Primary 360° Broad Buckling in Retinal Detachment

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Abstract

Background: Chronic rhegmatogenous retinal detachment behaves like proliferative vitreo-retinopathy (PVR) even without evidence of the same. Surgery could be done either with conventional buckling procedures where the extent of buckling is determined by the number and location of the breaks or by primary vitreous surgery. In this study these cases were managed with primary 360° encircling broad buckle without a vitreous procedure.

Methods: 210 eyes, with rhegmatogenous retinal detachment of more than six months duration and with PVR up to C3 (CP3 focal) were subjected to buckling surgery. Trans-scleral cryopexy of the breaks, 360° encircling buckle with a 276 - 279 tire and sub-retinal fluid drainage was performed.

Result: Most (85.74%) of the eyes showed anatomical retinal re-attachment.

Conclusion: Primary broad encircling buckling can be conducted successfully in cases of long standing retinal detachment.

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Key Words : Rhegmatogenous retinal detachment; Proliferative vitreo-retinopathy; Scleral buckling; Vitreous replacement; Retinal re-attachment

Introduction

The commonest cause of failure of the conventional buckling surgery for rhegmatogenous retinal detachment (RD) is the progressive epiretinal and vitreo-retinal traction due to proliferative vitreo-retinopathy (PVR). The issues that relate to the causation of PVR are complex but significant among these is the time course of the condition [1] : older the RD, higher is the incidence of PVR. The duration of retinal detachment at presentation is an important and poor prognostic indicator for reattachment surgery [2].

Conventional buckling procedures consisting of buckling the area of the break with or without an encirclage, which cannot counteract the traction forces of the proliferating intra-vitreous tissues. Apart from causing breaks elsewhere due to unequal distribution of tractional forces these surgeries lead to anatomical failure prompting many to switch over to primary vitreous manoeuvres with their attendant problems [2]. Can these cases be dealt with buckling alone?

A study was conducted at two tertiary care teaching hospitals of the Armed Forces utilising broad encircling (360°) buckle in these cases to find the outcome on retinal re-attachment.

Materials and Methods

A total of 210 patients with RD were enrolled in the study. The following were excluded:

1. Detachments with a single horse-shoe tear.
2. Detachments less than six months old.
3. Detachments with PVR more than C-3 (CP1-3P) grade.
4. Inferior detachments because of a tear located beneath the horizontal meridian.
5. History of previous vitreo- retinal surgery.

All patients were subjected to buckling surgery and local anaesthesia was used in patients more than 20 years of age.

Peritomy was done and all the four recti were hooked with bridle sutures. Trans-scleral cryopexy was utilised in all cases for the creation of chorio-retinal adhesion. A solid silicon tire of 7 to 8mm (MIRA 276 to 279) was used in all cases depending upon the location of the break. This buckle was applied 360° around the globe irrespective of the number and location of the breaks. Two pre-placed sutures were given in a horizontal mattress fashion in each quadrant. In larger eyes three sutures were given particularly in the supero-temporal quadrant. In shorter eyes only a single suture was given in each quadrant. The suture width taken was 3 mm more than the width of the proposed buckle to be placed. The suture was first passed horizontally along the posterior border of the proposed buckle and the anterior bite was passed at the level of the muscle insertion. The suture used was 4-0/5-0 silk. The buckle was first placed after the application of the sutures and temporarily secured in the quadrant opposite the break. Drainage was performed underneath the buckle near the horizontal rectus away from the break. The drainage was performed with a 26 gauge needle directly. The sutures were then tied with a constant watch on the intra-ocular tension (IOT) digitally

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and anterior chamber paracentesis was performed in case the IOT was found to be raised. The buckle ends were then approximated with two sutures. Intra-vitreous air was injected if the eye was very soft.

Postoperatively the eyes were put on topical steroid-antibiotics, cycloplegics and topical anti-glaucoma medications, if there was any rise in the pressure. Tablet ciprofloxacin 500 mg twice daily in adults and cap amoxicillin 500 mg 8 hourly in children was administered for five days starting one day prior to the day of surgery.

Patients were followed up on Days 1, 2, 7, 28, 90 and 180. The patients were examined for visual acuity, the status of the retina, the buckle height and the IOT.

Eyes where the retina failed to attach were subjected to vitreo-retinal (VR) surgery. The cases where the retina did not attach because of a missed break or a new break were not included in the study.

Results

The results are shown in Table 1. Of the 210 eyes in the age group of 8-72 years, 153 (72.86%) were those of males. Majority were in the age range between 51 to 60 years (25.71%). There were 99/210 (47.15%) phakic eyes, 89/210 (42.38%) were pseudophakic eyes and 22/210 (10.47%) were aphakic eyes. Post operative choroidal detachment was seen in 34/210 cases (16.19%), which responded to topical steroid-cycloplegic drops. No case had raised IOT at four weeks post-operatively. There was no case of anterior segment ischemia.

In those cases where the retina had settled, the buckle height was about 3-4 D with a smooth indent. Of these 210 eyes, 180 (85.74%) eyes had settled retina at the end of 180 days. The principal cause of failure to re-attach in the remaining eyes was PVR as missed breaks and new breaks which were excluded from the study.

On statistical analysis the proportion of positive outcome was 0.857 and 0.142 for negative outcome. The standard error of proportion was 0.024. The 95% confidence interval for settlement of the retina was 81 to 90. It is interesting to note that the non settlement of retina increases as the age progresses. The average age for non-settlement was 60.3 years. There is certainly a skewing of the data towards higher

ages with a coefficient of variation high at 27.286. In 70 patients less than 40 years of age, settlement of the retina was seen in 68 (97.14%) as compared to settlement of the retina in 112/140 (80%) of those between 41 to 80 years of age. The difference in the surgical outcome between these two groups is statistically significant with p value of < 0.001.

Discussion

Scleral buckling for PVR has been utilised by many workers notably Grizard and Hilton (1982) and Yoshida et al (1984) in the pre-VR surgery era, as reviewed by Thompson et al [3]. They all had studied the effects of scleral buckling in all types of PVR including D-3. The anatomical success rate in these studies had varied from 10-32%. The success rate in the present study has been 85% probably because of the case selection. This corresponds well with the success achieved with vitreous surgical procedures in cases with corresponding PVR [4, 5]. This corroborates the fact that primary 360° scleral encircling is as effective a tool for retinal re-attachment in long standing RD as is primary VR surgery [6].

A few questions arise as to why employ an encircling buckle when there is a single break and why use a broad buckling element? There is often some progression of abnormal traction forces beyond the break in long standing cases requiring a broad and an encircling element. This also reduces the incidence of a counter-coup break in the opposite quadrant.

The primary broad scleral buckling procedure has several advantages [3]. It relieves peripheral antero-posterior retinal traction, which helps to close the peripheral retinal breaks by stretching the peripheral retina over the convex buckle. The relief of antero-posterior traction is very important as it is not possible to remove 100% of the proliferation in all eyes with PVR. The buckle helps to remove circumferential retinal traction by reducing the circumference of the equatorial and anterior sclera. The buckle provides support to the peripheral retina, which may prevent recurrent retinal detachment when there is re-proliferation after surgery. PVR often starts in the inferior retina but usually spreads superiorly if not treated. Supporting the inferior retina with a segmental scleral buckle may allow retinal detachment when the proliferation develops in the superior retina. The buckle also helps to isolate the peripheral retina from the posterior retina, forming a posterior "ora serrata" on the crest of the buckle. This allows the posterior retina to remain attached in some eyes in which there is peripheral retinal detachment because of peripheral epiretinal proliferation.

Moreover this buckle helps in the re-establishment of the physiological trans-retinal pressure gradient to offset the abnormal traction forces and minimization of

Table 1
Age, sex distribution and post-operative retinal status

Age years	Males	Females	Total	Retinal status	
				Settled	% of settlement
<10	05	01	06	06	100
11-20	16	04	20	20	100
21-30	17	09	26	26	100
31-40	12	6	18	16	88.88
41-50	13	9	22	16	72.72
51-60	41	13	54	48	88.88
61-70	34	12	46	36	78.26
71-80	15	3	18	12	66.66
Total	153	57	210	180	85.74

further damaging effects from vitreo-retinal and epiretinal membrane traction. Sparing of crystalline lens (which is a victim in a vitreous procedures for PVR) is achieved. The scleral buckling procedure also helps in offsetting the problems associated with a silicone filled eye used in VR surgery and its eventual removal. However scleral buckling is associated with its own complications of refractive errors and problems due to impairment of muscle movements. Since this is a primary procedure, the associated complications are fewer than those associated with VR surgery [6].

For a VR surgery at any time an encircling broad buckle is required. By performing a primary encircling procedure a latter VR surgery when performed (if required) is shortened and has the advantages already enumerated. If scleral buckling by itself can produce an anatomical success then VR surgery with all its attendant complications becomes unnecessary. We did not use an encircling band along with the encircling buckle since it was felt to be superfluous when there is a 360° buckle and the results prove the same. There have been reports of persistent rise in intra-ocular pressure and the requirement for modification of the buckle [7]. We did not encounter any such problem in this study.

To conclude, long standing RD, even without PVR should be regarded as a detachment with PVR. These detachments can therefore be treated with 360° encircling broad buckle alone as the first surgery. This procedure seems to be adequate in majority of the cases for settlement of the retina.

In the words of Glaser BM [8], “In vitreo-retinal surgery, we have a tendency to think first of the techniques that directly attack the forces detaching the retina in the form of contractile peri-retinal fibrous tissue. However, much can be achieved, often with less insult to the integrity of the eye, when one augments the forces acting to re-attach the retina with scleral buckling and closure of retinal tears”. This has also been substantiated by other studies [6,9].

Conflicts of Interest

None identified

Intellectual Contribution of Authors

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