

Profile and Risk Factor Analysis on Surgical Outcome of Rhegmatogenous Retinal Detachment

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Abstract

Objective	To find out age-sex distribution, the visual status at the time of presentation, the associated risk factors and the outcomes of the surgical treatment.
Materials and Methods	All sixty-five patients underwent preoperative detail fundus evaluation for the extent of detachment, status of macula, retinal breaks and holes, retinal degenerations, proliferative vitreoretinopathy. Of these forty three RRD patients underwent surgical treatment. Preoperative risk factors for anatomic failure of retinal reattachment were analyzed. Minimums of two months follow-up after the surgical procedure were included.
Results	<p>Of the sixty-five cases included in the study, the age ranged from 10-78 years. The mean age was 41.3 years (95% CI, 9.5-8.1) 68% were male and 32% females. The peak age groups were in the 11-20 and 51-60 year age group.</p> <p>45% of the cases presented within one month from the onset of symptoms. 78.5% of the cases had a presenting best corrected visual acuity (BCVA) of <3/60 while 7.7% had 6/18 and better BCVA.</p> <p>24.6% had trauma, 21.5% had history of previous cataract surgery, 20% had associated myopia and 71.4% of them were above the age of 51 years.</p> <p>Forty-three (66%) eyes underwent surgical treatment of these 41 eyes with scleral buckling surgery and 2 with vitrectomy and band buckle. Our primary surgical success rate was 85.7% and visual improvement was seen in 52.3% of the cases.</p>
Conclusion	The surgical outcome was good which was comparable to the other vitreoretinal centers.
Keywords	Rhegmatogenous Retinal Detachment, B.P. Koirala Lions Center for Ophthalmic Studies, Surgical outcome

Introduction

The Rhegmatogenous Retinal Detachment (RRD) is the separation of neurosensory retina from retinal pigment epithelium following a hole or tear in the inner neurosensory retinal layer. The vitreous fluid enters in the potential space between the two embryonic layers of retina. Any ocular or systemic condition related with pathological vitreous liquefaction, premature vitreous detachment and extensive sites of vitreoretinal adhesion are associated with increased chances of RRD. Some of these important entities include myopia, lattice degeneration, previous cataract surgery, Nd: YAG Laser posterior capsulotomy, blunt and penetrating ocular trauma.

The pioneering work of Jules Gonin in 1920s demonstrated that the RRD could be treated with a success rate of around 60%. The anatomic success rate of retinal detachment surgery continues to improve as new diagnostic and

surgical techniques are being developed. Most reports of large consecutive case series indicate that a primary success rate of 90% is now achievable, though 10-20% case requires more than one operation for retinal reattachment¹.

The incidence of RRD in the general population is approximately 1 in 10,000². In the United States, two recent studies estimated the annual incidence of RRD at approximately 12 per 100,000 population was estimated^{2,3}. In Kumamoto, Japan, an annual incidence of 10.4 RD per 100,000 population was estimated by Sasaki K³. Between 1993 and 1996, 1126 RRD operations were performed on Singapore residents⁴. The average annual incidence of RRD operations was 10.5 per 100,000 population. The annual incidence was highest for Chinese (age adjusted incidence, 11.6 per 100,000), followed by Malays (7.0 per 100,000) and lowest for Indians (3.9 per 100,000).

In Nepal there are tertiary eye hospitals in Kathmandu and regional eye hospitals in almost

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all zonal regions of the country. These hospitals provide good eye care services for most avoidable blinding conditions. The RRD cases are mostly referred to the tertiary eye hospitals. This study was conducted in one of the tertiary eye hospital. The aim of the study was to find out age-sex distribution, the visual status at the time of presentation, the associated risk factors and the outcomes of the surgical treatment.

Materials and Methods

In this prospective study, data were obtained from sixty-five consecutive patients diagnosed as rhegmatogenous retinal detachment (RRD) at B. P. Koirala Lions Center For Ophthalmic Studies, TUH during the period starting from 1st of January 2000 to 30th June 2001.

Verbal consent was taken from all the cases before including them in this study.

All patients underwent a detailed ocular and systemic examination. Visual acuity was assessed using the illuminated multiple optotype Snellen chart and the best-corrected visual acuity was recorded. The anterior and posterior segments of both the eyes were examined using the Haag Streit 900 slit lamp bio-microscope.

Fundus evaluation was done using direct ophthalmoscope, binocular indirect ophthalmoscopy using 20D-condensing lens with or without scleral depression and also by slitlamp funduscopy using 90D lens and Goldmann three-mirror contact lens. All the relevant fundus findings were documented on a fundus-drawing chart and colored according to a standard protocol.

Intraocular pressure (IOP) was measured with the applanation tonometer attached to the Haag Streit slitlamp biomicroscope. Retinoscopy of both the eyes was done with Heine streak retinoscope on the first visit and two months following surgery to assess the refractive status of the patient.

Ultrasonography (USG) was done on the first visit and in the subsequent follow-ups as and when necessary.

The preoperative factors studied included previous ocular trauma, presence or absence of lens, pseudophakia, myopia (spherical equivalent in dioptres), previous vitreoretinal surgery, systemic diseases, significant vitreous opacification that obscures retinal details, extent and number of quadrants detached, status of the macula, proliferative vitreoretinopathy changes (graded according to Retina Society Terminology), retinal degeneration, retinal breaks (number, type, quadrants and associated features such as retinoschisis, etc).

Collected data was placed on the computer sheet for statistical analysis.

All patients had a minimum of two months follow-up after their surgical procedure. All patients whose retina was detached when last seen have been considered as failures.

Of the sixty-five eyes of the sixty-five patients included in this study, 42 underwent surgery at our hospital, one patient returned for follow up after operated abroad and one underwent photocoagulation alone for a sub-clinical detachment. We determined the primary anatomic reattachment success rate and analyzed the results in relation to some of the significant preoperative factors, which may be of risk for the failure of the surgical reattachment.

Results

During the eighteen-month study period, all the sixty-five patients were initially seen at the general outpatient department of BPKLCOS from where they were being referred to the vitreoretinal clinic for further work-up and management.

The mean age of these patients at the time of presentation was 41.3 years (95% CI, 9.5-81.1). The age ranged from 10-78 years. Of the sixty-five cases, 21 were female and 44 were male with male sex double that of female.

The peak age groups were 11-20 and 51-60 years. Each of these two age groups had 14 (21.5%) cases (Table 1). In the 11-20 age group, 13 (92.9%) of 14 cases were male and in the 51-60 age group, 9 (64.3%) of 14 cases were male.

Table 1: Age & Sex-specific Distribution

Age Group	Female No. (%)	Male No. (%)	Total No. (%)
0-10	1 (1.5)	1 (1.5)	2 (3.1)
11-20	1 (1.5)	13 (20.0)	14 (21.5)
21-30	1 (1.5)	5 (7.7)	6 (9.2)
31-40	4 (6.2)	5 (7.7)	9 (13.8)
41-50	4 (6.2)	4 (6.2)	8 (12.3)
51-60	5 (7.7)	9 (13.8)	14 (21.5)
61-70	4 (6.2)	6 (9.2)	10 (15.4)
71-80	1 (1.5)	1 (1.5)	2 (3.1)
Total	21 (32.3)	44 (67.7)	65 (100.0)

Fourteen (21.5%) cases belonged to the 11-20 age group and thereafter the number decreased with advancing age. However, a second peak (21.5%) occurred in the 51-60 age group. 24 cases accounting for 36.9% of the total were seen in 6th and 7th decade.

Laterality

Of the sixty-five eyes with RRD, 32 (49.2%) had detachment in the right eye and 33 (50.8%) had the involvement in the left eye.

Symptom Duration

The mean duration of symptom was 152.3 (SD 353.4) days. Duration of symptoms among these

sixty-five cases ranged from 2 days to 5 years. Forty-six (70.8%) cases of rhegmatogenous retinal detachment sought medical assistance within thirty days while fifty-two (80.0%) cases reported within the first three months (Table 2). Seven (10.8%) cases reported later than one year.

Table 2: Duration of the symptom

Duration / days	Number	Percent
0-7	8	12.3
8-30	21	32.3
31-90	23	35.4
>91	13	20.0
Total	65	100.0

Trauma

Sixteen (24.6%) of the sixty-five cases had sustained blunt ocular trauma. Ten (62.6%) of these sixteen cases were in the age group 11-30 years (Table 4). There was no trauma in the age group 0-10 and above 61 years.

Table 4: Trauma, previous cataract surgery and myopia in different age groups

Age Group	Trauma No. (%)	Previous Cataract Surgery		Myopia No. (%)	Total No. (%)
		Pseudophakia No. (%)	Aphakia No. (%)		
0-10	-	-	-	-	2 (3.1)
11-20	5 (7.7)	-	-	2 (3.1)	14 (21.5)
21-30	5 (7.7)	-	1 (1.5)	1 (1.5)	6 (9.2)
31-40	2 (3.1)	-	1 (1.5)	3 (4.6)	9 (13.8)
41-50	3 (4.6)	-	2 (3.1)	2 (3.1)	8 (12.3)
51-60	1 (1.5)	4 (6.2)	-	4 (6.2)	14 (21.5)
61-70	-	4 (6.2)	1 (1.5)	1 (1.5)	10 (15.4)
71-80	-	-	1 (1.5)	-	2 (3.1)
Total	16 (24.6)	8 (12.3)	6 (9.2)	13 (20.0)	65 (100.0)

The average duration from the trauma to the seeking of medical assistance among these sixteen cases was 491.2 (SD 675.4) days. Eleven (68.8%) cases reported within one year of trauma to the eye.

Pseudophakia /Aphakia

Fourteen (21.5%) cases had history of previous cataract surgery. There were eight (12.3%) pseudophakic and six (9.2%) aphakic RRD cases (Table 4). All the pseudophakics were in the age group 51-70 years. Ten (71.4%) of the fourteen cases of previous cataract surgery were above 51 years.

The mean duration from the cataract surgery to the onset of the symptoms of rhegmatogenous retinal detachment was 41.9 months (SD 34.2). Nine (64.3%) of the fourteen cases had history of cataract surgery less than three years. Duration from the cataract surgery ranged from 2 months to 9 years.

Myopia

Thirteen (20.0%) cases had associated myopia. Four (30.8%) out of thirteen myopic cases were

Best corrected visual acuity (BCVA) at Presentation

One (1.5%) patient had no perception of light at the time of the presentation and fifty (76.9%) had the BCVA in the range of light perception to <3/60 (Table 3) in the affected eye. There were five (7.7%) cases with good visual acuity of 6/18 or better.

Table 3: BCVA at Presentation in the affected eye

BCVA	Number	Percent
No light perception	1	1.5
PL-<3/60	50	76.9
3/60-<6/60	5	7.7
6/60-<6/18	4	6.2
6/18-6/6	5	7.7
Total	65	100.0

seen in the 51-60 age group. No myopic case was seen below 11 and above 71 years (Table 4).

The mean spherical equivalent power of myopia among these thirteen cases was -5.4 (SD 4.4) Dioptres. The power of myopia ranged from -1.00 to -15.00 dioptres.

Management

In forty-one (63.1%) cases scleral buckling surgery was done. One (1.5%) underwent vitrectomy with silicone oil tamponade while in another one (1.5%) case photocoagulation was done. 22 cases (33.9%) were referred to higher centre (Table 5).

Table 5: Initial Treatment Given

Treatment	Number	Percent
Scleral buckling	41	63.1
Photocoagulation	1	1.5
Referral to Higher Centre	22	33.9
Vitrectomy with silicone oil tamponade	1	1.5
Total	65	100

Surgical Outcome

Of the forty-two cases, which underwent surgical treatment, 36 (85.7%) had anatomical reattachment. All the cases had a follow-up of minimum two months after the treatment.

Visual Acuity after Surgery

Table 6: BCVA after surgery Vs BCVA before surgery

		Postoperative BCVA				Total	Improvement (%)
		*PL - <3/60	3/60 - <6/60	6/60 - <6/18	6/18 - 6/6		
Preoperative BCVA	PL-<3/60	13	6	12	1	32	59.4
	3/60-<6/60	-	2	1	-	3	33.3
	6/60-<6/18	-	-	1	3	4	75.0
	6/18-6/6	-	-	-	5	5	0
	Total	13	8	14	9	44	52.3

*PL denotes perception of light.

Of these 44 cases, 43 underwent treatment at our hospital and one case had returned for follow-up with us after getting operated abroad.

Of the 32 cases in the range of PL-<3/60 prior to surgery, 19 (59.4%) of 32 cases had improved their vision (Table 6). Of the three cases with the preoperative BCVA range of 3/60-<6/60; one (33.3%) case had improved the vision to 6/60-

Vitreoretinal Characteristics

Among the sixty-five cases, three had significant media opacity to obscure the retinal details and hence their details of the detachment could not be assessed, thus they are not included in this tabular analysis (Table 7).

Of the sixty-three cases, horseshoe tear (41.9%) was the commonest retinal break followed by round hole (24.2%). Macula was detached in

<6/18 range. Of the four cases, whose preoperative BCVA in the range of 6/60-<6/18, three (75%) cases had improved their postoperative BCVA to the range of 6/18-6/6. Of the five cases, whose preoperative BCVA in the range of 6/18-6/6, their postoperative BCVA remained unchanged.

72.6% of eyes. There was total retinal detachment in 21 (33.9%) of sixty-two eyes.

PVR grade C1 and worse were seen in 15 (24.2%) eyes. Lattice degeneration was seen in 5 (8.1%) of the sixty-two eyes. The commonest quadrant of retinal break was superotemporal (37.1%) followed by superonasal (30.6%), inferotemporal (11.3%), and inferonasal (4.8%).

Table 7: Characteristics of RRD

Characteristic	N=62 No. (%)
Type of retinal break	
Horseshoe tear	26 (41.9)
Round hole	15 (24.2)
Giant retinal tear	2 (3.2)
Retinal dialysis	3 (4.8)
Macular hole	1 (1.6)
None found	15 (24.2)
Macula status	
Macula on	17 (27.4)
Macula off	45 (72.6)
Extent of detachment	
Subclinical detachment	1 (1.6)
< One quadrant	3 (4.8)
< Two quadrants	22 (35.5)
< Three quadrants	11 (17.7)
Subtotal detachment	4 (6.5)
Total detachment	21 (33.9)

Characteristic	N=62 No. (%)
PVR Grade	
No PVR, A and B	47 (75.8)
C1 - D3	15 (24.2)
Retinal Degeneration	
• No retinal degeneration	52 (83.8)
• Lattice degeneration	5 (8.1)
• Pigment clumping	3 (4.8)
• Snail-track degeneration	1 (1.6)
• Chorioretinal atrophy	1 (1.6)
Quadrant of retinal break*	
Superotemporal	23 (37.1)
Superonasal	19 (30.6)
Inferotemporal	7 (11.3)
Inferonasal	3 (4.8)
None found	17 (27.4)

* >100% because of more than one break in a single eye.

Of the sixty-five cases included in this study, 42 underwent surgery at our hospital and one returned back for follow-up after getting operated abroad. Some of the significant preoperative factors, which are being predicted as risk factors for anatomic failure of retinal reattachment, have been compared with the surgical outcome in these 43 cases (Table 8).

We found that preoperative BCVA of 3/60 and better has a better chance of anatomical

reattachment than those whose preoperative BCVA is poorer than 3/60.

Also, we found that those eyes with more than two quadrants of detachment had a poorer surgical outcome than those with less than two quadrants of detachment. Similarly, involvement of the macula has a poorer surgical outcome than those with an attached macula. Also, those presenting within the first month had a better surgical outcome than those presenting later than thirty days.

Table 8: Preoperative Factors significant for anatomic failure of retinal reattachment

Factors	Total No. Of Eyes (N=43)	No. Of Eyes in which Retina was Reattached (%) (N=36)
Preoperative BCVA		
PL-<3/60	31	24 (77)
3/60-<6/60	3	3 (100)
6/60-<6/18	4	4 (100)
6/18-6/6	5	5 (100)
Extent of retinal detachment		
Subclinical detachment	1	1 (100)
< One quadrant	3	3 (100)
< Two quadrants	20	17 (85)
< Three quadrants	10	7 (70)
Subtotal detachment	3	3 (100)
Total detachment	6	5 (83)
Macula status		
Macula on	14	14 (100)
Macula off	29	22 (76)
Type of retinal break		
Horseshoe tear	21	16 (76)
Round hole	13	12 (92)
Giant retinal tear	2	1 (50)
Retinal dialysis	3	3 (100)
None found	4	4 (100)
Symptom Duration / days		
0-7	7	7 (100)
8-30	17	17 (100)
31-90	12	8 (66.7)
>91	7	4 (57.1)
Previous cataract surgery		
No cataract surgery	35	30 (86)
Pseudophakia	5	5 (80)
Aphakia	3	2 (67)

Discussion

A total of sixty-five consecutive cases of RRD were evaluated over a period of eighteen months. This accounted for 12.2% of the total cases seen in the vitreoretinal clinic during the same duration. Rhegmatogenous retinal detachment was found to be the third commonest cause of the vitreoretinal services of TUTH during this period. It corresponded with a study conducted at TUTH during the period starting from August 1993 to December 1994⁶.

It was found that the age of the included patients ranged from 10 to 78 years and the mean age was 41.3 years. This finding is very similar to that of a South Indian study⁷, who found that the mean age in their 577 consecutive cases of RRD was 42.3 years. We observed two peaks (11-20 and 51-60 year age group) in our study. These peaks are slightly different from the literature on the previous population-based studies on the incidence of RRD. Trauma was attributed as one of the probable causes of the RRD in this 11-20

12.3% of the cases presented within a week and 45% presented within one month. Those presented within a month showed 100% anatomical reattachment. Though 70.8% reported by two months from the onset of symptoms, the mean symptom duration was 152 days. Seven cases had extreme values ranging from 1-5 years.

This study showed 85.7% primary surgical success rate among the 42 eyes being treated. In a study conducted by Comer M.B *et al.*¹ in England, they found that vitreoretinal specialists in the vitreoretinal unit (VRU) could achieve a success rate of 90% with a single procedure. In contrast, the general ophthalmologists in the District General Hospitals (DGH) had lower success rates ranging from 47-77%. These results were achieved despite the general ophthalmologists treating selected RRD cases. Our results are slightly better than that of the DGH's of England where it was solely managed by general ophthalmologists. Our anatomical success rate of 85.7% thus could be explained by the fact that the surgery in these 42 eyes had been done by both general ophthalmologists as well as vitreoretinal specialists.

In the study, pseudophakic and aphakic RRD's comprised 21.5% (14 of 65 cases) of the total RRD cases. This corresponded with the study of Jonathan A.R *et al.*⁸ in which he found that pseudophakic and aphakic RRD's comprised 19% (60 of 311 cases) of the total RRD cases.

Our mean duration of cataract surgery to the onset of the RRD was 41.9 months (SD 34.2). Previous population-based studies of RRD after phacoemulsification and ECCE have estimated RRD ratios between 0.18% to 1.0% two to five

year age group. Occurrence of ocular trauma was highest in the age group of 11-30 years.

Jonathan A.R *et al.*⁸ and Haimann *et al.*² also found an association between risk of RRD and increasing age. In their study, peak incidence occurred in the seventh decade of life and thereafter, the incidence of RRD decreased. Our study also showed a decline in the occurrence of RRD after the age of 71 years. The number of cases, which had myopia, ocular trauma and previous cataract surgery taken together, were highest in the age group 51-60 years. This could probably explain the cause for the high occurrence of RRD in this age group.

This study revealed that male sex has a two-fold higher rate of RRD when compared with female sex. Similar findings were seen in the study conducted at Singapore by Wong T.Y *et al.*⁴ Jonathan A.R *et al.*⁸ also found that men have a higher risk of RRD than women.

years after cataract surgery⁹ and have shown no difference in the risk of RRD between ECCE and that of phacoemulsification.

In a Danish study,¹⁰ in which the risks of RRD after cataract surgery compared with the risk of RRD in those without cataract extraction were similar to the study of Jonathan A.R *et al.* Their estimated incidence rate of RRD 6 years after ECCE was 7.5 times as high as would have been expected in the population without cataract surgery.

In this study, lattice degeneration was seen in 8.1% of the cases. This corresponded with the study of Wilkinson C.P¹¹ where he described the prevalence of lattice degeneration in the general population as 8.0%. 42% of the retinal breaks were of the horseshoe type, while in an English study by Comer M.B *et al.*¹, they found that 76% of the retinal breaks were of horseshoe type tears. On comparing these two studies, we found that there is a significant difference in the distribution of the retinal breaks, especially the horseshoe type and the round holes. Also, our inability to locate the holes was significantly high when compared with theirs. This could be the reason why the distribution of horseshoe tear and round holes in our study is significantly lower than the study compared.

The number of cases with PVR grade C1 or worse in our study was 15 (24%) and in their study, it was 13 (4%). Similarly, the number of cases with total detachment in our study was 21 (34%), and in theirs, it was 22 (6%). This could be explained by the delay in the presentation of the cases in our study. There was no significant

difference in the percentage of the detached macula in both these studies.

We found that preoperative BCVA of 3/60 and better had a better surgical outcome when compared with that of < 3/60. We had a 100% success rate in those with preoperative BCVA of 3/60 and better. In cases with preoperative BCVA of < 3/60, our success rate was 80% while it was 87% in Sharma *et al.*'s study⁷.

Preoperative partial and subclinical detachment had a better surgical outcome than that of total detachment. In cases of partial and subclinical detachment, our success rate was 83% compared with 95% in their study (P value < 0.001). Cases with preoperatively attached macula have a good surgical outcome. The success rate of preoperatively attached macula in theirs and ours is 98% (p value < 0.01) and 100% respectively. Preoperative round holes have a better surgical outcome than horseshoe type of retinal break. The success rate of preoperative round holes in theirs and ours is 96% (P value < 0.01) and 92% respectively. The success rate with horseshoe type of break in theirs and ours was 86% and 76% respectively. There was no statistically significant difference in the surgical outcome of the superior and inferior location of the retinal breaks. Most of the preoperative factors predicted as significant for the anatomic failure of retinal reattachment in this study compared with that of the South Indian study⁷ were similar (P < 0.05) except for some factors, which may be because of very few samples in this study.

Hence, from the observations made in this study, there is strong association of poorer surgical outcome in those with the preoperative best corrected visual acuity of < 3/60, total detachment, detached macula, and PVR changes of Grade C1 or worse, while the surgical outcome is better in those with the preoperative best corrected visual acuity of 3/60 and better, partial and subclinical detachment, attached macula and in those with no PVR changes or with PVR Grade A or B.

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