

## Outcome of pars plana vitrectomy with silicon oil versus scleral buckling in primary retinal reattachment surgery

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### ABSTRACT

**Objective:** To evaluate the outcome of primary pars plana vitrectomy with silicon oil tamponade versus scleral buckling procedure as a treatment for rhegmatogenous retinal detachment.

**Methodology:** This prospective, comparative, interventional study was conducted from July 2008 to June 2009. Patients were selected and divided into two groups. Pars plana vitrectomy (group I) or scleral buckling (group II) was performed as primary procedure. Patients were followed for 06 months after surgery.

**Results:** Anatomical outcome in pars plana vitrectomy procedure was 96.2% as compared to scleral buckling procedure 87.0%. Functional outcome in pars planavitrectomy, best corrected visual acuity of 6/6 - 6/18 was attained in 34.6%, in sclera buckling procedure 65.2% at 06 months.

**Conclusion:** Anatomical outcome in pars plana vitrectomy is better as compared to scleral buckling. Visual outcome and visual rehabilitation is earlier and better in scleral buckling as compared to pars plana vitrectomy.

**KEY WORDS:** Pars Plana Vitrectomy, Proliferative Vitreoretinopathy, Scleral Buckling Procedure.

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### INTRODUCTION

Rhegmatogenous retinal detachment (RRD) is the disease which leads to decrease in visual acuity. It can also cause blindness if not treated promptly.<sup>1</sup> RRD incidence demonstrates significant

geographical variation and its incidence have been reported to be between 6.3-17.9 per 100,000 populations.<sup>2</sup> There are ocular and systemic disorders which cause pathological vitreous liquefaction, premature vitreous detachment and extensive sites of vitreoretinal attachment leading to RRD.<sup>3</sup>

There is still debate going on about the choice of RRD surgery i.e. scleral buckling (SB) and pars planavitrectomy (PPV). One major factor that determines the outcome of the surgery is the choice of operating method. In recent years, there is a shift in the choice of method, towards pars plana vitrectomy.<sup>4</sup> Many studies have shown advantages of PPV over SB because of improved localization of breaks, elimination of vitreous traction and removal of the vitreous a factor inciting proliferative vitreo-retinopathy (PVR).<sup>5,6</sup> But definite advantage of PPV over SB has never been proven. Still SB is the most popular method in many centres, even in more complicated types of RRD.<sup>7</sup> Therefore, over

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the past 20 years patients with comparable RRD have been and are still being treated with different surgical methods.<sup>4</sup>

Our study was designed to compare the anatomical and functional outcome between PPV and SB in a tertiary eye care center at Karachi, Pakistan.

## METHODOLOGY

This study was approved by institution review board of Isra Postgraduate Institute of Ophthalmology. Inclusion criteria was rhegmatogenous retinal detachment up-to PVR grade B<sup>8</sup> in either phakic or pseudophakic eye. Exclusion criteria were rhegmatogenous retinal detachment of PVR grade C and above, corneal opacity and trauma to the eye in past 6 months.

Patients were screened in the out-patient department and referred to the retina clinic where detailed history was taken. Visual acuity was examined by using Snellens' acuity chart. Anterior segment examination was carried out with slit lamp, intraocular pressure (IOP) was checked with Goldman-nappplanation tonometer. After pupillary dilatation fundus examination was carried out with 90 dioptre (D) lens. Peripheral retinal evaluation was performed using indirect ophthalmoscope with indentation and triple-mirror contact lens. Patients were briefed about the procedure and written consent was taken. Three vitreo-retinal surgeons, each having more than four years of experience, performed the surgeries. The choice of retinal re-attachment procedure was left to the surgeon. All the data were recorded in pre-designed proforma. Subjects were divided into two groups i.e pars planavitrectomy (PPV; group I) and scleral buckling (SB; group II).

### *Surgical Technique:*

**Scleral buckling:** Conventional techniques were used, localized or 360 limbalperitomy was performed depending upon the number of tears. Circumferential buckle (silicon tire no.279) or radial buckle (no.505) was used depending upon the indication. In addition 360° encirclement band (no.240) was also used where indicated. Cryotherapy was done at the margin of break. Sub-retinal fluid (SRF) drainage was performed where indicated.

**Primary Vitrectomy:** Three ports pars plana vitrectomy was performed with the binocular indirect ophthalmomicroscope (BIOM) lens. Central and peripheral vitrectomy was performed; margins of tear were refreshed with the cutter, followed by endocautery at tear margins. Retina was flattened with either perfluorocarbon liquid (PFCL) or by air. Two to three rows of endolaser

using double frequency Nd:Yag (Neodymium; yttrium aluminium garnet) laser was performed around all the breaks and around the retinotomy site. Finally, air or PFCL was exchanged with silicon oil 5000cs (centistokes). Ports were closed with 6/0 polyglactin (Vicryl) suture.

All patients were followed on one week, one month, three months and six months. At each follow-up, anatomical and functional outcomes were recorded. Readings from 01, 03, 06 months were included for analysis in this study. Any complication like raised IOP, cataract, macular pucker was also recorded. Success of RRD surgery was defined as fully attached retina during 06 months follow up period and improvement in best corrected visual acuity of one line or more on Snellens' acuity chart. An eye in which more than one procedure was required to attach the retina was labelled as failed RRD surgery.

All recorded data was entered in SPSS. All entries were cross checked. Data was analyzed by first performing descriptive statistics by groups. Sample size was not enough to perform advanced statistical methods, however non-parametric tests were applied to dichotomous variables for comparison of PPV versus SB.

## RESULTS

A total of forty nine eyes of 49 patients were included in the study. Male predominance was seen

Table-I: Descriptive analysis of PPV versus SB group

Variable	PPV (n = 26) (GROUP I)	SB (n = 23) (GROUP II)
<i>Sex</i>		
M	20(76.9%)	16(69.6%)
F	06(23.1%)	07(30.4%)
Median Age	45 (Range: 18-70 years)	39 (Range: 15-65 years)
Duration (days)	16.3±9.3	10.9±6.1
<i>Quadrant</i>		
01	00	03(13%)
02	08(30.8%)	11(47.8%)
03	09(34.6%)	09(39.1%)
04	09(34.6%)	00
<i>PVR</i>		
A	08(30.8%)	07(30.4%)
B	18(69.2%)	16(69.6%)
<i>Macula</i>		
On	01 (3.8%)	08 (34.7%)
Off	25 (96.1%)	15 (65.2%)
<i>Status of Lens</i>		
Pseudophakia	08 (30.7%)	05 (21.7%)
Lenticularchanges	08 (30.7%)	04 (17.4%)
Transparent	10 (38.4%)	14 (60.9%)

Table-II: Anatomical outcome at 06 months follow-up PPV versus SB group.

	PPV (n = 26) (GROUP I)	SB (n = 23) (GROUP II)
Anatomical success	25 (96.2%)	20 (87%)
Anatomical failure	01 (3.8%)	03 (13%)
Outcome (Anatomical and functional success)	25 (96.2%)	19 (82.6%)

[P value.00005a]

Pars planavitrectomy (PPV), Scleral buckling (SB)  
aMcNemar test

in both groups. Three patients in group I and two patients in group II missed the follow-up after 03 months. Descriptive analysis are shown in Table-I. Anatomical outcome in group I was (96.2%) in comparison to group II (87.0%) at 06 months follow-up, as shown in Table-II. Functional outcome was earlier in group II in comparison to group I at 01, 03 and 06 months, as shown in Table-III, but we also found gradual progressive visual improvement in group I in comparison to group II (P value: 0.06 versus 0.43). Most common complication was raised IOP in both groups, cataract was more commonly seen in group I, other complications are summarized in Table-IV.

## DISCUSSION

RRD is the potential cause of blindness if not treated timely and properly. Thus RRD has become one of the common indications for vitreoretinal surgery.<sup>9</sup>

In our study we have compared the two surgical methods for the treatment of RRD i.e PPV and SB. The pre-operative variable such as gender, age, quadrant of RRD, PVR, status of macula, status of lens and VA were compared between two groups. This study results showed that pre-operative extends of RRD, status of macula, status of lens and VA does affect the anatomical and functional outcome. In group I, there were more patients with pre-operative VA of 3/60 or less, more quadrants were involved and macula involving RRD were more, these may be the reason of poor functional outcome in group I. These variables were also reported in other studies<sup>10-13</sup> as the cause of poor visual outcome in RRD surgery. Ahmadi H<sup>14</sup> reported in his 06 months follow-up study that 12.8% eyes gained BCVA of 20/40 or better in scleral buckling group and in vitrectomy group 11.3% eyes achieved this level. In this study we have found out better anatomical outcome in group I as compared to group II. But one could argue that this better anatomical outcome might be due to presence of silicon oil which was

Table-III: Pre-operative and postoperative visual acuity 01, 03 and 06 months follow-up PPV versus SB group.

PPV (GROUP I)				
	Pre-operative VA	Post op VA 01Month	Post op VA 03Months	Post op VA 06Months
6/6 - 6/18	00	04 (15.4%)	08 (30.8%)	09 (34.6%)
6/24 - 5/60	02 (7.7%)	12 (46.2%)	11 (42.3%)	11 (42.3%)
3/60 - 1/60	10 (38.5%)	10 (38.5%)	04 (15.4%)	03 (11.5%)
PL-HM	14 (53.8%)		03 (11.5%)	03 (11.5%)
Missed follow-up	-			
SB (GROUP II)				
	Pre-operative VA	Post op VA 01Month	Post op VA 03Months	Post op VA 06Months
6/6 - 6/18	06 (26.1%)	14 (60.9%)	15 (65.2%)	15 (65.2%)
6/24 - 5/60	04 (17.4%)	03 (13%)	02 (8.7%)	03 (13%)
3/60 - 1/60	06 (26.1%)	05 (21.7%)	05 (21.7%)	03 (13%)
PL-HM	07 (30.4%)	1 (4.1%)	0	0
Missed follow-up	-		01 (4.1%)	02 (8.2%)

Scleral buckling (SB), Visual acuity (VA), Perception light (PL), Hand movement (HM)

present in all eye in group I at the end of 06 months study. Studies<sup>15,16</sup> published in literature have also reported difference in anatomical outcome between pars plana vitrectomy and scleral buckling (90.9% vs 80.0% and 84.0% vs 76.0%).

In this study we have found raised IOP as one of the commonest complication in group I. This raised IOP was also one of the commonest complications reported in other studies.<sup>17,18</sup> Cataract is also commonly seen in our study in group I. This complication has been reported in literature<sup>19,20</sup> as one of the most common complication, because of silicone oil. Secondary glaucoma and cataract were seen commonly in PPV and to manage these complications patient has to follow-up more frequently, if additional surgery will be needed, there will be added risk such as loss of accommodation if cataract extraction has to be done and added cost of cataract surgery. All these common complication could not be neglected in choosing the surgical method in RRD surgery.

Table-IV: Complications PPV and SB group.

Sr. no.	Complication	PPV (GROUP I)	SB (GROUP II)
1.	Raised IOP	14 (60.8%)	05 (22.7%)
2.	Cataract	06 (26.0%)	01 (4.5%)
3.	Macular pucker	04 (17.3%)	03 (13.0%)
4.	Re-detachment	01 (3.8%)	03 (13.0%)
5.	Sub-retinal vitreous haemorrhage	00	02 (9.0%)
6.	Choroidal detachment	00	01 (4.5%)
7.	Missed break	00	01 (4.5%)

Pars planavitrectomy (PPV), Scleral buckling (SB)

Macular pucker was also observed in both groups, this complication was also reported in literature<sup>21,22</sup> and depends upon the extent of RRD and involvement of the macula. In our study we have observed that extensive RRD and involvement of macula were more in group I.

Re-detachment in our study were more in group II and this detachment was more in pseudophakic eye, in literature<sup>5,6,23</sup> it is mentioned that incidence of re-detachment was higher in pseudophakic RRD if treated with SB as compared to PPV, because of the reason that in pseudophakic eye pupil sometimes failed to dilate, cortical remnant around the IOL (intra-ocular lens) and posterior capsular opacification may lead to missed break. This is one of the advantages of PPV to manage pseudophakic RRD. In the literature<sup>15,16</sup> re-detachment rate after primary re-attachment surgery was 20% and 24% eyes in SB and 9.1% and 16% eyes in PPV respectively.

Sub-retinal hemorrhage was experienced in group II. This complication was also reported by Abdullah AS<sup>24</sup> in scleral buckling group in his study. Choroidal detachment was also experienced in group II. This complication is reported to be one of the commonest complications seen in scleral buckling procedure in pseudophakic eyes<sup>25</sup>, but seen very rarely in PPV.<sup>5</sup> This is another reasons why PPV is becoming method of choice in RRD.

We found certain limitations in our study. Sample size of our study was small and the duration of follow-up was also short; hence a study with much larger sample size with follow up of longer duration will be needed to confirm these finding.

## CONCLUSION

Anatomical outcome in pars planavitrectomy (group I) was better as compared to scleral buckling (group II). Visual outcome and visual rehabilitation was earlier in scleral buckling (group II) as compared to pars planavitrectomy (group I).

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