]. Another study reported that the rate of MH closure was only 56% in eyes with a large MH of > 400 µm and about 10% of the closed MHs reopened after 6 months [12]. Moreover, surgical success in MH repair was found to be more than 90% within one year after the onset of the symptoms and lowered to 47.4% after 1 year [13]. Minimal visual gain can still be achieved after closing chronic MHs although this is associated with the MH duration [14].