ORIGINAL ARTICLE

Scleral Buckling and Pars Plana Vitrectomy versus Vitrectomy alone for Primary Repair of Rhegmatogenous Retinal Detachment

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ABSTRACT

Aim: To assess outcomes of combination of scleral buckling (SB) and pars plana vitrectomy (PPV) versus PPV alone in the primary repair of rhegmatogenous retinal detachments.

Methodology: This study was randomized control trial conducted in Opthalmology department of Nishtar hospital Multan, Bahawal Victoria Hospital, Bahawalpur, and Mayo Hospital Lahore. from January 2015 to January 2018. A total number of 200 eyes of two hundred patients were enrolled in this study. Non probability consecutive sampling technique was used. This study subjects were divided into two equal groups' by lottery method into PPV and SB with PPV respectively. Mean and standard deviation was calculated for quantitative data like age, follow up months, size of retinal detachement and frequency percentages for qualitative data like gender, Preoperative PVR, Phakic lens, Intraocular lens etc. χ^2 was applied to see difference in both groups and P value ≤ 0.05 was taken as significant.

Results: The mean age, follow-up and retinal detachment size of PPV was 54.80±5.64 years, 27.94±2.11 months and 4.81±2.26 clock hours respectively. Failed primary surgery and recurrent retinal detachment was observed as 0 (0%), 12(12%) respectively, for PPV and 0 (0%), 15(15%) respectively, for SB with PPV. Surgeries to attach, one, two, three and four was noted as 84 (84%), 5(5%), 4(4%) and 7(7%) respectively and Surgeries to attach, one, two, three and four was noted as 82 (82%), 16 (916%),1 (1%) and 1 (1%) respectively, for SB with PPV.

Conclusion: Results of our study revealed that both techniques PPV alone and SB with PPV are equally effective for primary repair of RRDs.

Keywords: Pars plana vitrectomy, Scleral buckling, Rhegmatogenous retinal detachment. Eye.

INTRODUCTION

The detachment of neurosensory retina from the retinal pigment epithelium is termed as retinal detachment. The main culprit for most of the RRD is vitreoretinal traction. Posterior vitreous detachment occurs as a result of aging process which makes the vitreous more syneretic[1]. The presence of strong vitreoretinal adhesions and development of PVD can result in the formation of retinal tears in some eyes. Thence, fluid from the liquefied vitreous can percolate beneath the tear, resulting in retinal detachment.

The technique of pars plana vitrectomy for the cure of RD has been adopted widely for the last 20 years[2]. Since intraocular tamponade by gas or silicone oil is unable to present direct support to the inferior breaks, such breaks prove to be an added challenge in the surgery. Therefore, the procedure of scleral buckling is put to use to make an inferior indent in order to support the inferior retina [3]. All the same, scleral explants with PPV are known to cause risks such as hypotony while placing the buckle accompanied by choroidal hemorrhage. A number of postoperative complications have been reported[4]. For instance extrusion, intrusion or infection of explant material, motility problems, refractive changes, diplopia, and anterior segment ischemia was observed[5].

For such cases, primary vitrectomy is a safe substitute as it brings about a direct approach to vitreous traction and prevents complications association with scleral explant [6]. It has been brought into focus that supplementary SB is nonessential to provide a support to the inferior retina, while good results can be obtained by PPV only in case of inferior breaks[7]. This study has been designed to establish if the scleral explants are essential during PPV in the management of RRD associated with inferior breaks in phakic eyes, and not complicated by PVR ≥grade C[8]. A randomised prospective comparison of primary vitrectomy and combined scleral buckling-pars plana vitrectomy (SB/PPV), with regards to the primary and final success rates in anatomic and functional aspects as well as the rates of complications[9,10]. Our study is a local reference for researchers of this region of south Punjab Pakistan.

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METHODOLOGY

It is a randomised control trial of pars plana vitrectomy and combined SB/PPV has been determined in this study in the phakic RRD with inferior breaks. Consecutive phakic eyes having primary RRD along with inferior breaks anterior to the equator between 4 and 8 'o'clock position, not worsen by proliferative vitreoretinopathy of grade C or more, having a clear lens were the candidates of study. The duration of study was one year and the sample size proved to be one of the logistical facilities. The study was conducted at Opthalmology department of Nishtar hospital Multan, Bahawal Victoria Hospital, Bahawalpur, and Mayo Hospital Lahore. from January 2015 to January 2018. The exclusion criteria included PVR grade C or greater, no retinal break detachment, aphakia or pseudophakia, giant retinal tear and history of any previous intra-ocular surgery. Approval from the ethics committee was obtained before starting the study. Patients gave informed consent before the surgery. Patients were randomly allocated to treatment groups with each group comprising of 100 eyes. All the patients received one set of sequentially numbered randomization envelopes having either one of the two surgical options and the details of the treatment were present in the envelope. The surgical procedure was performed under local peribulbar anesthesia by one surgeon. 360-degree explant (segmental 7 mm silicone tire) was used to support the inferior retinal breaks while performing the combined scleral buckling-vitrectomy. A three port 20 gauge pars plana vitrectomy were performed

on all the eyes which released the vitreous traction around the break and removed the accessible vitreous with the use of wide-angle lenses and scleral indentation. Triamcinolone acetate was used to create the posterior vitreous detachment, if not already present. Then fluid-air exchange was done with the help of internal drainage of subretinal fluid either through the break or retinotomy. A diode laser endophotocoagulation (360 degree along with delineation of the break and retinotomy) was used for the purpose of retinopexy. An air-silicone oil (5000 cS silicone oil) exchange was also performed in order to achieve a complete fill of the vitreous cavity.

Head positioning was instructed for the patients of both groups to promote tamponade of retinal breaks during first two postoperative weeks. Antibiotics, anti-inflammatory, and cycloplegic drops were administered postoperatively for a month as determined by the department protocol. Silicone oil was removed at 3 months and was combined with phacoemulsification if any signs of cataract were seen.

The evaluation of all the eyes was done at 7th day, at 1 month, and 6 month of follow up. The eyes were evaluated for the following parameters: Best corrected visual acuity (BCVA), IOP (always measured by applanation tonometry); lens status; and fundus examination. Those patients who experienced redetachment were subjected to another surgery with silicone oil tamponade and causes of surgical failure were determined. In the surgery, the explant was not applied. Post-op complications were also noted. Only those patients were included in the final analysis that completed 6 months of follow up. Mean and standard deviation was calculated for quantitative data like age, follow up months, size of retinal detachement and frequency percentages for qualitative data like gender, Preoperative PVR, Phakic lens, Intraocular lens etc. χ^2 was applied to see association and p value ≤ 0.05 was taken as significant.

RESULTS

A total number of 200 eyes were enrolled in this study. This study was divided into two equal groups i.e. 100 in each, PPV and SB with PPV respectively. The mean age, follow-up and retinal detachment size of PPV was 54.80±5.64 years, 27.94±2.11 months and 4.81±2.26 clock hours respectively. There were 82(82%) males and 18(18%) female. Preoperative PVR was noted as 8(8%). Phakic lens and Intraocular lens was observed as 41% (n=41) and 68(68%) respectively. Retinal break or detachment in fellow eye, Inferior breaks, Lattice (>6 clock hours) and Posterior vitreous detachment was noted as 25(25%), 14(14%), 6(6%) and 93(93%) respectively. Macula on and off was noted 48(48%) and 52(52%) respectively. Myopia (>6 diopters) was noted as 24(24%).While, the mean age, follow-up and retinal detachment size of SB with PPV was 55.60±4.51 years, 31.93±1.26 months and 6.48±2.09 clock hours respectively. There were 63(63%) males and 37(37%) female. Preoperative PVR was noted as 40(40%). Phakic lens and Intraocular lens was observed as 61(61%) and 41(41%) respectively. Retinal break or detachment in fellow eye, Inferior breaks, Lattice (>6 clock hours) and Posterior vitreous detachment was noted as 34(34%), 57(57%), 19(19%) and 90(90%) respectively. Macula on and off was noted 27(27%) and 73(73%) respectively. Myopia (>6 diopters) was noted as 19(19%) The differences were statistically insignificant, except gender (p=0.003), follow-up (p=0.000), Preoperative PVR (p=0.000), Phakic lens (p=0.005), Intraocular lens (p=0.000), Inferior breaks (p=0.000), Lattice (>6 clock hours) (p=0.005), Macula (p=0.002) and Retinal detachment size (p=0.000) (Table 1).

Vitrectomy gauge 20G, 23G and 25G was noted as 43(43%), 44(44%) and 16(16%) respectively, for PPV. Tamponade Air, 20% SF6, 14% C3F8 and 1000 cs silicone oil was observed as 8(8%),68(68%), 1(1%) and 17(17%) respectively, for PPV. Vitrectomy gauge 20G, 23G and 25G was noted as 59(59%), 36(36%) and 4(4%) respectively, for SB with PPV. Tamponade Air, 20% SF6, 14% C3F8 and 1000 cs silicone oil was observed as 3(3%), 58(58%),35(35%) and 20(20%) respectively, for SB with PPV. The differences were statistically insignificant, except vitrectomy gauge 25G (p=0.000) and tamponade14% C3F8 (p=0.000) (Table 2).

Failed primary surgery and recurrent retinal detachment was observed as 0%, 12(12%) respectively, for PPV. Surgeries to attach, one, two, three and four was noted as 84(84%), 5(5%), 4(4%) and 7(7%) respectively, for PPV. PVR formation, Intraocular pressure over 25mmHg, macular edema, postoperative cataract, A/C inflammation >2+, A/C fibrin, endophthalmitis and choroidal/subretinal hemorrhage was observed as 17(17%), 43(43%), 12(12%), 38(38%), 10(10%), 4(4%), 1(1%) and 10(10%) respectively, for PPV. Failed primary surgery and recurrent retinal detachment was observed as 0%, 15(15%) respectively, for SB with PPV. Surgeries to attach, one, two, three and four was noted as 82(82%), 16(16%6), 1(1%) and 1(1%) respectively, for SB with PPV. PVR formation, Intraocular pressure over 25 mmHg, Macular edema, Postoperative cataract, A/C inflammation >2+, A/C fibrin, Endophthalmitis and Choroidal/subretinal hemorrhage was observed as 21(21%), 43(43%), 28(28%), 54(54%), 7(7%), 5(5%), 0% and 5(5%) respectively, for SB with PPV. The differences were statistically insignificant, except surgeries to attach (p=0.024) and macular edema (p=0.005) (Table 3).

The mean age and RD size of the patients was 57.63±5.74 years and 5.42±2.04 clock hours respectively. Preoperative PVR was observed a36(36%). Type of surgery PPV and SB with PPV was 19(19%) and 20% (n=20) respectively, for PPV. Recurrent RD, Intraocular pressure over 25mmHg, Macular edema, Postoperative cataract, A/C inflammation >2+, A/C fibrin and Choroidal/ subretinal hemorrhage was observed as 81(81%),48(48%), 33(33%), 38(38%), 16(16%), 15(15%) and 6(6%) respectively.

The mean age and RD size of the patients was 59.63±5.74 years and 4.90±1.49 clock hours respectively. Preoperative PVR was observed as 36(36%). Type of surgery PPV and SB with PPV was 86(86%) and 80(80%) respectively, for PPV. Recurrent RD, Intraocular pressure over 25 mmHg, Macular edema, Postoperative cataract, A/C inflammation >2+, A/C fibrin and Choroidal/subretinal hemorrhage was observed as 4(4%), 41(41%), 17(17%), 39(39%), 4(4%), 3(3%) and 9(9%) respectively. The differences were statistically in significant, except preoperative PVR (p=0.004), type of surgery PPV (p=0.000) and SB with PPV (p=0.000). Recurrent RD (p=0.000), macular edema (0.009), A/C inflammation >2+ (p=0.005) and A/C fibrin (p=0.003).(Table. 4).

Table-I: Demographic and preoperative exam findings for PPV versus SB with PPV

Characteristics	PPV (n=100)	SB with PPV (n=100)	P value
Age	54.80±5.64	55.60±4.51	**p =0.270**
Gender			
Male	82 (82%)	63 (63%)	**p=0.003**
Female	18 (18%)	37 (37%)	
Follow-up (months), mean	27.94±2.11	31.93±1.26	**p=0.000**
Preoperative PVR	8 (8%)	40 (40%)	**p=0.000**
Phakic lens	41 (41%)	61 (61%)	**p=0.005**
Intraocular lens	68 (68%)	41 (41%)	**p=0.000**
Retinal break or detachment in fellow eye	25 (25%)	34 (34%)	**p=0.163**
Inferior breaks	14 (14%)	57 (57%)	**p=0.000**
Lattice (>6 clock hours)	6 (6%)	19 (19%)	**p=0.005**
Posterior vitreous detachment	93 (93%)	90 (90%)	**p=0.447**
Macula			
On	48 (48%)	27 (27%)	**p=0.002**
Off	52 (52%)	73 (73%)	
Myopia (>6 diopters)	24 (24%)	19 (19%)	**p=0.389**
Retinal detachment size (clock hours), mean	4.81±2.26	6.48±2.09	**p=0.000**

Table 2: Surgical instrumentation and tamponade agent for PPV versus SB with PPV

Characteristics	PPV (n=100)	SB with PPV (n=100)	P value
Vitrectomy gauge			
20G	43 (43%)	59 (59%)	**p=0.024**
23G	44 (44%)	36 (36%)	**p=0.248**
25G	16 (16%)	4 (4%)	**p=0.000**
Tamponade			
Air	8 (8%)	3 (3%)	**p=0.121**
20% SF6	68 (68%)	58 (58%)	**p=0.143**
14% C3F8,	1 (1%)	35 (35%)	**p=0.000**
1000 cs silicone oil,	17 (17%)	20 (20%)	**p=0.585**

Table 3: Analysis of postoperative findings for PPV versus SB with PPV

Characteristics	PPV (n=100)	No PVR (n=100)	P value
Failed primary surgery,	0 (0%)	0 (0%)	p=0.535
Recurrent retinal detachment,	12 (12%)	15 (15%)	
Surgeries to attach			
One	84 (84%)	82 (82%)	p=0.024
Two	5 (5%)	16 (16%)	
Three	4 (4%)	1 (1%)	
Four	7 (7%)	1 (1%)	
PVR formation,	17 (17%)	21 (21%)	p=0.471
Intraocular pressure over 25 mmHg,	43(43%)	43 (43%)	p=1.0
Macular edema	12 (12%)	28 (28%)	p=0.005
Postoperative cataract,	38 (38%)	54 (54%)	p=0.023
A/C inflammation >2+,	10 (10%)	7 (7%)	p=0.447
A/C fibrin,	4 (4%)	5 (5%)	p=0.733
Endophthalmitis	1 (1%)	0 (0%)	p=0.316
Choroidal/subretinal hemorrhage	10 (10%)	5 (5%)	p=0.179

Table 4: Analysis of postoperative PVR observation

Characteristics	PPV (n=100)	No PVR (n=100)	P value
Age (years)	57.63±5.74	59.63±5.74	
Preoperative PVR	36 (36%)	36 (36%)	p=0.004
RD size (clock hours)	5.42±2.04	4.90±1.49	p=0.042
Type of surgery			
PPV	19 (19%)	86 (86%)	p=0.000
SB with PPV	20 (20%)	80 (80%)	p=0.000
Recurrent RD	81 (81%)	4 (4%)	p=0.000
Intraocular pressure over 25 mmHg	48 (48%)	41 (41%)	p=0.319
Macular edema	33 (33%)	17 (17%)	p=0.009
Postoperative cataract	38 (38%)	39 (39%)	p=0.884
A/C inflammation >2+	16 (16%)	4 (4%)	p=0.005
A/C fibrin	15 (15%)	3 (3%)	p=0.003
Choroidal/subretinal hemorrhage	6 (6%)	9 (9%)	p=0.421

DISCUSSION

Literature available on this topic still unclear that when to use scleral buckle in PPV RRD, many preoperative things should be kept in concern like lens status, presence of inferior break, extent of detachment and PVR presence. In primary RRD many techniques can be used by the surgeons, PPV alone, SB alone, SB with PPV, but PPV alone for primary RRD repair got fame[11,12].

In a study conducted by Escoffery et al[13] concluded that vitrectomy alone is effective and sufficient mode of treatment for RRD repair. He used vitrectomy on aphakik, phakik and pseudophakik eyes and got 79% achievement. Another study conducted by Colyer MH et al[14] and concluded that PPV is better mode of treatment for primary RRD as compared any other technique.

In another study conducted by Chong DY et al[15] also reported similar findings that PPV is effective and favorite technique for primary repair of RRD. PPV is easy to use and have better outcome when compared with any other technique like SB or SB with PPV. These findings are also comparable with our results.

In a study conducted by Luke B Lindsell et al[16] reported that PPV with SB and PPV alone were equally effective for the treatment of primary repair of RRD in single surgery anatomic success both procedures were similar (85% with PPV and 83% with SB with PPV), and final outcome was100% in both groups. These findings were similar to our study. In PPV group 84% patients achieved success in one surgery and 82% in PPV and SB group.

In a study by Wong CW et al[17] reported that there was no significance difference in both group regarding SSAS and similar findings were observed in lens status. Results of this study were similar to our study. In our study we found no statistical difference regarding SSAS and visual acuity of in both groups. In a previous study Orlin A et al[18] also reported similar finding about lens status and SSAS as in our study. Another study on this topic by Schaal S et al[19] also reported similar results.

In our study preoperative PVR observed 36%, it was 17% in study by Luke B Lindsell et al[16] and similar in a meta analysis by Soni et al[20]. Failed primary surgery was not observed in both groups and recurrent retinal detachment was occurring in 12% in PPV group and 15% in PPV and SB group. We also found that significant lattice degeneration, inferior breaks and preoperative PVR have no significant effect on SSAS.

CONCLUSION

Results of our study revealed that both techniques PPV alone and SB with PPV are equally effective for primary repair of RRDs.

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