

Original research article

Pseudophakic retinal detachment: Clinical profile and surgical outcome

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Abstract

Rhegmatogenous retinal detachment is a potentially sight-threatening complication of cataract surgery.

Aim: To study the risk factors, clinical profile and surgical outcome of rhegmatogenous retinal detachment (RD) in pseudophakic eyes.

Setting: Ophthalmology Department, Deccan College of Medical Sciences, Hyderabad and Ophthalmology Department, Government Medical College, Narayanpet, Telangana.

Design: Prospective interventional case series.

Material and Methods: Patients with rhegmatogenous retinal detachments in pseudophakic eyes were included in the study. Detailed history taken and comprehensive eye examination was done. Baseline characteristics of retinal detachment and breaks were documented. Primary surgery was either scleral buckling or 23-gauge pars plana vitrectomy and the anatomical and functional outcome was evaluated on a follow-up for atleast 6 months.

Results: A total of 29 pseudophakic eyes with retinal detachment were enrolled in the study. The time interval between cataract surgery and diagnosis of RD was more than 24 months in majority of the eyes. Posterior capsule was ruptured during surgery in 10 cases (4%) and was intact in 15 eyes (52%) The most common type of retinal break found was a horseshoe tear (69%), and most retinal tears were in the superotemporal quadrant (63%). No break was found in 14 eyes (51%) Proliferative vitreoretinopathy of grade B or more than B was found in 17 (59%) eyes. The anatomical success rate of primary retinal reattachment surgery was 48%. The overall success rate after two or more procedures was 88%. A final visual acuity of $\geq 6/36$ was found in four eyes (100%) without macular involvement and in 7 eyes (28%) with macular involvement. A final visual acuity of $\leq 6/60$ was found in 11 eyes (38%). The cause of poor postoperative visual recovery was recurrent PVR changes.

Conclusion: Retinal breaks undetectable by careful clinical examination preoperatively can be found, in many instances, during pars plana vitrectomy. PPV is currently considered the treatment of choice for pseudophakic RD. As also shown by previous studies, in our series, PPV alone or in combination with an encircling buckle, produces excellent anatomical and functional results.

Keywords: Pseudophakia, retinal detachment, vitrectomy, retinal break

Introduction

Cataract surgery has evolved in the last thirty years from intracapsular cataract extraction to extracapsular, manual small incision cataract surgery to phacoemulsification. This has resulted in decrease in complications with an improved postoperative visual outcome. The causal relationship between cataract surgery and rhegmatogenous retinal detachment is studied using data from Medicare and other insurance information, and large population-based studies such as The Rochester Study^[1-4].

The reported 4-year incidence of retinal detachment after all cataract extractions is 1.17%, with higher rates in cases of vitreous loss (4.9%) and a lower rate with phacoemulsification (0.4%)^[5]. The risk factors for the development of RD may be un-modifiable like such as patient's gender, age or axial length of the eye; or they may be potentially modifiable like posterior capsular rupture or subsequent Nd-YAG laser capsulotomy^[6]. In this study we present the clinical features and surgical outcome for primary

rhegmatogenous RD in patients with pseudophakia after small incision cataract surgery (SICS).

Aim of the Study

To study the risk factors, clinical profile and surgical outcome of rhegmatogenous retinal detachment (RD) in pseudophakic eyes. It was a prospective, non-randomized, interventional case series conducted among patients presenting to Ophthalmology Department of Deccan College of Medical Sciences, Hyderabad and Government Medical College, Narayanpet from September 2022 to February 2024. The patients were followed up for at least six months.

Inclusion Criteria

All patients with rhegmatogenous retinal detachment in pseudophakic eyes presented to Ophthalmology Department of Deccan College of Medical Sciences, Hyderabad and Government Medical College, Narayanpet.

Exclusion Criteria

- Tractional and exudative retinal detachment in pseudophakic eyes.
- Pre-operative proliferative vitreoretinopathy (PVR) grade C-3 or higher according to the Retina Society Classification
- Visual acuity- no light perception.
- RDs associated with coloboma, uveitis, or glaucoma.
- RDs with a macular hole.
- An axial length >26 mm.

The profile of the pseudophakic eye at presentation was studied regarding patients’ age, gender, type of cataract surgery and intraocular lens, time interval between cataract surgery and diagnosis of retinal detachment. The status of posterior capsule, intact or not, a history of YAG capsulotomy, and the interval between the capsulotomy and RD, history of any laser treatment for peripheral retinal lesions and any history of trauma were carefully noted. Complete ophthalmic examination was done at initial presentation. Best corrected visual acuity (BCVA) using Snellen’s chart, slit lamp examination, presence of vitreous traction bands in the wound and intraocular pressure (IOP) was recorded. A detailed and thorough fundus examination with binocular indirect ophthalmoscopy with indentation and Goldman three mirror contact lens was performed in every case to search for any retinal break.

Information regarding extent of retinal detachment, number, size, type, extent and location of retinal breaks, status of macula, presence of any lattice and associated PVR changes were noted. Associated systemic diseases like diabetes, hypertension, bronchial asthma, coronary artery disease, any history of cerebrovascular accident were noted.

Scleral buckling procedure or 20-gauge Pars plana vitrectomy was performed depending on surgeon’s preference according to the merits of the case. The surgical method of retinal re-attachment surgery and outcomes of primary surgery were evaluated. The success of primary reattachment surgery was defined as anatomical retinal reattachment for at least three months. Causes of failure of primary surgery such as proliferative vitreoretinopathy (PVR) were analyzed. The method of secondary surgery and the final anatomical and functional outcomes and complications were noted. The data thus collected from 29 patients were analyzed using student t-test.

Observation and Results

There were a total of 29 pseudophakic RD patients with 22 males and 7 females, a male-female ratio of 3:1. The age of patients ranged from 35-71 years with a mean age of 57 years. Three eyes were diagnosed with RD after phacoemulsification and posterior chamber (PC-IOL) implantation, 25 eyes after small incision cataract surgery (SICS) and PC-IOL and one eye after intracapsular cataract extraction (ICCE) and scleral fixated IOL. The time interval between cataract surgery and diagnosis of RD was more than 24 months in majority of the eyes.

Table 1: Showing time interval between cataract surgery and development of RD and the incidence of PC rent

Time interval	Total	Pc intact	Pc rent	YAG cap*
< 6months	6	3 (20%)	3 (30%)	0 (00%)
6-12months	3	2 (13%)	1 (10%)	0 (00%)
12-24months	3	2 (13%)	1 (10%)	0 (00%)
24-48months	5	1 (7%)	1 (10%)	3 (75%)
> 48months	12	7 (24%)	4 (40%)	1 (25%)
Total	29	15	10	4

Four cases developed RD within six months of YAG capsulotomy.

Table 2: Clinical Profile of the patients

	Age	Gender	Type of Cataract Surgery	Type of IOL	Status of Posterior Capsule	Duration of Symptoms
20-40 years	2 (7%)					
40-60 years	20 (69%)					
>60 years	7(24%)					
Male		22 (76%)				
Female		7 (24%)				
SICS			25 (86%)			
Phacoemulsification			3 (10%)			
ICCE			1 (4%)			
PC-IOL				28 (96%)		
SF-IOL				1 (4%)		
Intact					15 (52%)	
Ruptured					10 (34%)	
YAG capsulotomy					4 (14%)	
< 1 month						14 (49%)
1-3 months						9 (31%)
3-6 months						3 (10%)
> 6 months						3 (10%)

The posterior capsule was intact in 15 eyes, ruptured during cataract surgery in 10 eyes, while four eyes underwent Nd: YAG posterior capsulotomy after cataract surgery. (Table 2) The time interval of RD and cataract surgery in eyes with an intact posterior capsule was compared to that of damaged posterior capsule. It was more than 24 months in 8 (53%) of the 15 eyes with intact posterior capsule, and within 12 months in 8 (57%) of the 14 eyes with damaged posterior capsule. RD developed earlier in eyes with damaged posterior capsule than in eyes with intact posterior capsule. ($p<0.05$) (Table 1.) Myopia and vitreous incarceration in the wound were the most common associated factors. Myopia of \geq six dioptres was found in two eyes which had GRT with advanced PVR changes and chorioretinal degeneration. (Table 3.)

Table 3

Associated Factors	Number of Eyes
Myopia	10 (34%)
Lattice degeneration	2 (7%)
Trauma	4 (14%)
PC rent during surgery	10 (34%)
YAG capsulotomy	4 (14%)
Vitreous incarceration in wound	7 (24%)
Retinal detachment in fellow eye	3 (10%)

The most common type of retinal break found was a horseshoe tear (69%), and most retinal tears were in the superotemporal quadrant (63%). Giant retinal tears were found in three eyes (19%), two of them with rolled over retinal flap and extensive PVR changes and extensive chorioretinal degeneration. Total RD was found in 17 (57%) eyes and macula was involved in 25 (86%) eyes. Proliferative vitreoretinopathy of grade B or more than B was found in 17 (59%) eyes. A history of ocular trauma was found in four (14%) eyes.

Of the 29 eyes, single retinal break was found in 12 (42%) eyes, two or more retinal breaks in two (7%) eyes, and no retinal breaks were visualized in 15 (51%) eyes. (Table 4) The most common type of retinal break found was a horseshoe tear (69%), and most retinal tears were in the superotemporal quadrant (63%). Giant retinal tears were found in three eyes (19%), two of them with rolled over retinal flap and extensive PVR changes and extensive chorioretinal degeneration. Total RD was found in 17 (57%) eyes and macula was involved in 25 (86%) eyes. Proliferative vitreoretinopathy of grade B or more than B was found in 17 (59%) eyes. A history of ocular trauma was found in four (14%) eyes.

Table 4: Characteristics of the Retinal Detachment Studied and Operated

Characteristics of Retinal Detachment	Number of Eyes	
Number of breaks	Single	12 (42%)
	Multiple	2 (7%)
	None observed	15 (51%)
Location of break	Superotemporal	10 (63%)
	Inferotemporal	2 (13%)
	Superonasal	2 (13%)

	Inferonasal	2 (13%)
Type of breaks	Horse Shoe Tear	11 (69%)
	Giant tear	3 (19%)
	Round holes	2 (13%)
	Ora dialysis	0
Extent of break	≤ 1 clock hour	11 (69%)
	> 1 clock hour	5 (31%)
Extent of detachment	1 quadrant	0 (0%)
	2 quadrant	9 (31%)
	3 quadrant	3 (21%)
	4 quadrant	17 (57%)
Macula status	On	4 (14%)
	Off	25 (86%)
Associated PVR	Grade A	12 (41%)
	Grade B	11 (38%)
	Grade C1	3 (10%)
	Grade C2	3 (10%)
Previous trauma history	Yes	4 (14%)
	No	25 (86%)

Scleral buckling was performed in six (21%) eyes and primary vitrectomy (Encircling band + pars plana vitrectomy with endolaser photocoagulation and silicone oil infusion) in 23 (79%) eyes.

Table 5

Type of Primary Surgery	Number of Eyes
Scleral Buckling	6 (21%)
Primary vitrectomy	23 (79%)

Anatomical failure was noted in 14 eyes (48%) that required resurgery. Causes of failure of primary reattachment surgery:

- Proliferative vitreoretinopathy (12 eyes), most common cause.
- Malposition of scleral buckle material (Two eyes).
- Patent breaks (Two eyes).

In secondary surgery, pars plana vitrectomy was done in three eyes who underwent scleral buckling as primary procedure, and re-vitrectomy was done in 11 eyes. Four cases were lost to follow up. Retinectomy was done in two eyes which had extensive PVR changes. The most common cause of failure of secondary reattachment surgery was proliferative vitreoretinopathy changes. The anatomical success rate of primary retinal reattachment surgery was 48%. The overall success rate after two or more procedures was 88%. A final visual acuity of ≥6/36 was found in four eyes (100%) without macular involvement and in 7 eyes (28%) with macular involvement. A final visual acuity of ≤ 6/60 was found in 11 eyes (38%). The cause of poor postoperative visual recovery was recurrent PVR changes, macular oedema, subluxated IOL, glaucoma.

Table 6: Anatomical and functional outcome after scleral buckling

No. of cases	% Macula off	% VA ≥ 6/36		% Retina reattached Procedure Single Re-surgery
		Pre-op	post- op	
6	83 %	17%	67%	50 % 100%

Table 7: Anatomical and functional outcome after primary vitrectomy

No. of Cases	Procedure	% Macula off	% VA ≥ 6/36		% Retina reattached Procedure	
			Pre-op	post-op	Single	Re-surgery
23	PPV +360°E	87%	4%	20%*/100%°	43%	86%

*Macula off pre-operatively.

° Macula on pre-operatively.

PPV-parsplana vitrectomy.

Primary vitrectomy resulted in better anatomical and functional outcome in pseudophakic RD. (p<0.0001)

Table 8: Final Visual Acuity

BCVA	PREOP Macula on Off	Number of Eyes
≥ 6/36	4 (100%)	7 (33%) 11 (44%)
6/60-6/36	0	3 (14%) 3 (12 %)
CF 3 meters-6/60	0	0 (00%) 0 (0%)
CF-CF 3 meters	0	8 (38%) 8 (32%)
PL +	0	3 (14%) 3 (12%)
Total	4	21 25

Discussion

The incidence of retinal detachment after SICS was found to be higher than that after phacoemulsification. Males tend to develop RD more than females. The time interval between cataract surgery and RD was about 24 months, on an average. Disruption of posterior capsule, either during cataract surgery or YAG capsulotomy, and intraoperative vitreous loss is associated with increased risk and early occurrence of RD than with intact posterior capsule.

The final reattachment rate of 86% is similar to 82% in 106 eyes with pseudophakic RD following phacoemulsification, reported by Ji Won Lim and Soo Jeong Ryu from Korea [7]. In this study there was no statistically significant difference between anatomic success and preoperative variables like baseline visual acuity; gender; age; laterality; presence of systemic complications; the time of RD evolution; the time between the onset of RD and surgery and the status of the posterior capsule. The factors that have an influence on anatomic success were inability to find a break and PVR changes. No break was found in 14 eyes (51%) and in 12 eyes the cause of primary failure was PVR changes. In the study by Ji Won and Soo Jeong [7], The number of eyes with unidentified breaks were 30 and PVR was an exclusion criterion. In the present study, 6 eyes with PVR C-1 and C-2 were operated and after secondary reattachment surgery, the overall anatomic success was 88%.

A crucial step of RD surgery is to locate and seal all of the retinal breaks causing RD. But, in pseudophakia the identification and localization of breaks become difficult due to poor mydriasis, cortical remnants, capsular opacification, glare or pitting from the intraocular lens implant, and corneal or vitreous opacities. Retinal breaks are not identified in 9% to 20% of pseudophakic RDs [8-10]. Therefore internal vitrectomy with endoillumination offers a situation where it is advantageous to locate these breaks.

In the present study, most of the breaks were found in superotemporal quadrant. (63%) One of the important changes in the vitreous after cataract surgery is anomalous posterior vitreous detachment, which might induce a retinal break [4, 11, 12]. Both posterior capsular rent with vitreous loss and Nd-YAG capsulotomy increase the risk of retinal detachment [13]. In the present study, these two comprised 14 eyes. The number of eyes that were managed by scleral buckling were only six but that gave a complete anatomic and functional success in all the cases. In a large series of 145 eyes with posterior chamber IOL, by Yoshida N *et al.*, [14] the success rate was 93%. Preoperative vitreous haemorrhage, large retinal breaks, posterior retinal breaks, total retinal detachment, proliferative vitreoretinopathy were the limiting factors for sclera buckling procedure. This study has few limitations. This is a retrospective study with a small sample size from a single retinal surgeon and the surgical procedures used are not uniform. A larger study is required to precisely define the anatomic and functional outcome. But this report will be very useful to surgeons performing Pseudophakic RD surgery.

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