

THE OUTCOME OF VITRECTOMY IN MACULAR HOLE AT CIPTO MANGUNKUSUMO NATIONAL GENERAL HOSPITAL

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ABSTRACT

Introduction: This study aims to determine the anatomical and functional outcomes in patients with macular hole (MH) underwent vitrectomy with internal limiting membrane (ILM) peeling.

Method: A descriptive retrospective study at Vitreoretinal Division of Ophthalmology Department, Faculty of Medicine: Universitas Indonesia – Cipto Mangunkusumo National General Hospital (FKUI-RSCM). Secondary data obtained from medical records of patient with MH within January – December 2017. The anatomical outcome was observed from the closure of MH. Functional outcome was observed from post-operative visual acuity at day-1, month-1, month-3, and month-6.

Result: 16 patients who met the criteria were included in this study. MH closure was observed in 43.8% of cases and failed closure in 56.2%. Improvement of visual acuity was observed on closure cases in 3 months and 6 months, occurred in 71.43% and 100% of cases, respectively.

Conclusion: MH closure rate was 43.8%. Satisfying result of improvement in visual acuity achieved after vitrectomy with ILM peeling..

Keywords: Macular hole, ILM peeling, Membrane peeling

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INTRODUCTION

Macular hole (MH) is one of the causes of visual impairment and quite often found as a cause of blindness. The visual impairment can be

sectional populations with 4346 subjects reported a prevalence of MH $0,09 \pm 3,04\%$.³ In the population in rural India, MH prevalence is $0.20 \pm 0.05\%$.⁴ Studies in the United States with a sample of 90% of Caucasian races have an incidence of MH of 7.8 people and 8.7 eyes per 100,000 people per year.^{5,6}

MH is also related to cystoid macular edema due to inflammation, diabetic retinopathy, vascular occlusion, hypertensive retinopathy, high myopia, macular pucker, retinal detachment, and trauma.⁷

Early detection of MH is associated with the increased success rate of MH closure and improvement in visual acuity after vitrectomy

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found as a distortion of image (metamorphopsia), decrease of visual acuity, and loss of some visual fields that can cause disturbances in daily activities, especially in reading and driving.¹

The Eye Disease Case-Control Study Group study shows that 72% of primary (idiopathic) MH is found mainly in women and more than 50% in people aged 65-74 years.² The Beijing Eye Study in cross-

surgery, especially in the smaller size of MH. The diagnosis of MH as early as possible is very important, especially in the other eye. OCT can provide detailed anatomy and size of MH and the presence of vitreous traction, which will aid in the diagnosis, staging, and follow-up, as well as for patient education.⁵

In the early stages of 1A or 1B, the MH can close completely spontaneously but 50% will continue to become full-thickness MH (FTMH). This occurs because the vitreous adhesions are separated from the fovea in the other 50%, and the fovea becomes normal again or looks like a reddish spot. An improvement in visual acuity will occur if there is a spontaneous posterior vitreous detachment from attachment in the macula.⁸ If the MH continues beyond stage 2, the decrease in visual acuity will continue and nearly 75% of MH stage 2 will continue to stage 3 or 4. Epiretinal membrane can occur as the complication of the expansion of MH which can reduce the anatomical success rate after vitrectomy. Patients with FTMH are at risk of experiencing FTMH in the other eye about 10-15%. The fellow eye that has undergone complete posterior vitreous detachment has a lower risk of developing FTMH.⁵

In MH stage 2, vitrectomy is performed not only to improve visual acuity but to prevent a decrease in visual acuity and prevent progression to stage 3 or 4.⁵

There have been a variety of results of the anatomical and functional success rate of MH surgery. Therefore, this study aims to determine the anatomical and functional success of MH surgery performed from January to December 2017.

METHOD

This research is a retrospective descriptive study conducted in the Vitreoretinal Division of the Department of Ophthalmology, Cipto Mangunkusumo General Hospital Jakarta. Subjects were patients who had undergone vitrectomy surgery on the macula in the January-December 2017.

The inclusion criteria were patients with macular hole with at least stage 3 and stage 4 MH in the Vitreoretinal Division, Cipto Mangunkusumo General Hospital Jakarta in the period January 2017 - December 2017 who had performed vitrectomy with internal limiting membrane (ILM) peeling.

Data were obtained from medical records and recapitulation records of patient that had undergone vitrectomy operations with ILM Peeling in the period January - December 2017 at Cipto Mangunkusumo General Hospital Jakarta. Data taken were age, sex, the onset of disease, pre-operative visual acuity, lens status, diagnosis, OCT examination, type of anesthesia, operative measures, and postoperative visual acuity. If there is a mismatch of data between the medical and the recapitulation record, the patient's medical record will be excluded.

Anatomical success is defined as closure of the hole in the retinal macula after vitrectomy based on funduscopy and OCT examination results.

Functional success is defined as visual acuity after vitrectomy surgery.

RESULT

16 patients underwent vitrectomy surgery with ILM Peeling in the January-December 2017 period that met the study criteria.

Table 1. **Characteristics of patient**

Variable	Frequency	Percentage
Gender (n=16)		
Male	6	37.5%
Female	10	62.5%
Age (n=16)		
41-50	3	18.7%
>50	13	81.3%
History of diabetes mellitus (n=13)		
Yes	6	37.5%
No	10	62.5%
History of hypertension (n=13)		
Yes	8	50%
No	8	50%
Lens status (n=16)		
Pseudophakic	3	18.7%
Phakic	13	81.2%
Type of anesthesia (n=16)		
Local	14	87.5%
General	2	12.5%

The most frequent type of anesthesia used was retrobulbar local anesthesia (87.5%).

Table 2. **Time (onset) from complaint to the surgery**

Variable	Frequency (n=16)	Percentage
≤ 6 months	11	68.8%
> 6 months	5	31.2%

The time (onset) from complaints to surgery in most cases was ≤ 6 months (68.8%), while 31.2% of cases had an onset of > 6 months.

Table 3. **Status of Preoperative VA and the outcomes of macular hole surgery**

		Number	Anatomical Closure Rate (%)	Postoperative VA of 6/12 Snellen or better
Preoperative VA	6/36 snellen or better	5	4 (80)	0
	less than 6/36 snellen	11	3 (27.2)	1 (9)

Table 3 showed the status of preoperative VA which categorizes the 6/36 snellen or better (5 patients), followed by less than 6/36 snellen (11 patients) and the final outcome of closure and postoperative VA of 6/12 snellen or better

Table 4. Surgical treatment of macular hole

Variable	Frequency (n=16)	Percentage
Vitrectomy + ILM peeling + SF6	8	50%
Vitrectomy + ILM peeling + C3F8	5	31.2%
Vitrectomy + ILM peeling + SO	3	18.8%

Table 4 showed that the most frequent procedure was vitrectomy with ILM peeling using SF6 gas tamponade (8 patients), followed by vitrectomy with ILM peeling using C3F8 gas tamponade (5 patients).

Table 5. Anatomical changes after vitrectomy

Variable	Frequency	Percentage
Closure	7	43.8%
Failed Closure	9	56.2%

Table 5 showed anatomical success rate achieved as high as 43.8%, whereas 56.2% of failed closure cases after vitrectomy with ILM peeling.

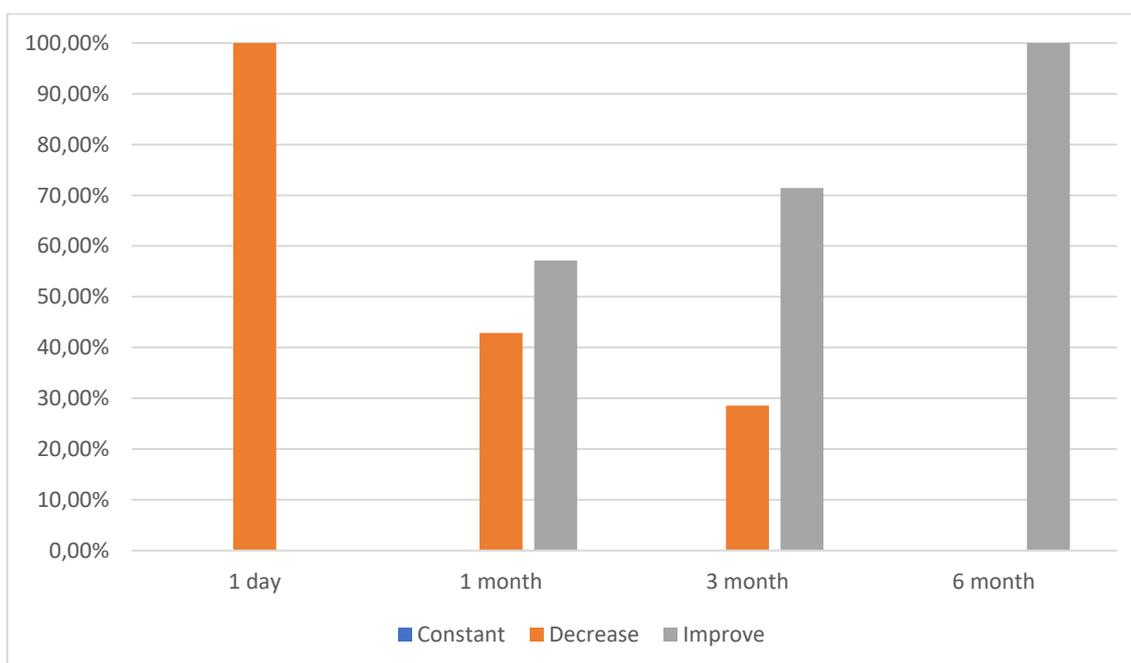


Figure 1. Percentage of best corrected visual acuity in all closure cases following 1 – 6 months follow up period

The decrease in visual acuity occurred 1 day after the vitrectomy with ILM peeling in the all of closure cases (100%). Improvement of visual acuity seen at the 3rd and 6th months in 71.43% and 100% of cases, respectively. In addition, based from the preoperative OCT, the finding of Mean Macular Hole Index (MHI) of the entire 16 patients were 0.43

DISCUSSION

In this study, the number of female patients more than men. These results are consistent with several studies that there are more women than men.^{2, 7-8} and even the ratio of women to men can reach 2 to 1.⁸ It is still unclear what causes this gender difference.

Most age groups were found at age 61-70 years (46%) with a median age of 60.43 years in this study. This corresponds to many studies that MH is more common in elderly, estimated as the age of occurrence of posterior vitreous detachment.^{2, 6-12}

Secondary MH can be associated with other eye disorders, such as abnormal vitreous adhesions and inflammation in certain areas, retinal bleeding, retinal artery occlusion, retinopathy, which all of mentioned before can be related to hypertension or diabetes.^{8-9,13}

In this study only 3 (18.75%) of the total of 16 patients who had cataract surgery with a pseudophakic lens, while the other patients had never been operated on. Several studies reported a history of eye surgery can also be associated with secondary MH.^{8-9,13}

There is a pattern of visual acuity in most cases of MH. A drastic decreased in visual acuity occurred initially on day 1 after the surgery followed by an increased in visual acuity in month 1, month 3, and it increased until finally stabilized in month 6. It turned out that the highest group of visual acuity at 6 months postoperatively was not different from the preoperative visual acuity. This pattern corresponds to existing research that the surface architecture of the macula improves significantly in the majority of patients, although a decrease in visual acuity occurs in the short term after the surgery is often encountered.¹¹

Several studies in the last 5 years reported successful closure of MH with surgery ranging from 91-98% 25-28 with a median postoperative VA (on successful closure of MH) was around 20/40 or 6/12.²⁵⁻³¹ A lower success rate is documented in this

study at 43.8% however there was an increased in VA in all of cases at 6-months postoperatively with closure result. Post-operative anatomical success is followed by better visual acuity.¹⁴⁻²⁰ Meanwhile, unsuccessful closure of MH were recorded at 56.2% in this study. There are several factors that might be of influence of this result, according to Jaycock et al, the latency between hole onset until surgery, the anatomical hole and stage of the MH, and preoperative VA are an important factor to unsuccessful closure.

Surgical intervention at stage 3 and 4 MH also had its effect on the outcome of the vitrectomy, Jaycock et al, reported anatomical closure rates for holes of up to 4 months preoperative latency of 82.5% and found closure rates of 77.8% and 63.6% respectively. In addition, for the functional success, holes that present for 4-6 months and 6-12 months they found that the percentage of patients with a postoperative VA of 6/12 or better in these three groups were 33.3%, 29.6% and 18.2%. Jaycock et al also reports that the closure rate for macular holes of less than 6 months duration was 95.2%, and for those from 6 – 12 months duration and greater than 1 year was 91.7% and 47.4% respectively. This shows that patient's waiting time from diagnosis to surgical intervention is an important factor for the anatomical success of MH closure. This trend is also consistent with Tsipursky et al in which their findings are preoperative MH duration which had < 3-month duration had better closure rates than the ≥ 3-month group. This findings are in line with the result of this study which found that those who waits ≤ 6 months had better outcome than ≥ 6 months at 68.8% and 31.2% respectively. Furthermore, according to Venkatesh et al³², they stated that the Macular Hole Index (MHI) are also an important factor that can predict the anatomical closure of MH. We found that the mean MHI of these 16 patients were 0.43 which predicts poor anatomical closure outcome even after vitrectomy.

Preoperative VA is also an important factor which can influence the anatomical and functional success of MH intervention, this is supported by Jaycock et al which reports patients with preoperative VA of 6/36 or better the closure rate was 91.2%, meanwhile those with preoperative VA of less than 6/36 snellen had a closure rate of 57.1%, and they reported successful functional achievement of 6/12 Snellen or better were 61.8% and 14.3% respectively.

Sustained postoperative face-down positioning effectiveness as a successive MH closing factor is still unclear, as Mitra et al conclude that sustained face-down position for postoperative position may not be necessary since 93% of eyes achieved hole closure with prone positioning for only 1 day, however the study did had 4 eyes that had unsuccessful closure in which 3 of the failure claimed that they did not position at all post-operatively.

The duration of onset under 6 months is one of the functional success factors, namely a better improvement in VA after the closure of MH.^{5, 21, 22} In MH that has occurred for more than 2-3 years, the reported success rate is lower (63%) and visual acuity is worse than early MH.^{21, 23-27} The statistical analysis of the relationship between visual acuity and duration of onset until the patient is operated is not possible to be done because of the small size of data. In addition to that there are several confounding factors that might affect the outcome, such as patient's compliance on face down posture after vitrectomy, and the operator's experience on the vitrectomy on MH might also add to the reasons why the low success rate on anatomical closure on this study.

From existing research, decreased metamorphopsia complaints are known to occur in 85% of patients and this can improve quality of life even though there is no increase in visual acuity.⁹

Retinal tamponade with air (for several days), SF6 gas (2-4 weeks), C3F8 (1-3 months) or silicone oil (for the long term) can be used at the end of MH surgery to help achieve anatomical closure on MH with not much different result.²⁴ In general, there is no consensus about the best selection for this tamponade.⁵

CONCLUSION

The success rate of closure of MH was 43.8%. There is a quite high increased in visual acuity after vitrectomy with ILM peeling in MH cases.

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