



Original Article

Frequency of persistent sub-macular fluid after pars plana vitrectomy with gas in macula - off rhegmatogenous retinal detachment.

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ABSTRACT:

BACKGROUND: Rhegmatogenous Retinal Detachment (RRD) is a sight-threatening disease. Scleral Buckling (SB) and Pars Plana Vitrectomy (PPV) are the main stay of treatment for RRD. The choice of surgical procedure depends on duration and nature of RRD, patient's age, location of break and status of crystalline lens. Incomplete functional recovery is observed in some patients in terms of best corrected visual acuity as compared to clinically attached retina viewed by slit-lamp biomicroscopy. The reasons for this discrepancy was not well known before the invent of optical coherence tomography (OCT). Among many causes, one important cause is Persistent Sub-Macular Fluid (PSMF). Persistent sub-retinal fluid (PSRF) may be a source of vision loss following repair of rhegmatogenous retinal detachment (RRD). As PSMF has a benign course, this study will help in better patient's reassurance regarding visual recovery.

OBJECTIVE: The objective of this study is to see the frequency of persistent sub-macular fluid following PPV with gas in patients of macula off RRD. Study Design was prospective interventional. Place & duration of study was Department of Ophthalmology, Mayo Hospital Lahore, from 11-09-2016 to 10-01-2017 respectively.

MATERIALS & METHODS: Twenty patients of macula off RRD full filling the inclusion and exclusion criteria were selected. 23G PPV with isovolumetric C_3F_8 gas tamponade was performed in all cases by single surgeon. OCT was performed one month post operatively in all cases. Those who did not show PSMF were categorized in group A, while those who showed PSMF were categorized in group B. Repeat OCT was done on 2nd, 3rd and 4th months post operatively for group B only.

RESULTS: The mean age of cases was 48.60 ± 11.14 years. There were 12(60%) male and 8(40%) female cases. Right eye was operated in 11(55%) cases while 9(45%) cases had left eye operated. Only 2(10%) developed sub-macular fluid at 1st and 2nd month of procedure that was settled at 3rd months.

CONCLUSION: The persistent sub clinical sub macular fluid was eventually to be resolved with no effect on anatomical outcome.

KEYWORDS: Persistent Sub-macular Fluid, Pars Plana Vitrectomy, Optical Coherence Tomography.

INTRODUCTION:

Rhegmatogenous Retinal Detachment (RRD) is a sight-threatening disease. The disease occurs in approximately one out of 10,000 individuals every year and permanent severe visual loss may occur in untreated cases ultimately.^{1,2} It is defined as detachment of neurosensory retina (NSR) from retinal pigment epithelium (RPE) due to break (hole or tear) in NSR accompanied by liquefaction of vitreous³. If macula is also detached, it is known as macula-off RRD.

Now a days, Scleral Buckling (SB) and Pars Plana Vitrectomy (PPV) are the main stay of treatment for retinal detachment.^{1,3} The choice of surgical procedure depends on duration and nature of retinal detachment, patient's age, location of break and status of crystalline lens.^{4,5} Long acting gas tamponed (C_3F_8) is currently tamponed of choice in RRD of less duration with no clinical significant proliferative vitreo-retinopathy (PVR).

Around 90% of macula-on rhegmatogenous retinal detachments keep the same preoperative vision after surgery, while for macula-off detachments, incomplete functional recovery is observed in terms of best corrected visual acuity as compared to clinically attached retina viewed by slit-lamp biomicroscopy. The reasons for this discrepancy was not well known before the invent of optical coherence tomography (OCT).^{6,10,11}

The introduction of OCT has resulted in the identification of macular pathologies that can't be seen on clinical examination which are responsible for poor visual recovery. Among many causes, one important cause is Persistent Sub-Macular Fluid (PSMF). PSMF has been described on OCT in patients who have undergone otherwise successful retinal re-attachment surgery with closed breaks. The incidence of persistent sub-macular fluid eight weeks after PPV is about 19%.⁵ This fluid often can't be seen on slit-lamp clinical examination, nor can be detected by fundus fluorescein angiography (FFA).^{6,10,14}

Persistent sub-retinal fluid (PSRF) may be a source of vision loss following repair of rhegmatogenous retinal detachment (RRD).^{4,6,9,15} regardless of the preoperative status of the macula or the type of surgery used to repair the detachment. Benson and associates found the incidence and duration of PSMF after PPV and reported that PSMF transiently delay the visual recovery in otherwise clinically attached retinas but it does not affect final visual outcomes.^{8,16} Wolfersberger reported the time course of foveal reattachment after PPV and SB; however, the information on visual outcome was not reported.

Studies showed that sub-macular fluid may persists for more than six months after successful vitrectomy and sub-macular fluid is absorbed ultimately in all cases and there is no statistically significant effect on final visual outcome after its absorption.^{8,10,16} The study rationale is to find the frequency of

persistent sub-macular fluid after PPV with Gas in clinically attached retinas which is a definite cause of delay in early visual recovery in these patients. As PSMF has a benign course, this study will help in better patient's reassurance regarding visual recovery.

MATERIAL AND METHODS:

This prospective interventional study was conducted at vitreo retina clinic, Department of Ophthalmology, Mayo Hospital Lahore, from 09-09-2016 to 10-01-2017. Total 20 patients of macula off RRD were included in the study through simple randomized sampling technique. Inclusion criteria for selection of these patients was both genders with age 18 and above, patients who have macula off rhegmatogenous retinal detachment and clinically complete attached retina after pars plana vitrectomy with gas, patients who completed a follow-up examination as required postoperatively were included in the study. Patients who had retinal detachment with inferior break or multiple breaks, long standing RD with advanced proliferative vitreo-retinopathy or combined RD, those with a history of previous scleral buckling or pars plana vitrectomy, a trauma history and history of ocular surgery other than cataract surgery were excluded. Patients with giant retinal tears (GRT), age-related macular degeneration, macular hole, macular edema, epiretinal membrane, vitreo-macular traction, occlusive retinal vascular disease, uveitis and glaucoma were also excluded. Informed consent was taken. All surgeries were performed by a single experienced retinal surgeon. Surgical technique was 23G PPV with iso-volumetric C_3F_8 gas used as a tamponed. In all surgeries laser was applied to all brakes during vitrectomy under air. Indirect ophthalmoscopy with 78D and macular OCT was performed after one month post operatively. The eyes in which no sub macular fluid found on OCT were categorized in group A, while eyes which had sub macular fluid on OCT were categorized in group B. No further follow up was done for group A while for group B, indirect ophthalmoscopy with 78D and OCT were performed at second, third and fourth month post-operatively. Mean \pm SD was applied for quantitative data like age. Frequency and percentages were used for categorical data like gender, side of surgery and development of sub-macular fluid.

RESULTS:

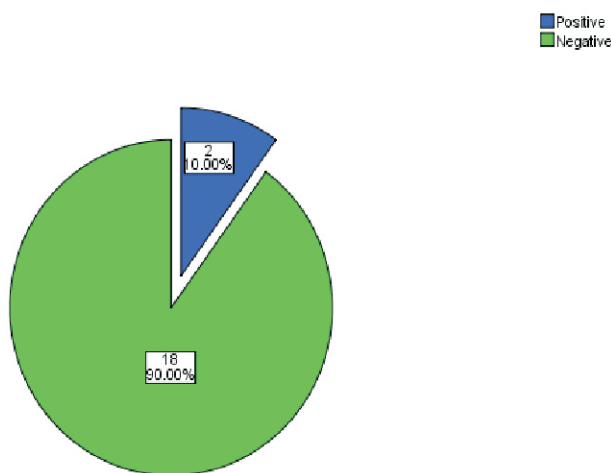
The mean age of cases was 48.60 ± 11.14 years with minimum and maximum age of 22 and 63 years (Table 1). There were 12(60%) male and 8(40%) female cases. Right eye was operated in 11(55%) cases while 9(45%) cases had left eye operated (Table 2). Only 2(10%) developed sub-macular fluid at 1st and 2nd month of procedure that was settled at 3rd months. The cases that developed sub-macular fluid at 1st and 2nd month were females having left side surgery with ages of 27 and 43 years (Figure 1).

Table 1: Descriptive statistics of age (Years)

Mean	48.6
S. D	11.142
Range	41
Minimum	22
Maximum	63

Table 2: Frequency distribution of gender and side of surgery

Gender	Frequency	Percent	Side	Frequency	Percent
Male	12	60	Right	11	55
Female	8	40	Left	9	45
Total	20	100	Total	20	100

Sub-macular fluid (at 1st and 2nd month)**Figure-1**
DISCUSSION:

Our study shows that the PSMF was removed in majority of cases within one month after PPV with gas in macula-off RRD and only 2 (10%) of 20 patients who underwent vitrectomy showed PSMF on OCT one month after surgery. This finding is comparable with that of other studies showing the rapid disappearance of SMF after PPV with gas.

Benson and associates reported that 15% of patients had persistent SMF at 6 weeks after PPV with gas (C_3F_8) in macula off RRD detected by OCT.¹⁶ Wolfersberger and his team carried the same study and reported that all patients who underwent PPV didn't show SMF one month after surgery.^{7,19}

Veckneer and associates carried a study on one hundred patients with macula off RRD. All patients had undergone PPV with gas. They observed sub macular fluid in 15 out of one hundred patients (15%) six weeks post operatively.⁹

Studies are carried out to see the effect of persistent sub macular fluid on final best corrected visual acuity (BCVA) and

whether the duration of RD or type of surgery (PPV or SB) will affect the absorption of PSMF. Yong Kyu and associates studied the absorption of PSM fluid in macula off RRD both after scleral buckling and PPV with gas. They found that sub macular fluid absorbs more rapidly in patients underwent vitrectomy than patients had scleral buckling.¹⁶

All studies results showed that PSMF was absorbed more rapidly in PPV group as compared with scleral buckling.^{5,9,16} One postulated mechanism is that in PPV most sub retinal fluid is removed with internal drainage and postoperative internal tapenade with gas facilitates the displacement of SMF from the macular area.^{6,19} Benson and associates also observed that SMF absorbed more rapidly and frequently in acute RRD as compared to sub-acute group in patients who underwent scleral buckling but no such difference was noted in patients who underwent PPV.^{3,8}

Tee and colleagues studied the persistence of SMF based on etiology. They observed sixty-one macula off RRD and divided them in two groups: tractional retinal tears (TRT) group and atrophic round holes and dialyses (RHD) group to investigate the incidence and duration of PSF. OCT was performed twelve weeks postoperatively. The Incidence and persistence of PSF was greater and longer respectively in the RHD group compared with TRT group.²⁰

Je Hyun Seo and associates studied the effect of persistent sub macular fluid on final visual out comes. They found that PSM fluid was absorbed in all cases in less than 12 month post operatively and no statistically significant effect on final VA.⁴

Se Woong and colleagues found SMF bleb in 11 (9.3%) of 118 cases of RRD who had successful scleral buckling and cryotherapy. These blebs were developed 8 weeks after SB. Indocyanine green angiography was done of these patients and revealed choroidal vascular congestion near blebs. These blebs disappear spontaneously within one year. He postulated that choroidal vascular changes resulting from cryotherapy may be associated with the bleb formation.^{4,17}

Trishna and associates observed the effect of immediate face down posture on PSMF after PPV and noticed that effect of face down posture did not influence the frequency or absorption rate of PSMF post-operatively.⁵

In summery all studies show that postoperative SRF persists and delayed visual recovery transiently, but did not influence final visual outcomes regardless of the type of surgery (PPV or SB) or duration of RD.^{9,13,17,21} Our study is limited to observe the frequency of PSMF only in macula off RD after PPV with gas; further study is needed to see the effects of PSMF on final BCVA post operatively.

CONCLUSION:

The authors conclude that sub clinical sub macular fluid may persist eventually to be resolved with no effect on anatomical outcome. However, the sample size in this single center study

was small and the authors recommend multicenter trial with large sample size to know more about the post vitrectomy sub retinal fluid and its effect on visual and anatomical outcome.

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