

Original Article

ANATOMICAL AND FUNCTIONAL RESULTS IN MACULAR HOLE SURGERY

Khalid Waheed, Nasrullah Khan, Saqib Siddique and Muhammad Tayyib

Objective: To assess the anatomical and functional results in macular hole surgery**Material & Methods:** This study was conducted in the department of ophthalmology, SIMS/ Services Hospital Lahore over a period of one year between July 2008 to July 2009. Eighteen eyes of eighteen patients were included in this study. Pars plana vitrectomy was done in all cases. Internal limiting membrane (ILM) staining with trypan blue or brilliant Perfluoropropane (C3F8) 14% was used in 17 cases and silicone oil was used in one case for internal tamponade. Patients were advised to posture in face down position for one week. All patients were followed-up for at least six months.**Results:** 18 eyes of 18 patients were operated. 15 (83.33%) patients had idiopathic while 3 (16.66%) had secondary macular holes. There were 17 (94.44%) phakic and 1 (5.55%) pseudophakic patients. In 5 (27.77%) ILM staining was done with brilliant peel while in 13 (72.22%) patients Trypan blue was used. For internal tamponade C3F8 was used in 17(94.44%) patients and in 1 (5.55%) silicone oil was used. Postoperatively, 100% macular hole closure was achieved in all cases with at least 6 month follow-up.**Conclusion:** Pars plana vitrectomy with ILM peeling is a very effective technique for the surgical closure of full thickness macular holes. This technique should be combined with post-operative head posturing for at least one week to expedite hole closure.**Keywords:** Macular hole, Pars plana vitrectomy, internal tamponade.**Introduction**

Full thickness macular holes are defects involving all layers of the retina from the internal limiting membrane through the outer segment of retinal photoreceptors. The vast majority of macular holes are idiopathic, and are predominantly seen in emmetropic patients in the sixth or seventh decades of life, more often in women at a ratio of 3:1.^{1,2} The prevalence of idiopathic macular holes has been estimated to be 3.3 per 1000.³ Other causes of macular holes include trauma, high myopia, cystoid macular edema, inflammation, solar retinopathy, vitreomacular traction syndrome, traction from epiretinal membranes and degenerative conditions of the retina.

Material & Methods

This prospective study was carried out in the Department of Ophthalmology, Services Hospital Lahore, over a period of one year between July 2008 to July 2009. Eighteen eyes of eighteen patients were included in this study. After admission, a detailed history and general, physical and ocular examination was carried out. Patient's age and gender with particular reference to any injury or surgery was recorded. All patients underwent routine examination including visual acuity testing, pupillary examination, and slit lamp biomicroscopy. Watzke-

Allen test was performed in every patient and then fundus photographs were taken. Pars plana vitrectomy was done in all cases. ILM staining with trypan blue or brilliant peel was carried out after air fluid exchange. ILM peeling was carried out with the help of MVR Blade (Micro Vitreo Retinal) and endgripping forceps. Perfluoropropane (C3F8) 14% was used in 17 cases and silicone oil was used in one case for internal tamponade. Patients were advised to posture in face down position for one week. All patients were followed-up for at least six months at the interval of one week, two weeks, one month, two months, and six months. On each follow up visit, detailed examination was performed which included fully corrected distance and near visual acuity and intraocular pressure. Anterior and posterior segments were evaluated for any postoperative complications. Patients data was analyzed using SPSS 10. Relative descriptive statistics, frequencies and percentages etc. were computed for presentation of visual outcome and complications postoperatively. Numeric variables like age, hospital stay were presented by mean \pm standard deviation. Marginal homogeneity test was applied with significance taken at $p < 0.05$.

Results

18 eyes of 18 patients were operated. There were 4 (22.22%) males and 14 (77.77%) female patients.

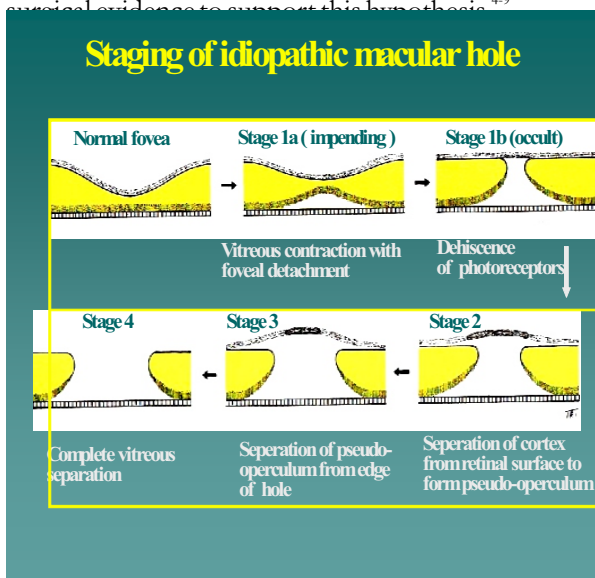
Male to female ratio was 1:3.5; the age of the patients ranged from 12 to 65 years. 15 (83.33%) patients had idiopathic while 3 (16.66%) had secondary macular hole. One patient had macular hole with retinal detachment (R.D). 14 (77.77%) patients had duration less than one year. There were 17 (94.44%) phakic and 1 (5.55%) pseudophakic patient. In 5 (27.77%) ILM staining was done with brilliant peel while in 13 (72.22%) patients Trypan blue was used. For internal tamponade C3F8 was used in 17 (94.44%) patients and in 1 (5.55%) silicone oil was used.

Table-1: Pre-op and post-op visual acuity.

Visual Acuity	Pre-Op	Post-Op	Follow Up
Counting Finger	10	2	2 Months
6/60-6/36	8	10	5 Weeks
6/36-6/24	-	3	1 Month
6/18-6/12	-	3	6 Months

Discussion

Idiopathic macular hole (MH) is a rare condition that affects mainly women in their seventh decade. It has been proposed that MH develops as a result of prefoveal cortical vitreous contraction, causing tangential forces that dehisce the neurosensory retina at the fovea.⁴ The role of surgery in macular hole repair has traditionally been considered to eliminate tangential surface traction at the vitreoretinal interface and there is clinical, OCT, and surgical evidence to support this hypothesis.⁴⁻⁹



Several studies have demonstrated benefit from ILM peeling during macular hole surgery.^{10,11} The

rationale for ILM removal includes the contractile myofibroblasts may proliferate along the ILM causing tangential traction, and their removal may facilitate hole closure by eliminating tangential traction. The process of ILM removal may induce reparative gliosis, facilitating hole closure.¹² ILM peeling was performed in all our cases. Peeling of the ILM may achieve successful hole closure with a shorter duration of face-down positioning.¹³

Anatomical closure occurred in 17 (94.44%) cases in our study. Sato and Isomae¹³ reported a 91% hole closure rate with ILM peeling, air tamponade, and 1-day prone positioning. Possible adverse effects from ILM removal may include petechial hemorrhages, retinal whitening, shearing injury to muller cell footplate,¹² transiently depressed focal macular electroretinogram, paracentral scotoma, & punctuate inner choroidopathy.¹⁴ Petechial haemorrhage occurred in 7 (38.88%) cases in our study. Peeling of the ILM is technically difficult without staining, because of the poor visibility of the ILM and its friable nature. Indocyanine gree (ICG), infracyanine gree, trypan blue and triamcinolone acetone¹⁵ have been used to improve the visibility of the ILM. Of these ICG has been used most extensively. It selectively stains the ILM providing excellent visualization.¹⁶ However; several reports suggested that ICG is toxic to retinal tissue in a dose and time dependent manner. Ho et al¹⁷ demonstrated cytotoxic effects of ICG on cultured human RPE cells. We used trypan blue and brilliant peel in our study. Brilliant peel excellently stained ILM. An improved hole closure rate has been observed with a long acting gas tamponade followed by face down positioning at least 90% of the time for 2 weeks. Isomae et al¹⁸ noted a 90.5% hole closure rate on prone positioning for holes of less than 6 months duration. We used 16% C3F8 in 17 (94.44%) cases with one week face down position and gained anatomical closure in all cases. Silicone oil may be used in selected patients who are unable to maintain face down position post-operatively.¹⁹ We used silicone oil in one patient who had macular hole with RD. Retinal breaks and retinal detachment (RD) are well known complications of pars plana vitrectomy. The incidence of retinal detachment following surgery for full thickness macular holes ranges from 1.1% to 14%.²⁰ No such complication occurred in our study. Late reopening of macular holes secondary to formation of ERMs (epiretinal membranes) has been reported.²¹

Brooks²² noted a 16% of reopening in stage 3 eyes without ILM peeling, but a 0% incidence in similar

eyes where the ILM had been removed. Kumagai et al also observed a reduction of the rate of reopening of macular holes from 7% without ILM peeling to 0.6% with ILM peeling. In our study reopening of macular hole did not occur in any case. Excellent anatomic and functional results can be expected in most patients with chronic holes. Stec et al²³ reported an 83% hole closure rate in holes of longer than 1 year's duration with vitrectomy, ILM peeling, and long acting gas tamponade.

Conclusion

Pars plana vitrectomy with ILM peeling has very

promising results for the surgical closure of full thickness macular holes. Use of vital dyes, Trypan blue for staining and visualization of the ILM is pivotal in successful and complete removal of ILM. This technique should be combined with post-operative head posturing for at least one week to expedite hole closure.

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