



Sub-foveal Choroidal Thickness in Primary Macular Hole- case Study of Lumhs, Jamshoro

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Primary macular hole is a defect in fovea and is a frequent cause of decrease vision and metamorphopsia. Primary macular Hole (PMH) was first time introduced by Johnson and Gass in 1988.

Aims and Objectives: This study aims to evaluate the sub-foveal choroidal thickness in primary macular hole.

Materials and Methods: This prospective and controlled study was done at Institute of Ophthalmology, Liaquat University of Medical & Health Sciences, Jamshoro for the period one year. Visual acuity was checked with Snellen Chart and ophthalmic examination was done with bio-microscopic slit lamp using 90 diopter (D) lens pre-operatively and post-operatively. Swept Source optical coherence tomography (SS-OCT) was used to confirm the diagnosis, outcome of PMH surgery, to measure choroidal thickness of both eyes preoperatively and postoperatively at the end 2nd month.

Results: From the selected patients, the average ages was 63 year, ranging between 46 to 80 years and from them 45 were females and 26 were males. 41 were right eye and 30 were left eye. PMH characteristics was used for the determination of duration of symptoms and minimum hole diameter, In 63 patients hole was closed and in 8 patients the hole was opened. The average duration of symptom was 5 months and Average minimum diameter was 320 μm and range was 139-650 μm among the patients with closed hole.

Conclusion: Sub-foveal CT was thinner in eyes with PMH as compared to fellow normal eye. But it was not related with anatomical results of PMH surgery. The sub-foveal CT reduced thickness is due to longer duration and larger minimum diameter of PMH.

Keywords: Sub-fovea; PMH; diopter (D) lens; Swept Source optical coherence tomography (SS-OCT).

1. INTRODUCTION

PMH is a defect in fovea and is a frequent cause of decrease vision and metamorphopsia. In 1988, Johnson and Gass were first ones to narrate about Primary macular Hole (PMH) [1,2]. Females and elderly population are frequently affected with incidence of 7.8-8.7 cases per 100,000 populations [3,4]. Primary macular hole was previously known as idiopathic macular hole. In which vitreomacular traction exerted anteroposteriorly and tangentially are responsible for its formation [5,6]. Since 1991, pars plana vitrectomy (PPV) (with induction of posterior vitreous detachment), internal limiting membrane (ILM) peeling with short or long-acting gas followed by face down positioning has been done successfully for treatment of PMH [7,8]. The main metabolic supply to fovea is from choroid. Choroidal blood supply to fovea is reduced secondary to loss of overlying retinal tissue, which is said to be controlling choroidal foveal blood flow [9-11]. Zhang et al. suggested that the foveal choroidal thickness is reduced in patients with macular hole (MH), which is marker for MH chronicity. Aras et al. suggested reduced choroidal blood flow to foveal area in patients with macular hole, which may affect the healing of MH thus affecting the closure of macular hole [12-14]. For choroidal imaging, swept source optical coherence tomography (SS-OCT) a novel modality is used, which has higher and better resolution and speed as compared to enhanced depth imaging-spectral domain optical coherence tomography (EDI SD OCT) [15-18]. The rationale for this study is that no such study was found in Pakistan on this topic after comprehensively searching for it and internationally few studies has been done on it. So, in this study we will try to find out any relation between choroidal thickness with characteristic of macular hole and success of macular hole surgery.

2. MATERIALS AND METHODS

This prospective and controlled study was done at Institute of Ophthalmology, Liaquat University of Medical & Health Sciences, Jamshoro for the

period of one year Total 71 patients were selected with similar type of ailment. For each patient, detailed history was taken, best corrected visual acuity was checked with Snellen Chart and ophthalmic examination was done with biomicroscopic slit lamp using 90 diopter (D) lens pre-operatively and post-operatively. Swept Source optical coherence tomography (SS-OCT) was used to confirm the diagnosis, outcome of PMH surgery, to measure choroidal thickness of both eyes preoperatively and postoperatively at the end 2nd month. We excluded those patients who have been operated for PMH previously or having history of PPV for any other retinal disease such as retinal detachment, persistent vitreous hemorrhage. We also excluded patients with secondary macular hole such as traumatic macular hole. All patients underwent pars plana vitrectomy with internal limiting membrane peeling with Sulphahexafluoride (Sf6) used as intraocular tamponade with face down positioning for 7 days. Data was analyzed using SPSS version 22.0, T-test was used to check significance with p-value less than 0.05 as significant.

3. RESULTS

71 eyes of 71 patients were included in our study. Average age was 63, ranging between 46 to 80. Out of 71 patients, 45 were females and 26 were males. Out of 71 eyes, 41 were right eye and 30 were left eye.

Table 1. Demographic survey

Age	Mean: 63 Range: 46-80
Gender	Male: 26 (36.6%) Female: 45 (63.4 %)
Laterality	Right Eye: 41 (57.7%) Left Eye: 30 (42.3%)

Duration of symptom and minimum hole diameter were determined and evaluated as PMH characteristics. Out of 71 patients, in 63 patients hole was closed and in 8 patients hole was not closed (Table 2).

Table 2. Characterization

No of patients	Hole Closed	Hole Open
71	63 (88.7%)	8 (11.3%)

Table 3. Hole closed

	Average	Range
Duration of symptoms (months)	5	3-8
Minimum diameter(μ)	320	139-650

Table 4. Symptom duration

	Average	Range
Duration of symptoms (months)	7	3-8
Minimum diameter(μ)	520	264-800

Table 5. Sub-Foveal CT

	Affected Eye	Fellow Eye	p-Value
PMH	207	254	<0.001
Hole Closed Sub-Foveal CT(mean)	214	250	<0.001
Hole Open Sub-Foveal CT (mean)	199	239	<0.001

The 63 patients, in which macular hole was closed, average duration of symptom was 5 months. Average minimum diameter was 320 μm and range was 139-650 μm. (Table 3).

The 8 patients, in which macular hole was not closed, average duration of symptom was 7 months. Average minimum diameter was 320 μm and range was 139-650 μm (Table 4).

Mean sub-foveal CT in affected was 207 μm and in fellow non affected eye, it was 254 μm. Mean sub-foveal CT in hole closed was 214 microns in affected as compared to fellow eye mean Sub-foveal CT was 250 microns. Mean sub-foveal CT in hole open was 199 microns in affected as compared to fellow eye mean Sub-foveal CT was 239 microns (Table 5).

4. DISCUSSION

Macular hole surgery is one of the vitreoretinal surgical procedure with excellent success rate. Different parameters have been evaluated over past decades to access the anatomical outcome. In our study, macular hole was closed in 88.7% of cases. Jatoi A. also reported closure rate of 87.5% [19]. Rizwi SF. also reported anatomical closure of 88% [20]. Modi A. also reported closure rate of 86.5%. Thus, the closure rate was similar to other studies [21]. In our study, Sub-foveal CT was decreased in eye with PMH i.e.,

207 μm as compared to normal fellow eye in which CT was 254 μm. Xu. Also reported decreased choroidal thickness in eyes with PMH [22]. Zeng J et al. reported decreased CT in eyes with PMH as compared to fellow normal eye. He reported CT of 206.82±67.09 μm in eyes with PMH as compared to fellow normal eye CT was 228.34±80.71 μm [23]. This supports our study, which yielded similar result of decreased CT in eyes with PMH i.e., 207 μm as compared normal fellow eye in which CT was 254 μm. Reibaldi M et al. suggested decreased sub-foveal CT in eyes with PMH (183.2 μm) as well as in fellow normal eye (196.6 μm), but it was more decreased in eyes with PMH [24]. In our study, we didn't find any relation between sub-foveal CT and closure of PMH. Duration and minimum hole diameter was related with macular hole closure. Sul S. also reported negative relation between macular hole closure and CT [11].

5. CONCLUSION

Sub-foveal CT was thinner in eyes with PMH as compared to fellow normal eye. But it was not related with anatomical results of PMH surgery. The sub-foveal CT reduced thickness is due to longer duration and larger minimum diameter of PMH. More studies, is needed to be done to find out relation between sub-foveal CT and macular hole.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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