

# Visual and Surgical Outcomes in Late Presentation of Retinal Detachment

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## ABSTRACT

**Purpose:** To evaluate the frequency of treatment success in terms of visual and surgical outcomes in patients with late presentation of retinal detachment.

**Study Design:** Quasi experimental.

**Place and Duration of Study:** Sindh institute of Ophthalmology and visual Sciences from June 2022 to January 2023.

**Methods:** A total of 50 eyes of 50 patients with delayed presentation of retinal detachment who underwent Pars Plana Vitrectomy (PPV) were included and followed up for 6 months. Pre and post-surgery Best Corrected Visual Acuity (BCVA) and anatomical attachment of retina were comprehensively analyzed. Factors affecting anatomical success were also studied.

**Results:** Mean age of patients was 47±18 years. Twenty seven patients were (54%) were more than 45 years of age and 32(64%) were males. Thirty eight (76%) patients achieved successful anatomical attachment of retina at 6<sup>th</sup> month follow-up. Post-operative BCVA also showed improvement in vision. Risk factors identified for poor anatomical and visual outcome following PPV for retinal detachment are; PVR advance stage, longer duration of visual symptoms and poor-presenting BCVA. Age, sex, laterality, Pre-operative BCVA, lens status, diagnosis, and type of surgery showed insignificant associations (P >0.05).

**Conclusion:** Anatomical failure and poor functional outcomes appear to be mostly caused by PVR. PVR, longer duration of visual symptoms and poor-presenting VA are risk factors for poor anatomical and visual outcome following PPV surgery for RD. Late presentations to clinics can decrease with mass awareness. The frequency of proliferative vitreoretinopathy would decline, and visual results would be improved.

**Key Words:** Retinal detachment, Pars Plana Vitrectomy, Vitrectomy, Best corrected visual acuity.

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## INTRODUCTION

Retinal detachment (RD) is a significant contributor to vision loss and with early intervention more than 80% of retinal detachment cases can be successfully treated with positive visual outcomes.<sup>1</sup> Contrarily, late presentation of retinal detachment has often been

reported in low-income countries and associated with non-affordability, lack of access to healthcare, and awareness.<sup>1</sup> The incidence of RD is 13:100,000 person/ year and males are more likely to develop the condition than females.<sup>2-4</sup>

Rhegmatogenous RD is a surgical emergency of the eye and a common, vision threatening ophthalmic condition. Lattice degeneration, trauma, and intraocular surgical procedure are causative factors of RD.<sup>5-7</sup> The delayed presentation results in lower baseline vision and worse long-term visual and anatomic outcomes.<sup>8,9</sup> RD treatment generally requires immediate surgical intervention and is frequently

compounded by atrophic retinal and vitreous alterations. Options for repair include PPV, Lensectomy, air-fluid exchange, endolaser, scleral buckle(SB), and long-acting gas or silicone oil tamponade.<sup>9</sup>

Primary PPV approach allows for a direct attack on the etiology of retinal detachment by releasing vitreo-retinal traction internally and by allowing a slight but effective intraocular tamponade. Additionally, the non-physiological deformation of the globe and motility issues brought on by the scleral buckling treatment is reduced by this method. Postoperatively, vitrectomized eyes without a scleral buckle experience far less pain and conjunctival or lid edema.<sup>10</sup> To choose the best surgical procedure the considerable factors are the number, location, and size of retinal breaks, as well as the presence of PVR. Other considerations include the patient's ability to posture in a way that will allow for the best positioning of intraocular tamponade agents, the condition of the lens, the surgeon's preferences and experience, and other factors. If PVR is present prior to surgery, the success rate drops, making it the most reliable predictor of primary surgical failure.<sup>11</sup>

PPV is a widely used option for treating various types of RDs both nationally and internationally. In comparison to the previous decade, "recent developments, advancements in mechanical and technical disciplines, such as the use of perfluorocarbon liquids, high speed cutters, wide angle viewing systems, and micro incision vitrectomy systems", improved visibility and reduced complications.<sup>12</sup> The postoperative BCVA and the rate of retinal re-attachment are typically used to describe the output of vitreoretinal surgery. If retina stays attached for at least six months following the last surgery it is considered as anatomic success.<sup>13</sup>

RD is an acute ophthalmic emergency and time of presentation affects the visual prognosis. Relatively poor visual acuity (VA) and surgical outcomes are related to both delayed presentation and delayed surgical intervention. We examined prospective functional and anatomical outcomes of the patients who required primary PPV surgery for the treatment of RD related to a variety of pathologies.

## METHODS

The study was carried out from June 2022 to January 2023. The research included a total of 50 patients (50

eyes) with primary RD who were hospitalized within the specified period and operated with PPV alone or PPV plus Phacoemulsification. Patients with primary RD who were 18 years old or above and of either gender were included. Patients with fresh RD, PVR-causing folded retina, macular or more posterior breaks, giant retinal tears, previously unsuccessful scleral buckling procedures, other retinal pathology underlying RD or potentially affecting macular function, and eyes with prior major retinal interventions (buckling procedure, PPV, pneumatic retinopexy) were excluded. A senior consultant comprehensively assessed each patient, and experienced vitreoretinal surgeons performed surgery. The type of RD and associated factors, such as diagnosis, were evaluated using a slit lamp and a dilated fundus examination. Patients were informed and given their verbal/written consent before data collection started. The institutional research and ethics committee gave its approval for conducting this study. Using a non-contact wide-angle viewing system (BIOM®; Oculus GmbH, Wetzlar, Germany), perfluorocarbon (PFC) if necessary, external cryopexy and/or endolaser, fluid-air exchange, with air, gas (SF<sub>6</sub>, C<sub>3</sub>F<sub>8</sub> or C<sub>2</sub>F<sub>6</sub>) or silicone oil 1000cS or 5000cS as tamponade, was component of the pars plana vitrectomy (PPV) procedure.

In a pre-design proforma, detailed history of each patient was recorded. All patients were examined for extent of detachment, macular state, PVR staging, location, and diagnosis, along with any other relevant information such as lens status. The classification of lens status comprised clear, cataractous, pseudophakia, and aphakia and the Retina Society Terminology Committee's categorization was utilized to stage PVR.<sup>14</sup> The Snellen chart was used to assess the BCVA before and after surgery. According to the World Health Organization categorization of visual handicap, the patients were divided into four groups: mild: 6/12—6/18, moderate: 6/18—6/60, severe: 6/60—3/60, and blindness (6/60, Counting Finger, Hand Movement and Perception of light). The final anatomical and functional outcomes were measured at the 6-month follow-up visit.

Sample size was calculated by using Open Epi sample size calculator. Taking statistics of Treatment success (no re-detachment) as 89%<sup>15</sup> at margin of error of 9% and confidence interval of 95%. All the cases were included through non-probability consecutive sampling technique.

Data was analyzed by using SPSS version 24. Descriptive statistics were reported as mean ± SD and frequency and percentages. Association between outcome of the study and other associated variables were observed by using Chi-square test. P-value <0.05 was considered as significant.

## RESULTS

In this study of 50 patients (50 eyes) with Retinal detachment mean age was 47.04±18.05 years. There was no difference between male and female participants according to age (mean age of male was 46.81±17.9 years and females was 47.44±18.79 years). Table 1 shows demographic, clinical and treatment outcome data.

Comparison of BCVA showed that patients who had VA at HM improved except 2(8.7%). Patient PL improved as well, patients who were only able to count fingers at base line also showed improvement in their visions (Table 2).

Patients were assessed for final outcome (Retinal re-detachment/Success) at 6 month post operative follow-up. PVR stage showed significant association with Retinal re-detachment. PVR-Chad higher frequency of treatment failure as compared to PVR-B (P= 0.047). Age, sex, laterality, Pre-operative VA, lens status, diagnosis, and type of surgery showed insignificant associations (P>0.05) (Table 3).

## DISCUSSION

In this research the anatomical success was 76%, which is in the range reported in literature (53-81%).<sup>1</sup> In a study by Anguita R. et al., mean duration of visual loss was 12.7±21.3 weeks and the overall primary success rate was 69%. The baseline BCVA was 20/500, and at the last follow-up was 20/160 which

**Table 1:** Patients demographic characteristics, clinical and treatment status and outcome.

Study Variables	Frequency (%)
<b>Age</b>	45 or less 23(46%)
<b>Groups (in years)</b>	More than 45 27(54%)
<b>Symptoms</b>	Less than 1 month 27(54%)
<b>Duration (in months)</b>	1-3 months 16(32%)
	More than 3 months 7(14%)
<b>Sex</b>	Female 18(36%)
	Male 32(64%)
<b>Eye</b>	Left 21(42%)
	Right 29(58%)
<b>Before V.A</b>	1/60 5(10%)
	2/60 5(10%)
	3/60 2(4%)
	6/36 2(4%)
	6/60 2(4%)
	CF 5(10%)
	HM 23(46%)
	PL 6(12%)
<b>After V.A</b>	1/60 5(10%)
	2/60 4(8%)
	6/12 1(2%)
	6/18 2(4%)
	6/24 3(6%)
	6/36 13(26%)
	6/60 7(14%)
	CF 12(24%)
	HM 3(6%)
<b>Lens status</b>	phakic 20(40%)
	Pseudophakia 30(60%)
<b>Diagnosis</b>	Bullous RD 2(4%)
	Inferior Bullous RD 15(30%)
	Subtotal RD 2(4%)
	Superior bullous RD 2(4%)
	Temporal RD 1(2%)
	Total RD 28(56%)
<b>PVR Stage</b>	PVR-B 25(50%)
	PVR-C 25(50%)
<b>Surgery</b>	Phacoemulsification& PPV 17(34%)
	Pars planavitrectomy (PPV) 33(66%)
<b>Outcomes</b>	<b>Retina Flat (Success)</b> 38(76%)
	<b>Retina Re-detached</b> 12(24%)
<b>Total</b>	<b>50(100%)</b>

**Table 2:** Comparison between Pre versus Post Surgery Visual Acuity of RD Patients.

Visual Acuity	Post-Surgery									Total
	1/60	2/60	6/12	6/18	6/24	6/36	6/60	CF	HM+	
1/60	1(20%)	1(20%)	0(0%)	1(20%)	0(0%)	1(20%)	1(20%)	0(0%)	0(0%)	5(100%)
2/60	1(20%)	0(0%)	0(0%)	0(0%)	0(0%)	3(60%)	1(20%)	0(0%)	0(0%)	5(100%)
3/60	1(50%)	0(0%)	0(0%)	0(0%)	1(50%)	0(0%)	0(0%)	0(0%)	0(0%)	2(100%)
<b>Before Surgery</b>	6/36	0(0%)	0(0%)	0(0%)	1(50%)	1(50%)	0(0%)	0(0%)	0(0%)	2(100%)
	6/60	0(0%)	0(0%)	1(40%)	0(0%)	0(0%)	1(50%)	0(0%)	0(0%)	2(100%)
	CF	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)	2(40%)	1(20%)	2(40%)	5(100%)
	HM	2(8.7%)	3(13%)	0(0%)	0(0%)	1(4.3%)	6(26.1%)	3(13%)	6(26.1%)	23(100%)
	PL	0(0%)	0(0%)	0(0%)	1(16.7%)	0(0%)	0(0%)	0(0%)	4(66.7%)	6(100%)
<b>Total</b>		5(10%)	4(8%)	1(2%)	2(4%)	3(6%)	13(26%)	7(14%)	12(24%)	50(100%)
P-value	0.041(Significant)									
CF = Counting Finger, HM = Hand Movement PL = Perception of light.										

**Table 3:** Association of Post-Surgery outcome (Retina Re-detachment) with associated factors.

Associated Factors	Retina Re-detached		Total	P-values	
	Yes	No			
Age groups	45 or less	6(26.1%)	17(73.9%)	23(100%)	0.75
	More than 45	6(22.2%)	21(77.8%)	27(100%)	
Duration	Less than 1 month	3(11.1%)	24(88.9%)	27(100%)	0.066
	1-3 months	6(37.5%)	10(62.5%)	16(100%)	
	More than 3 months	3(42.9%)	4(57.1%)	7(100%)	
Sex	Female	5(27.8%)	13(72.2%)	18(100%)	0.639
	Male	7(21.8%)	25(78.1%)	32(100%)	
Eye	Left	4(19%)	17(81%)	21(100%)	0.485
	Right	8(27.6%)	21(72.4%)	29(100%)	
Before V.A	1/60	1(20%)	4(80%)	5(100%)	0.532
	2/60	1(20%)	4(80%)	5(100%)	
	3/60	1(50%)	1(50%)	2(100%)	
	6/36	1(50%)	1(50%)	2(100%)	
	6/60	0(0%)	2(100%)	2(100%)	
	CF	0(0%)	5(100%)	5(100%)	
	HM	5(21.7%)	18(78.3%)	23(100%)	
	PL	3(50%)	3(50%)	6(100%)	
Lens status	Phakic	4(20%)	16(80%)	20(100%)	0.589
	Pseudophakia	8(26.7%)	22(73.3%)	30(100%)	
	Bullous RD	0(0%)	2(100%)	2(100%)	
	Inferior Bullous RD	3(20%)	12(80%)	15(100%)	
Diagnosis	Subtotal RD	1(50%)	1(50%)	2(100%)	0.735
	Superior bullous RD	0(0%)	2(100%)	2(100%)	
	Temporal RD	0(0%)	1(100%)	1(100%)	
	Total RD	8(28.6%)	20(71.4%)	28(100%)	
PVR Stage	PVR-B	3(12%)	22(88%)	25(100%)	0.047(Sig.)
	PVR-C	9(36%)	16(64%)	25(100%)	
Surgery	Phacoemulsification & PPV	4(23.5%)	13(76.5%)	17(100%)	0.955
	Pars plana vitrectomy (PPV)	8(24.2%)	25(75.8%)	33(100%)	

Chi-square test applied. Significance level set at 0.05

was significantly improved.<sup>16</sup> Furthermore, results of another study indicated that, PPV was a successful surgical intervention for RD in any studied group with or without PVR. The primary anatomical re-attachment rate for the retina was 89% reported by Awan MA et al.<sup>12</sup> Other international studies have reported similar success rate in the range of 81% (95% CI: 78%-83%).<sup>17,18</sup>

For improved visual outcomes, timely detection and management are crucial. Williamson et al, demonstrated that surgery performed at any time between initial 3 days following the beginning of symptoms resulted in equal visual outcomes. Surgery performed between days 4 & 6 resulted in poor visual outcomes.<sup>19</sup> Similar to this study, significantly improved BCVA was reported at postoperative six-month follow-up by other authors who emphasized the significance of RD surgery in time for a higher success rate and better vision.<sup>14,17</sup>

According to our study findings, patients older than 45 years were more likely to have retinal

detachments. Additionally, it was noted that percentage of males with RD was more than females. The cause may be men who are engaged in outdoor activities are more vulnerable to trauma.<sup>5</sup> There seem to be a trend in third-world countries towards delaying the presentation of retinal detachments to retina specialists health facilities. The most likely contributing factors are lack of knowledge and clinical resources. These patients' average presentation time was more than 3months. This much time significantly lowers the success rates surgeries.<sup>5,20</sup> In the current study duration of onset of symptoms till they reach at hospital facility was  $3.34 \pm 3.66$  months. Out of total, 46% patients presented after 1 month of visual symptoms and 54% presented for taking treatment within one month but none of the patients presented in 1<sup>st</sup> week of developing symptoms. Another study showed average interval between 1<sup>st</sup> symptoms and surgical intervention as 2 weeks.<sup>21</sup>

Advanced PVR stage was the main reason for treatment failure. In the remaining cases, no specific

cause for failure was identified. Post operative complications included cataract formation or progression in 16.2%, followed by elevated IOP in 12% cases and ERM in 8% patients.

Patients with PVR stage-B had better post operative outcomes as compared to PVR stage-C. Similar to current and existing research findings, It was demonstrated that the stated risk factors for the primary failure included extent of detachment and preoperative PVR.<sup>22</sup> Preoperative advance PVR increased the likelihood of immediate surgical failure by more than threefold.<sup>23</sup> The probability of surgical failure increased significantly by around 12% for each additional clock hour of detachment. The macula may separate as a result of delayed presentation. The visual result of macula-off retinal detachment is worse. Patients with RD are reported to appear late in undeveloped countries. Additionally, detachments in developing countries have a complex nature.<sup>23</sup>

Ignorance and unfamiliarity with the symptoms of RD is the main reason for delay in presentation. Therefore, a major focus to optimize functional success following RD surgery may be patient education.<sup>24</sup>

Strength of this study is the prospective design with consecutive cases, inclusion of complicated patients with PVR grade C, only patients who underwent PPV were included and an adequate six-month follow-up period. Limitation of study was small sample size, no control group and only a single center study.

## CONCLUSION

The findings of this study underscore the importance of accessible and cost-effective vitreoretinal therapies in countries like Pakistan, where resources are limited. With a high incidence of retinal detachment (RD) and a significant proportion resulting in poor anatomical and visual outcomes due to factors like proliferative vitreoretinopathy (PVR), there is a pressing need for interventions that are not only effective but also economically feasible. Moreover, the study highlights the significance of public awareness campaigns focusing on general eye health and strategies for preventing eye diseases. Educating the population about the importance of regular eye check-ups, early detection of symptoms, and timely intervention can potentially reduce the burden of RD and other vision-threatening conditions.

**Conflict of Interest:** Authors declared no conflict of interest.

**Ethical Approval:** The study was approved by the Institutional review board/Ethical review board (SCH-IRB-2022-04).

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Bibi Rafeen Talpur; Assistant Professor: *Concepts, Design, Data acquisition, Data analysis, Manuscript preparation, Manuscript editing, Manuscript review.*

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