Original article

Scleral buckle surgery for pseudophakic and aphakic retinal detachment in western Nepal

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Abstract

Introduction: Retinal detachment remains one of the most serious complications of cataract surgery. Treatment of this condition has represented a challenge for vitreoretinal surgeons. Scleral buckle (SB) surgery is one of the treatment options in pseudophakic and aphakic retinal detachment (RD).

Aims: To find out the anatomical and visual outcome of SB in pseudophakic and aphakic RD.

Subjects and methods: Retrospective case series of 46 consecutive eyes of 46 patients with RD (38 pseudophakic and 8 aphakic eyes) that had undergone conventional SB surgery were reviewed from patient files. Postoperative retinal status at 3 weeks, 6 weeks and 3 months were recorded to see the anatomical success rate after retinal reattachment surgery. Best corrected visual acuity (BCVA) at 3 months follow-up was noted.

Results: The mean age of the patients was 54.28 ± 13.49 years. Forty eyes (86.9 %) had primary attachment by 6 weeks duration. Five eyes had undergone repeat surgery within a six-week duration (pars plana vitrectomy). Forty patients had follow-up visit to 12 weeks, achieving retinal attachment in 37 eyes (80.5 %). Best corrected visual acuity (BCVA) at 3 months was better than 6/60 in 18 eyes (39.1%), BCVA better or equal to 1/60 but less than 6/60 in 18 eyes (39.1%) and BCVA less than 1/60 in 4 eyes (8.7 %).

Conclusion: Conventional scleral buckling has good outcome for pseudophakic and aphakic RD and can be useful for patients in peripheral eye hospitals where patients cannot afford high cost surgeries.

Keywords: scleral buckle, pseudophakia, retinal detachment

Introduction

A rhegmatogenous retinal detachment (RRD) occurs when fluid from the vitreous cavity passes through a break in the neurosensory retina into the potential space between the retinal pigment epithelium (RPE) and the neurosensory retina. If untreated, most RD will progress to a complete detachment and result in loss of vision of the affected eye. RD remains one of the most serious complications of cataract surgery. It has been estimated that up to 40 % of patients referred to vitreo-retinal surgeons for retinal reattachment surgery have had prior cataract extraction (Haimann et al 1982). The incidence of

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RD after the intracapsular cataract extraction (ICCE) is about 0.8 - 3.6 % (Javitt 1991; McHugh 1991; Naeser 1995; Snellingen 2000), and incidence of RD after extra-capsular cataract extraction (ECCE) and intra-ocular lens (IOL) implantation is about 0.30 - 1.7% (Coonan 1985; Smith 1987; Davison 1988; Javitt 1991; Ruit 1991; Nielsen 1993).

There are many reports about the clinical characteristics of pseudophakic and aphakic RD. The incidence of pseudophakic RD increases in cases of posterior capsule rupture with vitreous loss during cataract extraction. Visualization of peripheral retina may be less perfect due to poor mydriasis and posterior capsular opacification (Cousins, 1986; Yoshida, 1992a). Pseudophakic RD appears to have a predominance of small horse-shoe tears, often located anterior to the equator, near the ora serrata and usually in the supero-temporal quadrants (Hagler, 1982; Ober, 1986; Tasman, 1989; McHugh, 1991). In most cases, the macula is already detached at presentation. Aphakic patients are more inclined to have silent RD than pseudophakic patients. RD with aphakia is most often related to numerous small holes, less than 1 disc diameter, located between the ora serrata and the equator (Yoshida et al 1992b).

Scleral buckle surgery is a standard surgical method in managing RD after cataract surgery. The outcomes of scleral buckling in aphakic and pseudophakic eyes generally are less favorable than in phakic eyes. The range of anatomic success varies from 61.5 % to 80 % in cases of pseudophakic and aphakic RD managed by sclera buckling (Cousins 1986; Yoshida 1992b). During the last few years, several papers have compared the anatomical and functional outcomes for RDs treated with scleral buckling versus vitrectomy on pseudophakic RDs (Ranta 2002; Brazitikos 2005; Halberstadt 2005; Sharma 2005; Arya 2006). The data suggest that there are no significant differences in the anatomical outcome between the two techniques. However, some controversy exists about the functional outcome. Scleral buckle is one of the treatment options in developing countries, where vitreo-retina set-up is less accessible and high cost surgeries are not easily applicable to the patients in peripheral eye hospitals. This study has been carried out at a tertiary eye hospital in western Nepal to find out anatomical and visual outcome of SB in pseudophakic and aphakic RD.

Subjects and methods

A total of 46 patients with retinal detachment (38 pseudophakic and 8 aphakic eyes) that had undergone conventional scleral buckle (SB) surgery from May 2007 to September 2008 were retrospectively reviewed. From the record files, the patient's profile, systemic disease if present, preoperative evaluation regarding the duration of cataract surgery, and the onset and duration of visual symptoms were noted. Visual acuity was measured with using a standard Snellen chart at 6 meters. Slit-lamp bio-microscopy findings recorded were the position of the intraocular lens, status of posterior capsule, history of Nd.YAG posterior capsulotomy and presence of vitreous incarceration to the cataract wound. Pre-operative and post-operative intraocular pressure (IOP) was recorded. Each patient underwent a thorough retinal evaluation using a binocular indirect ophthalmoscope with scleral indentation and Goldmann three-mirror lens. Information regarding the number, size, type, and location of retinal breaks as well as the location and extent of RD was recorded. Anterior and posterior segment findings of the fellow eye were also noted. Exclusion criteria included: past history of blunt trauma in the affected eye, previous posterior segment trauma or surgery, uveitis, giant retinal tear, advanced proliferative vitreo-retinopathy (PVR > grade B, graded according to the Classification of The Retina Society Terminology Committee, 1983) and patients who did not follow-up at retina clinic for 2 visits (3rd and 6th week). Under peribulbar block, scleral buckling surgery was performed in all cases by a single surgeon (Byanju RN). Surgery was aimed at including all breaks within a single

buckle. Sub-retinal fluid was drained off following sclerotomy and retinal breaks were treated by trans-scleral cryotherapy. An internal tamponade was done using air or C_3F_8 gas. The sutures overlying the silicon band were tightened. After the SB surgery, we reviewed the anatomical success of retinal reattachment surgery and visual outcome in the operated eyes. Anatomical success was defined either as a complete reattachment of the retina, or as a stable situation with an attached retina and confined pockets of subretinal fluid. Retinal evaluation was performed at 3 weeks, 6 weeks and 3 months during the post-operative period to see whether the eyes had developed a recurrent detachment or not. Best corrected visual acuity (BCVA) at 3 months follow-up was noted. The cause of re-detachment and the subsequent clinical procedures were also noted. ***Statistics***: Statistical analysis of data was performed using SPSS 11.5 (Chicago, IL, USA).

Table 1

Visual acuity (VA) before and after scleral buckle surgery

Range of visual acuity	Pre-operative uncorrected visual acuity		Post-operative best corrected visual acuity at 3 months	
	No. of Eyes	Percent	No. of Eyes	Percent
Better than 6/18	0		4	8.7 %
6/18 to 6/60	2	4.3 %	14	30.4 %
Less than 6/60, = 1/60	13	28.3 %	18	39.1 %
FC	7	15.2 %	1	2.2 %
HM	15	32.6 %	2	4.3 %
PL	9	19.6 %	1	2.2 %
Missing variables*	0	-	6*	13.0 %
Total number of eyes	46	100.0 %	46	100.0 %

FC- Finger Counting, HM- Hand Motion, PL- Perception of light, =: Better than or equal to.
*Lost follow up at 3 months.

Results

The mean age of the 46 patients was 54.28 ± 13.49 years (range 17 - 80 years). There were five patients with age less than 40 years (10.9 %), 28 patients between 40 to 60 years (60.9 %) and 13 patients more than 60 years of age (28.2 %). Out of 46 patients, 37 (80.4 %) were male and 9 (19.6 %) were female, with the male to female ratio of 4.1:1. There were 38 patients (82.6 %) from North India and 8 patients (17.4 %) from Nepal. The 36 patients (78.3 %) were farmers by occupation, 8 (17.3 %) were housewives and the remaining 2 patients were unemployed. The duration of cataract surgery ranged from 1 month to 20 years (mean 4.63 ± 4.44 years). 17 eyes (37 %) had developed RD within 2 years of cataract extraction, whereas 29 eyes (63 %) had RD after 2 years of cataract extraction. The patients presented with loss of vision from 2 days to 6 months (mean 30.26 ± 34.40 days). The ratio of RD in the right eye to the left eye was 2:1 (31/15 eyes). Forty patients did not have any systemic diseases, whereas 4 patients had hypertension, 1 patient had diabetes mellitus and one patient had rheumatoid arthritis.

Pre-operative uncorrected visual acuity (UCVA) on the affected eyes were better than 6/60 in 2 eyes (4.3 %), between 6/60 to 1/60 in 13 eyes (28.3 %), and less than 1/60 in 31 eyes (67.4 %) (Table1). Among pseudophakic eyes, 22 eyes (47.8 %) had intact posterior capsule, 11 (23.9 %) had PC defect but no vitreous incarceration to cataract wound, 2 eyes (4.3 %) had PC defect with vitreous incarceration and 3 eyes (6.5 %) had ACIOL (Table 2). Three eyes (6.5 %) had undergone Nd:YAG laser posterior capsulotomy. Subtotal RRD (< 3 quadrant) with macula on was found to be in 2 eyes (4.3 %), subtotal RRD with macula off (> 3 quadrant) in 20 eyes (43.5 %) and 24 eyes (52.2 %) had total RRD (Table 3). Supero-temporal retinal break was more common with aphakic eyes than pseudophakic eyes (ST/IT; aphakic eyes = 6/2, pseudophakic eyes = 10/12). Two eyes had supero-nasal break whereas 3 eyes had inferonasal break. Retinal break was not visible in 9 eyes (19.6 %), out of which 6 eyes had total bullous retinal detachment (Table 3). We found a single horse shoe tear (HST) more common as a causative factor in total bullous RD (8/24 eyes), and a single retinal

hole more common in subtotal RD with macula off (10/20 eyes). The mean pre-operative intraocular pressure (IOP) was 10.54 ± 4.9 mmHg (range 2-25 mm Hg). The mean first post-operative intraocular pressure was 17.02 ± 10.79 mm Hg (range 4 - 48 mm Hg). Proliferative vireo-retinopathy (PVR) was found in 4 eyes (Grade B) pre-operatively (Aphakia-2, Pseudophakia-2).

Table 2
Location of retinal breaks in aphakic and pseudophakic retinal detachment

Table 3
Extent of RD in relation to number of retinal breaks

Extent of RRD	Number of retinal holes and tears						Total no. of eyes
	Single hole or break	Single HST	2 holes and tears, within 2 clock hours apart	2 holes and tears, more than 2 clock hours apart	Posterior break	Break not visible	
Subtotal RRD with macula on			2				2 (4.3 %)
Subtotal RRD with macula off	10	5	2			3	20 (43.5 %)
Total RRD	6	8	2	1	1	6	24 (52.2 %)
Total	16 (34.8 %)	13 (28.3 %)	6 (13.0 %)	1 (2.2 %)	1 (2.2 %)	9 (19.6 %)	46 (100 %)
RRD - Reghmatogenous retinal detachment, HST- horse shoe tear							

Scleral buckling was the primary surgical procedure for all 46 eyes. Air tamponade was performed in 39 eyes (84.8 %) and C3F8 gas tamponade was performed in 7 eyes (15.2 %). As a second operation, pars plana vitrectomy (PPV) was performed in one aphakic eye and 4 pseudophakic eyes within the 3 to 6 weeks post-operative period. Two patients with re-detachment at 6 weeks refused the second operation. The success rate of primary retinal reattachment surgery was 86.9 % in sixth week follow-up. The overall success rate at 3 months follow-up was 80.5 %. During the 3 - 6 weeks post-operative period, malposition of buckle (1 eye) and missed break (1 eye) were the causes of the failure of the primary surgery whereas PVR grade C (2 eyes) was the cause of detachment at 3 months.

Table 4
Retinal status on post-operative visits

Retinal status	3rd week		6th week			Follow up at 3 months		
	Aphakia	Pseudophakia	Aphakia	Pseudophakia	Total no. of eyes	Aphakia	Pseudophakia	Total no. of eyes
On	7	23	8	32	40 **(86.9 %)**	7	30	37 **(80.5 %)**
Off	1	2	0	2	2 (4.3 %)	0	3	3 (6.5 %)
CD	0	1	0	1	1 (2.1 %)	0	0	0
Pockets of SRF	0	1	0	3	3 (6.5 %)	0	0	0
Missing variable*	0	0	0	0	0	1*	5*	6 (13 %)
Total	8	38	8	38	46			46

CD- Choroidal Detachment, SRF- Sub retinal fluid. *Lost follow -up

On examination of the fellow eye, 30 eyes had a normal anterior as well as posterior segment. Seven fellow eyes (15.2 %) had an old RD and five eyes had a predisposing retinal disease (3 eyes - lattice degeneration, 1 macular scar, 1 horse shoe tear). Two fellow eyes had a corneal scar and two eyes were pthisical eyes. Best corrected visual acuity (BCVA) of the operated eyes at 3 months was better than 6/18 in 4 eyes (8.7 %) and 6/18 to 6/60 in 14 eyes (30.4 %). BCVA better or equal to 1/60 but less than 6/60 was seen in 18 eyes (39.1 %) and less than 1/60 in 4 eyes (8.7 %). Six patients did not come for the follow-up visit at 3 months (Table1).

Discussion

Several studies have addressed the influence of risk factors in the development of RD following cataract surgery. The pre-operative risk factor (before the cataract extraction) in our study was age, gender and fellow eye RD. Tielsch et al (1996) found that the occurrence of RD in the fellow eye increases the risk of RD in the undergoing cataract surgery. There were 33 patients with age less than 60 years (71 %) when cataract surgery was performed. Younger patients appear to have a higher incidence of RD following cataract surgery (Davison, 1988; Javitt, 1994; Norregaard et al 1996). It is not clear whether the risk of pseudophakic RD is affected

by the sex of the patient, but the majority of reports commented on the increased risk of RD in men (Yoshida et al 1992a ; Norregaard et al 1996; Olsen 2000). Over 50 % of pseudophakic RD occurs during the first year after cataract surgery (Coonan et al 1985; Bradford et al 1989; Gray et al 1989; Nielsen et al 1993). The present study showed that 37 % of RD occurred during 2 years after the cataract surgery. In our study, 22 eyes (47.8 %) had an intact posterior capsule (PC), 11 (23.9 %) had a PC defect but no vitreous incarceration to cataract wound and two eyes (4.3 %) had a PC defect with vitreous incarceration. Javitt et al (1991) found that patients undergoing cataract extraction and anterior vitrectomy were 4.5 times more likely to develop a RD within 4 years following cataract surgery (5 %) compared to those in whom anterior vitrectomy was not performed (1.1 %). However, Smith et al (1987) did not find any increased risk of RD in patients in which vitreous loss had occurred. Three patients had undergone Nd:YAG laser posterior capsulotomy in this study. In a multivariate analysis, Nd: YAG posterior capsulotomy was associated with an almost four-fold increased risk of RD after cataract surgery (Tielsch et al 1996).

Very few eye hospitals in Nepal have a vitreo-retina setup. Many of the eye hospitals do not have a vitrectomy machine to perform pars plana vitrectomy. Lumbini Eye Institute (LEI) is a tertiary eye care hospital in the western terai region of Nepal with 215 beds for inpatient service. This is the only eye hospital in western Nepal which provides vitreo-retina service to people of 3 regions of Nepal (Western, Mid Western and Far Western regions). Scleral buckling remains the first line of treatment and an affordable surgery for patients of third world countries. A survey performed in 1997 by members of the Retina and Vitreous Societies from the United States and Canada (Benson et al 1999) found that 62 % of the surgeons preferred sclera buckling procedures to treat pseudophakic RDs, 30 % would use pneumatic retinopexy, 7 % primary vitrectomy, and 1 % Lincoff balloon. Many authors, however, hypothesized that removal of the vitreous traction bands and RPE cells may decrease the rate of post-operative PVR (Bartz-Schmidt et al 1996; Desai et al 1997; Campo et al 1999).

Using scleral buckling, retinal reattachment has been achieved in 80 – 100 % of cases after one or more surgeries (Ramsay, 1983; Greven, 1992; Yoshida, 1992b; Girard, 1995; Wu, 2002; Jun, 2003; Halberstadt, 2005; Sharma, 2005; Ross, 2008). The success rate of primary retinal reattachment surgery in our retrospective case series was 86.9 % in the sixth week follow-up. The overall success rate at 3 months follow-up was 80.5 % which is similar to the above studies. Girard and Karpouzas et al (1995) reported on a retrospective study of 290 cases of pseudophakic RD with a minimum follow-up of six months. Surgical techniques used included pneumatic retinopexy (2 %), sclera buckling alone (83 %), combined scleral buckling and pars plana vitrectomy (8 %), and pars plana vitrectomy alone (6.5 %). The reattachment rate was 70 % with a single surgery, and 85 % with multiple surgeries. Ranta and Kivela et al (2002) reviewed anatomical and functional outcomes in a series of 101 pseudophakic RD patients. Scleral buckling was used as a primary procedure in 70 % of cases, whereas pars plana vitrectomy, with or without scleral buckling, was used in 29 %. In 74 % of cases the retina was reattached with a single surgery, and in all patients anatomical success was achieved with multiple surgeries. Using multiple regression analysis, the authors found that the use of scleral buckling was associated with better final visual acuity. Yoshida and associates (1992b) used scleral buckling to treat 376 eyes of 361 patients with aphakic and pseudophakic RDs. Pars plana vitrectomy was performed, combined with scleral buckling, in 10 eyes (2.7 %) complicated by PVR (8 eyes) or vitreous hemorrhage (2 eyes). Anatomical success was achieved in 81.6 %, 82.4 %, 76.6 %, and 71.7 % in the aphakic, iris-fixated, ACIOL and PCIOL groups, respectively, after a single surgery. Final anatomical success with additional surgeries was achieved in 94.2 %, 100 %, 92.8 %, and 92.4 % in the aphakic, iris fixated,

ACIOL and PCIOL groups, respectively. No statistically significant difference in anatomical success was observed among groups. The aphakic and the PC-IOL group had significantly higher rate of good vision (20/20 – 20/40) than the AC-IOL group. Greven and associates (1992) reported an anatomical reattachment rate in 77 % and 90 % of cases after single or multiple surgeries, respectively, in a consecutive series of 227 pseudophakic RD. In 98 % of cases, scleral buckling procedures were used as the initial procedure whereas in only 8 % of cases pars plana vitrectomy was performed. Before surgery, 17 % of cases had a visual acuity of 20/40 or better. Following surgery, a visual acuity of 20/40 or better was achieved in 47 % of cases.

In our retrospective study, the BCVA at 3 months was better than 6/18 in 4 eyes (8.7 %) and 6/18 to 6/60 in 14 eyes (30.4 %). The BCVA was better or equal to 1/60 but less than 6/60 in 18 eyes (39.1 %) and less than 1/60 in 4 eyes (8.7 %). Ross et al (2008) have shown the BCVA of better or equal to 20/50 in 50 % of macula-off detachments (12/24 eyes) that had undergone sclera buckle surgery. Sharma et al (2005) have reported a 76 % (19/25 eyes) success rate of primary reattachment after sclera buckling, with the BCVA improved from a preoperative median of HM (range HM to 6/24) to a median of 6/36 (range 6/60 - 6/12) at the end of the 3-months follow-up. Several factors appear to have an influence in the anatomical and functional recovery after vitreo-retinal surgery in pseudophakic and aphakic RD. Higher reattachment rates have been achieved in cases in which the macula was attached pre-operatively (Yoshida et al 1992b). Similarly, patients with less extensive RDs appear to have better anatomical outcomes after vitreo-retinal surgery (Yoshida et al 1992b; Girard et al 1995). The presence of PVR at presentation appears to be one of the most important factors determining the anatomical outcome in pseudophakic RD, with higher re-detachment rates in those cases in which PVR is present (Greven et al 1992; Yoshida et al 1992b; Girard et al 1995). In our study, two eyes had PVR grade C which had redetachment at 3 months follow-up. Poor presenting vision and longer duration of symptoms before presentation (Greven et al 1992), the presence of preoperative choroidal detachment (Girard, et al 1995), vitreous hemorrhage (Yoshida et al 1992b), large retinal breaks (e" 1 clock hour), or breaks located posterior to the equator and the occurrence of intraoperative hemorrhage (Yoshida et al 1992b Girard et al 1995) appear to be variables predictive of poor anatomical success. Goezinne et al (2010) have reported that 29 of the 97 pseudophakic eyes in their studies developed re-detachment (30 %) at 6 months follow-up, and concluded that RD of more than 3 quadrants, break size of more than 3 disc diameter and PVR grade C were significant risk factors for re-detachment.

On retinal evaluation of fellow eyes, 7 eyes (15.2 %) were found to have old RD, 3 eyes had lattice degeneration with atrophic holes, 1 eye had macular scar and 1 fellow eye had horse shoe tear. Four fellow eyes had received prophylactic laser therapy. There appears to be a consensus in the literature regarding the value of prophylactic treatment of symptomatic retinal tears (Kazahaya, 1995). In a recent study, members of the American Academy of Ophthalmology's Preferred Practice Retinal Panel (PPP) found "strong" evidence in the literature to support treatment of this symptomatic retinal tears (Wilkinson, 1999). Our study has its limitation to its short follow-up period and the sample size small in number.

Retrospective case control study design comparing the outcomes of sclera buckle surgery and pars plana vitrectomy would add definite conclusions regarding interventional studies for pseudophakic and aphakic retinal detachment.

Conclusion

Using the given surgical indications and methods, the present study reveals good anatomical and functional outcomes after scleral buckle surgery for primary retinal re-attachment of pseudophakic and aphakic retinal detachment. Early detection of RD

by regular fundus examination and timely referral to a vitreo-retina service provides better outcome for aphakic and pseudophakic retinal detachment.

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