

■ *Original article*

## Anatomical and functional outcomes of surgery of rhegmatogenous retinal detachment

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### Abstract

**Introduction:** Rhegmatogenous retinal detachment (RRD) is a potentially blinding condition.

**Objective:** To evaluate the anatomical and functional outcome of surgery of RRD.

**Materials and methods:** A prospective study of interventional case series was designed including 50 consecutive patients with RRD in a tertiary level eye center in Kathmandu. The patients underwent scleral buckling (SB) or pars plana vitrectomy (PPV) according to the proliferative vitreo-retinopathy (PVR) changes. All the patients had at least 3 months of follow-up. The anatomical and physiological outcome measures were primary retinal reattachment and improvement in visual acuity respectively. The surgery was considered successful when there was attachment of retina after the first surgery.

**Results:** The mean age of these patients at the time of presentation was  $46.24 \pm 19.82$  years. Of 50, sixty-six percent of the patients underwent SB and 34 % underwent PPV. Primary surgical success rate was 88 %. While comparing the initial best corrected visual acuity (BCVA) with the final, 72% had an improvement, 12 % unchanged and 16 % had a deteriorated visual acuity.

**Conclusion:** The visual acuity improves and the anatomical success rate is high in the majority of the patients after surgery for rhegmatogenous retinal detachment.

**Keywords:** rhegmatogenous retinal detachment, scleral buckling, pars plana vitrectomy, anatomical outcome, physiological outcome

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### Introduction

Rhegmatogenous retinal detachment (RRD) is a potentially blinding condition and a common cause of ocular morbidity. Nearly all RRDs progress to total blindness unless they are repaired successfully. The main objective of the RRD surgeries is to permanently reattach the neuro-sensory retina to the retinal pigment epithelium with the least possible amount of tissue trauma.

The treatment of RRD and its complications continue to be one of the most important indications for vitreoretinal surgery, comprising about half of all surgical cases treated in a vitreo-retinal surgery department (Ah-fat FG et al 1999). A previous study in Nepal showed that 70 % of the vitreo-retinal procedures were performed exclusively for RRD (Paudyal G et al 2005).

The recruitment study of the scleral buckling versus primary vitrectomy in RRDs (SPR Study) examined a representative group of patients with RRDs in participating centers in the year 2000 and found about 50 % of patients presenting with a localized detachment (up to 4 clock hours) associated with

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single or neighboring breaks. In the participating centers, the vast majority of these cases were treated with SB. At the other end of the spectrum, complicated cases with PVR of grade B or C, giant tears, or macular holes comprise approximately 20 % of all primary RRDs and are most commonly treated with primary PPV( Feltgen N et al 2007).

Between these two extremes, there is a large group of RRDs with medium severity that comprise about 30 % of all primary RRDs in the SPR recruitment study. This group includes patients with multiple breaks in different quadrants, bullous RRDs, breaks extending central to the equator, breaks with marked vitreous traction, and RRDs with unclear hole situations (no break, or not all breaks could be identified on examination before surgery) that are more common in pseudophakic RRDs. In these cases, SB and PPV or combinations of both have been used, with a trend towards PPV in recent years. A large debate about the optimal treatment of these types of RRD evolved, with arguments for SB or PPV based mostly on results of retrospective single-center studies (Barrie T et al 2003).

The primary retinal reattachment rate is of great importance in the assessment of retinal reattachment surgery. Retinal reattachment with a single procedure is generally associated with a better visual outcome and a reduced patient morbidity. This study was designed to determine the characteristics of the RRD cases, management options and the primary success rate of the retinal detachment surgery in a tertiary care hospital.

**Materials and methods**

All the patients who underwent surgery for RRD over a period of two years in the BP Koirala Lion’s Center for Ophthalmic Studies were included. The exudative and tractional RD and the previously treated RRD cases were excluded. A detailed patient profile including age, sex, occupation and address was noted.

All patients underwent a detailed ocular and systemic examination. The parameters studied were VA, pupillary reaction, lens status (phakic, visually significant cataract, pseudophakic, aphakic), intra-ocular pressure (IOP), media haziness, Shaffer’s sign, vitreous hemorrhage, PVR changes (graded according to Retina Society Terminology (Machemer R et al 1991), retinal degeneration, retinal breaks ( number , type, quadrants) and status of the macula (whether detached or not ). Ultrasonography was done whenever necessary. All the patients underwent surgery by surgeons with experience of more than 10 years (SNJ, JKS). Complicated cases with PVR grade B or C, giant tears, or macular holes are managed with pars plana vitrectomy (PPV) with internal tamponade whereas other cases were managed with scleral buckling. Cryotherapy or laser therapy was used to achieve retinopexy. Drainage of subretinal fluid was done whenever necessary.

All patients had a minimum of three months follow-up after the surgery. The surgery was considered failed when there was detachment of the retina after the first time of the surgery. Though some cases had attached retina in the second time of the surgery, we considered them as failed surgery. We determined the primary anatomic reattachment success rate and visual outcome. Collected data was placed on the computer sheet for statistical analysis.

**Statistics:** Analysis of data was done using SPSS-14.

**Results**

The mean age of these patients at the time of presentation was 46.24 ± 19.82 years. The age ranged from 9 to 86 years. The two peak age groups were 10 - 20 and 50 - 60 years. Of 50 cases, 21 were female and 29 male.

**Table 1**

**Case distribution according to age group (in years)**

Age group	>10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90
No.	1	9	1	6	4	17	7	4	1

### Clinical features

The most common presentation was floaters in 20 cases (40 %) followed by flashes of light in 16 cases (32 %) and curtain like shadow in 9 cases (18 %). Most of the patients (n=36, 72 %) had a sudden marked diminution of vision. 24 patients (48 %) had a relative pupillary defect, whereas Shaffer's sign was positive in 45 cases (90 %). The mean duration of symptoms was  $28.64 \pm 36.96$  days. The duration of symptoms ranged from 1 to 210 days.

### Visual acuity (VA) at presentation

34 cases had the VA in the range of light perception to  $< 3/60$  in the affected eye. Out of them 19 cases had a visual acuity of hand motions, followed by 5 cases having counting finger close to face and 4 cases having perception of light at the time of presentation. There were 2 cases with visual acuity of 6/18 and 2 cases having visual acuity 6/9.

### Risk factors

#### Trauma/pseudophakia/myopia

5 cases had sustained blunt ocular trauma, 3 of which were in the age group of 10-20 years and 1 case was in the age group of 20-30 years. 13 cases had a history of previous cataract surgery. There were 10 pseudophakic and 3 aphakic patients. 15 cases had associated myopia, of which 8 cases had myopia of less than 6.0 D while 7 cases had it more than 6.0 D.

### Retinal characteristics

Retinal tear (60 %) was the commonest finding followed by retinal hole (30 %) and retinal dialysis (10 %).

**Table 2 (A)**  
**Location of retinal tears**

Location	Frequency	Percent
2 HS – ST, N	1	2
2 HS- ST, SN	1	2
GIANT- ST	1	2
HS- IN	1	2
HS-IT	2	4
HS-SN	5	10
HS-ST	13	26
MULTIPLE HS-T,S,I	1	2
LINEAR- I	2	4
LINEAR- T	2	4
LINEAR- ST	1	2

**Table 2 (B)**  
**Location of retinal holes**

Location	Frequency	Percent
S	1	2
I	3	6
ST	5	10
SN	2	4
IT	1	2
ST (multiple holes)	1	2
ST with macular hole	1	2
T ( multiple hole)	1	2

**Table 2 (C)**  
**Retinal dialysis**

Location	Frequency	Percent
I	2	4
SN	3	6

HS- horse shoe tear, T- temporal, S- superior, N- nasal, I- inferior, ST- superior temporal, SN- superior nasal, IN- inferior nasal, IT- inferior temporal

Status of the macula: The macula was attached in 22 % and detached in 78 %.

### Surgery

#### Scleral buckling

33 cases underwent scleral buckling. 26 cases (52 %) had encircling 240 silicone band and 276 tire surgery, 5 cases had 240 encircling band and radial sponge, 1 case had 240 encircling band with C3F8 and another 1 case had only 505 silicone radial sponge. The macula was detached in 25 cases and 8 cases had attached macula.

#### Pars plana vitrectomy

17 cases underwent P P V. Fourteen cases (28 %) had encircling 240 silicone band and P P V with silicone oil tamponade; 2 cases had encircling 240 band with PPV and C3F8 and another 1 case had 240 band with PPV and air tamponade. The macula was detached in 14 cases and 3 cases had it attached.



### Surgical outcome

#### Anatomical outcome

All the cases had a follow-up of at least three months after the treatment. The minimum follow-up was 3 months and the maximum follow-up was 16 months. 44 cases (88 %) had anatomical reattachment. Repeated surgeries done for the same case considered as failed surgeries. Out of 6 failed cases, 3 cases refused the second surgery. 2 cases underwent PPV+SO tamponade and the retina got attached in the second attempt. One case had a re-detached retina after second surgery.

#### Functional outcome

36 cases (72 %) had improved VA, 6 cases (12 %) remained unchanged and 8 cases (16 %) deteriorated while comparing the final BCVA with the initial VA at the time of presentation.

Out of 4 cases with initial visual acuity of perception of light, 2 cases had BCVA of 1/60 and 2 had 2/60 at the final follow-up.

There were 19 cases with VA of HM at the initial presentation. Out of 19 cases, 4 cases got detached retina during the follow-up. In one case vision further deteriorated to PL and in another case, it remained stable. 7 cases improved to 1/60, 4 cases improved to 2/60. Others had the BCVA between 3/60 and 6/60. Out of 5 cases with initial VA of CF, each case had the final BCVA of 1/60, 2/60, 4/60, 6/60 and 6/18 respectively. One case got the retina detached in a subsequent follow-up.

Out of 11 cases with macula attached, 1 case had BCVA of 6/6, 1 case had 6/9, 3 cases had 6/12, 1 case had 6/24, 4 cases had 6/60 and the remaining 1 case had BCVA of 2/60. One case got the retina detached after the surgery.

Overall, after the final follow-up 21 cases (42 %) had VA in the range of 1/60 to 2/60. Nine cases had the VA between 5/60 - 3/60, 12 cases had VA between 6/24 - 6/60, 6 cases had normal VA (6/6 - 6/18) and 1 case had 6/6.

Table 3

#### Preoperative and postoperative visual acuity

Visual Acuity	Total patients	
	Pre-operative	Post-operative
PL	4	1
HM	19	1
CF	4	0
1/60	5	11
2/60	2	10
3/60	3	5
4/60	1	2
5/60	1	2
6/60	4	7
6/36	0	4
6/24	3	1
6/18	2	2
6/12	0	3
6/9	2	0
6/6	0	1

#### Discussion

This study was done to evaluate the anatomical and functional outcome after retinal reattachment surgery in RRD in patients attending B P Koirala Lions Centre for Ophthalmic Studies (BPKLCOS). A total of 50 consecutive cases of RRD were evaluated over a period of eighteen months. The study showed that the age of the included patients ranged from 9 to 86 years and the mean age was 46.24 years. This finding is very similar to that of Tarun S et al (1994) who found that the mean age was 42.3 years. In a study done by Subhadra et al (2005) in 'retinal detachment in south India-presentation and treatment outcomes' the mean age was 57.45 years. We observed two peaks of 10 - 20 years and 50-60 years in our study. The first peak in our study was mainly due to ocular trauma that led to retinal dialysis in young children. Jonathan A R et al (1999) and Haimann et al (1982) found an association between the risk of RRD and increasing age. In their study, the peak incidence occurred in the seventh decade of life and thereafter the incidence of RRD decreased. Wong TY et al (1999), in their population-based study on the incidence of RRD, found the peak in the 40-50 year age group.

Our study revealed that the male sex was predominant, 29 cases (58 %) were male. Similar

findings were seen in the study conducted at Singapore by Wong TY et al (1999). Jonathan AR et al (1999) also found that men have a higher risk of RRD than women. In another study done by Subhadra et al (2005), 74.5 % were males.

### Trauma

There were 5 cases (10 %) of blunt ocular trauma which is similar to the study done by Subhadra et al (2005). They found blunt ocular trauma in 70 eyes (16.2 %). The most common locations for retinal breaks due to trauma are inferotemporal and superonasal (Cox MS 1976, Hagler WS 1968), whereas we had 2 cases each of supero-nasal and inferior location.

### Myopia

In our study 15 cases (30 %) had associated myopia which is similar to the study done by Subhadra et al (2005), whereas research done by Austin et al (1990) found the presence of myopia in 46.9 % eyes. We also had 1 case with a macular hole in a myopic patient having refractive error more than -6.0 D. Approximately 30 % of patients who present with a retinal detachment have lattice degeneration on examination ( Straatsma et al 1974, Foos RY 1984), but in our study, lattice degeneration was seen in only 16 % of the cases while the study done by Subhadra et al (2005) found lattice degeneration in 116 eyes (26.8 %).

### Phakic status

In our study, pseudophakic and aphakic RRDs comprised 26 % of the total cases which was less than the study (35.1 %) done by Subhadra et al (2005). We had 20 % pseudophakic and 6 % aphakic eyes, whereas they had 20.6 % pseudophakic and 14.5 % aphakic. The study done by Jonathan AR et al (1995) found that pseudophakic and aphakic RRDs comprised 19 % ( 60 of 311 cases) of the total RRD cases, whereas the study done by Schepens CL (1951) and Norton (1964) described that 40% of retinal detachments occur in aphakic and pseudophakic eyes.

### Retinal characteristics

In our study, horse-shoe retinal tear was the commonest ( 48%) finding which is similar to the study done by Subhadra et al (2005). We found retinal

holes in 15 cases (30 %) which is similar to the finding of Subhadra et al (2005). In a study conducted by Nicula C et al (2005) to evaluate the risk factors implicated in the development of RRD in aphakic and pseudophakic eyes, they found that the most frequent breaks in causing rhegmatogenous retinal detachments were “horse shoe tears” in 23.4 % of the cases.

### Anatomical and functional outcome

This study showed an 88 % primary surgical success rate among the 50 eyes being treated. In a study conducted by Comer M B et al (2000) in England, they found a success rate of 90% with a single procedure. In a study done by Subhadra et al (2005), the anatomical success rate was 80.3 %.

**Table 4**  
**Comparing this study to the different studies showing anatomical success (Michels RG 1990)**

Authors(year)	No. of Macula Success		
	cases	off	rate
Synder et al (1978)	30	80%	97%
Tanenbaum (1979)	15	80%	85%
Freeman et al (1979)	252	78%	80%
Ramsay et al (1983)	71	76%	76%
Ho & Tolentino(1985)	14	57%	100%
Wilkinson (1986)	145	78%	87%
Yoshida et al (1992)	266	75%	77%
This study	50	78%	88%

While comparing our results with the above results, we had similar findings with those of Tanenbaum and Wilkinson. However, we had a poorer outcome than that of Synder et al (1978) and Ho & Tolentino (1985).

At the final follow-up, 6 cases had VA 6/6 to 6/18, 12 cases had VA 6/24 to 6/60, 9 cases had VA 5/60 to 3/60, 10 cases had 2/60 and 11 cases had 1/60,1 case had HM and another 1 had PL. There was functional improvement in visual status in 36 cases (72 %), 6 cases (12 %) remained the same and 8 cases (16 %) had deterioration while comparing the final BCVA with the initial VA at the time of

presentation. In a study conducted by Tani (1981) the overall anatomic success rate was 90 % (427 of 473 eyes) and visual acuities of 6/15 (20/50) or better were 37 % (174 of 470 eyes).

### Conclusion

Rhegmatogenous retinal detachment (RRD) is an important cause of visual impairment and blindness. Timely surgical management with retinal reattachment surgery results in good anatomical and functional outcome.

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