Original Article

Analysis of Vitrectomy in GRT with or without Encircling Band

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Abstract

Purpose: *The purpose of this study was to evaluate difference in the surgical outcome for management of giant retinal tear (GRT) by pars plana vitrectomy (PPV), with and without encircling 240 band.*

Methods: *This was a randomised control study, 20 patients having GRT underwent PPV combined with encircling band in one group (A) and without band in group (B) along with laser retinopexy of the retina followed by silicon oil tamponade. All patients were followed up for at least 1 year.*

Results: *Complete success (retinal attachment after silicon oil removal) was achieved in 12eyes (80%), at the end of follow up, while incomplete success (where retina remain detached under silicon oil removal or redetached after SOR) was seen in 8 eyes (20%) patients. At the end of follow up improvement of best corrected visual acuity was achieved in 19 eyes. Preoperative best corrected visual acuity ranged from Hand movements(HM) to 6/60, while post operative visual acuity ranged from 6/9 to HM in group A and 6/18 to HM(hand movements)in group B.*

Conclusion: *GRT can be effectively treated with PPV along with encircling scleral band, 3600 laser retinopexy and silicon oil tamponade(1000cc and 5000cc in recurrent RD post SOR) with minimum incidence of recurrence.*

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Keywords: *Giant retinal tear, scleral band, laser retinopexy, PFCL (perfluorocarban liquid)*

Introduction:

Giant Retinal Tear (GRT) can't be buckled alone as chances of recurrence is very high. Use of perfluorocarbon liquid (PFCL) and 23 G vitrectomy has made GRT surgery easy and less time consuming.

The success rate of management of giant retinal tears with vitrectomy, internal tamponade, and peripheral 360° photocoagulation of the retina without belt buckle(BB) is high. The risk of redetachment due to secondary peripheral retinal tears is decreased by photocoagulation.[1]

This study was designed to evaluate PPV with endolaser barrage 360°, PFCL, SOI (silicon oil injection) versus PPV (pars plana vitrectomy) with BB, endolaser, SOI, PFCL, for primary RD with giant retinal tears as regards intraoperative and postoperative complications and recurrence rate.

Methods

20 eyes of 20 patients having GRT were included in this study All surgeries were done in hospital by a single surgeon.

7 patients had a history of blunt ocular trauma out of which 5 patients had macula on RD and 2 had macula off RD. 3 patients had cataract extraction prior to GRT, 3 patients had LASIK, 3 had ND-YAG capsulotomy, 2 patients were aphakic, 2 patients with high myopia more than 18-20 D between age group of 18-20 yrs also presented with GRT (Table 1).

17 eyes were operated under local anesthesia, and 3 under general anesthesia. In group A, 360° peritomy was done followed by tying of the four recti muscle and placement of an encircling equatorial band No. 240 (2.5 mm) Sclera tunnel were made , but not tied with sleeve till the retina is flat under the PFCL.While in group B direct 23G vitrectomy with trocar cannula was done.

Conventional 3-port pars plana vitrectomy (PPV) procedure using 23-gauge vitrectomy system coupled with non-contact wide field viewing system (RESIGHT ZEISS). Triamcinolone assisted vitrectomy was performed, PVD(posterior vitreous detachment) induction was done only in trauma cases while other cases with GRT already had PVD, Then perfluorocarbon liquid (PFCL) was injected into the vitreous cavity to unroll the retina and displace the subretinal fluid. This was followed by diathermy of the edges of the tear, excision of the anterior flap, and smoothening of the edges of the posterior flap. Meticulous removal of the peripheral vitreous base under wide field viewing with indentation with all efforts made to remove as much vitreous as possible. Under PFCL tamponade, 360° laser (3-4 rows extended up to the retinal periphery) was applied to seal the retina. Finally, tightening the encircling silicon 360° band followed by direct PFCL/silicon oil (1000 Cs) exchange. The height of the buckle aimed to be relatively low and broad to minimize radial folds formation. All patients were instructed for postoperative face down for 8 hours daily for at least seven days. All surgeries were done by one surgeon (SAD). In phakic eyes, the lens was spared in all cases. This treatment was a part of standard patient care and not specific for the study.

Silicon oil removal, with or without cataract surgery, was planned within 4–6 months from the initial surgery. All patients were followed up regularly for at least six months after silicone oil removal with complete ophthalmological

examination on each visit with special attention to best-corrected visual acuity (BCVA), lens status, IOP and peripheral retinal state.

Complete anatomical success was defined as complete retinal attachment after silicone oil removal at the 6th postoperative month, while incomplete success was considered in eyes where the retina remained detached under silicon oil or redetached after silicon oil removal.

Results

20 eyes of 20 patients suffering from GRT were included in this study. The range of age was between 18-65 years. PVR in group A was grade A in 4 eyes, grade B in 5 eyes and grade C1 in 1 eye. Similarly in group B grade A in 5 eyes ,grade B in 4 eyes and grade C1 in 1 eyes. At the initial procedure, 12 eyes were phakic, 6 eyes were pseudophakic and 2 eyes were aphakic. In all phakic eyes, the lens was spared in the primary intervention.

The range of GRT was from 90-270 (Table 1). From which 3 had superior GRT and 4 had inferior GRT in group A while in group B, 6 had superior GRT and 4 had inferior GRT .Superior GRT can be managed without a belt buckle with good success rate. The macula was attached in all cases except 7 cases preoperatively. Preoperative visual acuity was from hand movements (HM) to 6/60. Retinal attachment with primary procedure was achieved in 14 eyes. From the remaining 6 eyes, 3 eyes had retinal detachment due to opening of giant retinal tear during SOR in group A, these cases were managed by retinotomy (RR), endolaser and ReSOI (5000Cs) and 3 eyes had recurrent RD during SOR in group B, in these cases belt buckle and ReSOI was done. In 5 eyes retina was successfully attached after the second procedure with no recurrence after the removal of silicon oil while in remaining one eye the visual acuity was poor which further went into phthisis.

The comparison between extent of GRT <120 and > 120 was done which showed difference of association between two groups to be statistically insignificant at P=.05 (Table 2).

At the end of follow up period , BCVA improved in 19 eyes and worsened in 1 eye. 12 phakic eyes developed cataract during follow up period and were managed by phacoemulsification and lens implantation during silicon oil removal. Dispersed vitreous haemorrhage was seen in one eye which resolved spontaneously within 2 weeks. 2 eyes had secondary glaucoma and these were managed with topical antiglaucoma drugs and further SOR and endo CPC (cyclophotocoagulation) was done.

Discussion

GRT was a very common complication after fishing the nucleus in an era of ECCE(extra capsular extraction). Now a days GRT is seen in cases of trauma, highmyopia, post

Table 1: Details of the patients in both groups

Age	Duration of RD	CAUSE	Extent OF GRT	PVR	Lens status	BCVA	Complications	Time of redetachment after SOR	Resurgery
Group A									
25	5 days	BT	Sup.170	A	PHAKIC	6/24	Sec. Glaucoma	-	Topical +SOR
55	10 days	After Yag	Sup.120	A	Psedophakic	6/12	Dispersed VH	-	Cleared spontaneously
20	2 weeks	High myopia	Sup.200	B	Phakic	6/60	-	-	-
55	7 days	Aphakia	Sup.90	B	Aphakia	f.c.	-	-	-
50	2 weeks	After cat surgery	Inf. 180	B	Pseudophakia	f.c	Opeining of GRT	6weeks	SOR+RR+EL+RE SOI (5000)
18	10 days	High myopia	Sup.270	A	Phakic	6/60	Opening of GRT	2 weeks	L+Revit+Resoi+EL
52	7 days	After cat	Inf. 180	C1	Psedudophakic	6/60	Rec. RD	4 weeks	SOR+RR+ReSOI+EL
18	5 days	BT	Sup.120	B	Phakic	6/60	Sec.Glaucoma	-	Topical +SOR+EL
23	10 days	After lasik	Sup.140	A	Phakic	6/36	-	-	-
56	2 weeks	After cat surgery	Inf 210	B	pseudophakic	H.M.	Sec. Glaucoma	-	Topical+Endecpc during SOR
Group B									
20	2 days	BT	Sup.150	A	Phakic	6/18	-	-	-
45	7 days	After Yag	Sup.100	A	Pseudophakic	6/18	-	-	-
21	5 days	After Lasik	Sup.120	A	phakic	6/24	-	-	-
22	2 weeks	BT	Inf.170	B	phakic	6/60	Rec. RD	1week	BB+RESOI+EL
25	2 days	After Lasik	Sup.160	B	phakic	6/60	-	-	-
35	5 days	BT	Inf.180	C1	phakic	6/60	Opening of GRT during SOR	10 days	BB+RESOI+EL
65	7 days	After Yag	Inf.110	B	Pseudophakic	6/36	-	-	-
28	10 days	BT	Inf.180	B	phakic	6/60	Rec. RD	2 weeks	BB+RESOI+ EL
60	5 days	Aphakia	Sup.110	A	aphakic	H.M	-	-	--
45	8 days	BT	Sup.270	A	phakic	F.C	-	-	-

Table 2: Comparison between extent of GRT

GRT	A	B	Total
<120	1	3	4
>120	9	7	16
			20

Chi. Square 1.25
Degree of freedom 1
Probability 0.264
Insignificant at P 0.05
Difference of association between two groups is considered to be statistically insignificant at P=.05

LASIK and unlasered lattices, after YAG and in diabetic vitrectomy (after high vaccum vitrectomy).

Fishing still remaining the common cause for inferior GRT's. Meticulous vitrectomy and endolaser on table under PFCL have greatly enhance the success rate of GRT's surgery. Timely referral is very important otherwise PVR changes develop very quickly due to liberation of RPE cells making the surgery difficult.

Superior GRT's in our study can be managed without a belt buckle (BB) with good success rate Perfluorocarbon liquids have revolutionised the treatment of GRT by allowing the steam rolling of retina flat in a controlled posterior to anterior fashion by displacing the subretinal fluid through the large peripheral retinal opening and heavy liquid that can be exchanged first with air then with silicon oil or long acting gas . Laser is preferred over cryotherapy to prevent development of PVR changes.

Generally, PPV combined with BB is the standard treatment for RD with severe PVR and for RD with inferior breaks.[2] During the past decade, several authors addressed the view of PPV and gas alone without SB as a safe and effective form of treatment for uncomplicated RD with inferior breaks[3].

Moreover, PPV has been successfully used without BB for complicated RD such as pseudophakic RD and RD with PVR[4].

In the study herein, GRT were successfully treated with combined PPV and encircling belt buckle, and the tear was further stabilized with adjuvant 360° laser retinopexy and silicon oil tamponade. This approach afforded good anatomical and visual outcomes.

Management of GRT is a challenging surgical problem with many different approaches to manage; however, when the GRT is more than 120°, the intervention is rather complex.

Scleral buckling with or without belt buckle in the management of GRT is still debatable. In this study, an encircling buckle was placed only in 10 cases during primary intervention, and in 3 cases during resurgery in group B as these patients had inferior break. The rationale is that GRT more than 180° has a high risk of recurrence and it is essential to target successful attachment in the primary surgery as reoperation is rather complex in these cases and the outcome is often poor. Also, previous studies reported that the larger the size of the giant tear, the more the risk of redetachment[5]. In inferior retinal break, buckle is often needed, in addition to silicon oil tamponade, to support the inferior quadrant as silicon oil does not tamponade the inferior retina. Now a days newer technique are used for the management of inferior pvr and inferior breaks as Inj. ozurdex ,inj,methotrxate but in our study we have not used any of these.

Machemer et al.[6] showed that the achievement of retinal reattachment occurred by three aspects - relief from traction, alteration of intraocular currents, and chorioretinal adhesion. In this study, all vitreous was completely removed, all traction was completely released, and endolaser or cryotherapy was performed for all breaks. Some authors stated that tamponade agents should close the retinal breaks within the early hours after surgery; after that time fluid will not enter the subretinal space through the break and chorioretinal adhesion can be achieved with photocoagulation or cryopexy.

Some surgeons prefer adjunctive beltbuckle as a primary procedure in all GRT aiming to reduce the failure rate. Their rationale was that belt buckling reduces the early and late tractional forces, and supports areas of undetected retinal breaks[7,8] Meanwhile, other surgeons reserve belt buckle only for second intervention[9]).

Previous studies reported successful repair of GRT with PPV and 360° laser retinopexy without belt buckling. Kreiger et al.10 previously treated 11 cases with GRT with PPV and silicon oil tamponade with strong emphasis on extended laser treatment to the whole peripheral retina to create strong adhesion and to minimize secondary tears due to anterior PVR. They didn't place a scleral buckle in their study. Their procedure was successful in 10 (90.9%) eyes and they experienced recurrence in only one (9.1%) case occurred as the result of posterior PVR. Superior GRT without PVR can be managed without band whereas inferior GRT should be supported with belt buckle.

Similarly, Ambresin et al.[1] treated a series of 18 eyes with the same technique, the repair of GRT with PPV, PFCL, SOI and retinopexy and they experienced successful retinal attachment in 16 (88.8%) eyes and recurrence in only two eyes.

On the other hand, in a prospective randomized comparative study conducted by Sharma et al.[8] they used 360° degree 9 mm silicone band buckle in 10 cases and none in 11 cases. They reported that the primary success was 100% in scleral buckle group as compared to 37.5% in nonscleral buckle group, and that resurgeries were required in 8 out of 11 cases in non-scleral buckle group. The final visual acuity was better in eyes treated with scleral buckle.

Also, the intraoperative use of PFCL was essential to unfold the retina, to displace subretinal fluid and blood, and to stabilize the retina-providing counter traction for any membrane dissection, and to avoid the need for drainage retinotomy.[5,11] Retinal slippage in the presence of buckle was avoided by doing direct PFCL/silicone exchange and tightening of the scleral buckle was done before exchange to ensure complete silicone oil fill.

Controversy remains whether lens extraction is necessary or not in the management of fresh giant tears. The advantage of lens removal is the better visualization of vitreous base. In this series, it was found that lens removal was not necessary and may minimize the surgical trauma in such complex

procedure. In addition, intraocular lens power calculation is often inaccurate in eyes with GRT when the macula is off. Moreover, the use of wide angle viewing systems coupled with indentation for giant tear surgery improves the ability to see the peripheral retina in phakic and pseudophakic eyes and makes thorough vitreous base shaving feasible.

This doesn't agree with Kreiger et al.[10], who believed that a lensectomy is necessary for optimal removal of the basal vitreous and provides excellent visualization postoperatively for photocoagulation and avoids subsequent cataract surgery. Sharma et al.[8] considered lens removal only in cataractous eyes, subluxated lenses or the presence of PVR as the main indications for lens removal in GRT.

Also, many eyes with GRTs are often highly myopic and the pars plana region is often wide and broad. This anatomic variation allows adequate exposure of the vitreous base with less risk of lens touch. However, the initial surgery for GRT should not be compromised to preserve the lens. In the current study, cataract developed in 12 phakic eyes and phacoemulsifaction was done during silicon oil removal thus avoiding disadvantages of multiple surgeries.

Conclusions

This study has shown that PFCL and silicon oil tamponade have greatly increased the success rate of GRT surgery .Most of inferior GRT's need belt buckle with or without sclera buckle, as silicon oil fail to tamponade inferior retina, So in a selective cases of superior GRT vitrectomy without BB can be attempted with good results. Belt buckle in inferior GRT greatly increases the success rate.

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