ORIGINAL ARTICLE

Scleral Buckling and Pars Plana Vitrectomy versus Pars Plana Vitrectomy alone in the Treatment of Rhegmatogenous Retinal Detachment with inferior break

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ABSTRACT

Aim: To compare scleral buckling and pars plana vitrectomy versus pars plana vitrectomy alone in the treatment of inferior RD with inferior retinal breaks.
Design: The present study was a randomized controlled trial.
Study Settings: It was conducted at the Ophthalmology Unit III, Mayo Hospital Lahore over 1 year from January 2017 to December 2017.
Study Procedure: 30 consecutive patients of both genders aged between 20-60 years presenting with rhegmatogenous retinal detachment with inferior break were included after written informed consent. These patients were randomly allocated into 2 treatment groups. Patients in Group-A underwent scleral buckling and pars plana vitrectomy while those in Group-B underwent pars plana vitrectomy alone. Outcome was measured in terms of successful sealing of breaks and visual acuity at 3 and 6 months follow-up.
Results: In this study, the mean age of the participants was 42.6±12.5 years. There were 18 (60.0%) male and 12 (40.0%) female patients with a male to female ratio of 1.5:1. The combined surgical procedure of PPV and SB was associated with significantly better anatomical outcome at 3 months follow-up (83.3% vs. 60.0%; p-value=0.045). However, there was no statistically significant difference after 6 months (86.7% vs. 76.7%; p-value=0.317). Combining PPV with SB was however associated with better functional outcome in terms of visual acuity in such patients.
Conclusion: Combining pars plana vitrectomy with scleral buckling was found to good anatomical outcome and was associated with higher visual acuity in patients with rhegmatogenous retinal detachment. Thus it can be advocated that in future practice scleral buckling should also be performed in addition to pars plana vitrectomy to improve the anatomical and functional outcome.
Keywords: Rhegmatogenous Retinal Detachment, Vitrectomy, Scleral Buckling.

INTRODUCTION

Rhegmatogenous retinal detachment (RRD) is a potentially blinding ophthalmic condition resulting from separation of upper neurosensory retina (NSR) from the retinal pigment epithelium below and the deposition of fluid within this latent space[1]. The term rhegmatogenous has been taken from the Greek word rhegma, which means a break or a discontinuity. It is the most frequent retinal emergency causing loss of vision, with a prevalence of 1 in 10,000 persons per year[2]. The threat is maximum in the age between 55 to 70 years. The danger of retinal detachment in the contralateral eye is from 3.5% to 5.8% in the first year and 9% to 10% in subsequent 4 years period; existing retinal detachment in one eye is thus the most important risk factor for rhegmatogenous retinal detachment in the contralateral eye[3]. The most common cause of RRD is vitreal degeneration. Vitreous is mainly composed of water (96%-98%) and is steadied by collagen fibers that extend into the internal layers of the retina[4]. This vitreous scaffold suffers physiological degeneration which has been revealed as early as the initial few years of life[5]. With the passage of time the collagen fibers harden, occasionally resulting in visualization of the mobile dots known as "floaters" or muscae volitantes. This increasing loss of elasticity ultimately leads to splitting of the vitreous from the retina[4].

Not so long ago, rhegmatogenous retinal detachment was an incurable disease eventually leading to irreversible loss of vision. However, the scenario has changed dramatically now, as effective treatment options were established and trialed. This started with the development and promotion of scleral buckling by Charles Schepens in 1951, which carried a high success rate and soon became the procedure of choice for RRD[4]. Robert Machemer in the 1970s proposed pars plana vitrectomy (PPV) which demonstrated better efficacy and became the gold standard treatment in patients with rhegmatogenous retinal detachment. Still later, Hilton and Grizzard in 1986 introduced pneumatic retinopexy as an OPD procedure proficient enough for treating select cases of rhegmatogenous retinal detachment [5]. At present, various types of retinal re-attachment surgical procedures exist, comprising pneumatic retinopexy (PR), scleral buckling (SB), and parse plana vitrectomy (PPV) with or without scleral buckling. The reported anatomical success rate of scleral buckling varies from 60% to 80%[5,6]. The main

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reasons behind unsuccessful scleral buckling include small retinal tears and anterior location of retinal tears that cannot be detected and development of proliferative vitreoretinopathy (PVR)[7]. With the recent developments in vitrectomy procedures, pars plana vitrectomy (PPV) has become the procedure of choice by many surgeons. This is largely due to the fact that small and inferior retinal tears can be detected, sub-retinal fluid can be drained, retinopexy is performed, and proliferative vitreoretinopathy (PVR) is less likely to develop[8-10].

Choosing which patients will benefit from an additional scleral buckling at the time of parse plana vitrectomy for primary rhegmatogenous retinal detachment repair is largely determined by preoperative exam findings and surgeon's predilections. Certain features conventionally related with higher risk for primary surgical failure have been used to rationalize placement of scleral buckle at the time of pars plana vitrectomy, comprising large detachment size, extensive lattice degeneration, phakic lens status, pre-existing proliferative vitreoretinopathy, and inferior breaks[11-13]. However, other evidence advocates that an additional scleral buckle offers no supplementary benefit over parse plana vitrectomy alone in these circumstances[14-16]. Due to this unsolved controversy in the existing literature, need for the present study was felt.

STUDY PROCEDURE

The present study was a randomized controlled trial carried out at the Department of Ophthalmology, Mayo Hospital Lahore over 1 year from January 2017 to December 2017. Sample size of 30 cases was calculated with 95% confidence level and 5% margin of error while taking expected frequency of successful treatment to be 100% with PPV and SB[17] while 76.9% with PPV alone[18]. Non-probability, consecutive sampling was done and 60 patients of both genders aged between 20-60 years were included into this study after taking written informed consent. Patients were considered for surgery with inferior retinal breaks between 4 to 8 o'clock positions. Both Phakic and pseudophakic were included while those with previous ocular surgery, ocular trauma, high myopia, proliferative vitreoretinopathy, history of diabetic or hypertensive retinopathy and family history of retinal dystrophies were excluded. All patients underwent complete ophthalmic examination with measurement of uncorrected and corrected distant visual acuity, slit lamp examination for anterior segment diseases and indirect ophthalmoscopy for confirmation of diagnosis. Inferior retinal breaks were confirmed and fundus diagrams were drawn. The patients were divided in two groups. Patients in Group-A underwent 23G, 3 ports vitrectomy, through pars plana with endotemponade of 5000cs Silicon oil with scleral buckling while those in Group-B underwent vitrectomy performed by 23G, 3 ports technique, through pars plana, with endotemponade of 5000cs silicon oil alone. All patients were given topical moxifloxacin and topical prednisolone acetate for two weeks. The uncorrected visual acuity and sealing of breaks were assessed at 3 and 6 months post operatively. Demographic details of the patient along with treatment outcome were recorded in a predesigned proforma. All the procedures were performed by vitreoretinal surgeon and all the pre- and post- operative patient's assessments

STUDY RESULTS

The patients with the age ranged from 20 years to 60 years with a mean of 42.6±12.5 years were included in the study. There were 18 (60.0%) male and 12 (40.0%) female patients with a male to female ratio of 1.5:1. It involved right eye in 17 (56.60%) patients as shown in Table 1. There was no statistically significant difference in the study groups in terms of mean age (p-value=0.984), mean baseline visual acuity (p-value=0.695) and gender (p-value=0.592) and side of involvement (p-value=0.795) distribution as shown in Table 2.

Table 1: Demographic Distribution of study participants

Characteristic	**Rhegmatogenous Retinal Detachment n=30**
Age (years)	42.6±12.5
Gender	
• Male	18 (60%)
• Female	12 (40%)
Side	
• Right	17 (56.60%)
• Left	13 (43.33%)

Table 2: Demographic features of study groups

Characteristic	**PPV+SB n=30**	**PPV Alone n=30**	**P value**
Age (years)	42.5±12.6	42.6±12.7	0.984
Gender			
• Male	18 (60.0%)	20 (66.7%)	0.592
• Female	12 (40.0%)	10 (33.3%)	
Side			
• Right	17 (56.7%)	16 (53.3%)	0.795
• Left	13 (43.3%)	14 (46.7%)	
Baseline Visual Acuity	1.19±0.09	1.18±0.11	0.695

Independent sample t-test and chi-square test, observed difference was statistically insignificant, PPV: Pars plana vitrectomy, SB: Scleral buckling

Table 3: Comparison of functional and anatomical outcome

Outcome	**PPV+SB n=30**	**PPV Alone n=30**	**P value**
Visual Acuity			
• Baseline Visual Acuity	1.19±0.09	1.18±0.11	0.984
• Visual Acuity at 3 months	0.73±0.18	0.47±0.12	<0.001*
• Visual Acuity at 6 months	0.58±0.18	0.38±0.11	<0.001*
Treatment Success (sealing of breaks)			
• 3 months	12 (80%)	9 (60.0%)	0.045*
• 6 months	13(86.6%)	11(76.33%)	0.317

Independent sample t-test and chi-square test, * observed difference was statistically significant, PPV: Pars plana vitrectomy, SB: Scleral buckling

At 3 months follow-up, the frequency of successful treatment was higher in patients treated with PPV and SB compared to those treated with PPV alone (86.7% vs.

76.7.0%; p-value=0.045). However, after 6 months follow-up, the frequency of successful treatment was comparable in both the groups (86.7% vs. 76.7%; p-value=0.317) as shown in Table 3. The combined surgical procedure consisting of pars plana vitrectomy and scleral buckling was however associated with significantly better visual acuity at 3 (0.73±0.18 vs. 0.47±0.12; p-value<0.001) and 6 (0.58±0.18 vs. 0.38±0.11; p-value<0.001) months follow-up as shown in Table 3.

DISCUSSION

A number of alternatives are available for treatment of retinal detachment, comprising scleral bucking (SB), pars plana vitrectomy (PPV) alone or in combination with a scleral buckle and pneumatic retinopexy (PR). While scleral buckling (SB) surgery is the conventional technique of retinal re-attachment, the use of pars plana vitrectomy is rising[1,3]. Impending drawbacks of PPV with SB include an increased conjunctival congestion and discomfort during the early postoperative period, acute change in refractive error, and rarely strabismus or acute or sub-acute infection associated with the use of a buckle support[19]. Likely advantages of PPV without SB include minimal trauma, reduced pain and postoperative swelling, reduction in floaters, minimal acute change in refractive error and improved detection of breaks and re-attachment even when individual breaks cannot be traced[17-19]. The current evidence on potential benefits of addition of scleral buckling to traditional parse plana vitrectomy was inconclusive which necessitated the present study[11-16].

In this study, the mean age of the participants was 42.6±12.5 years. There were 18 (60.0%) male and 12 (40.0) female patients with a male to female ratio of 1.5:1. Right eye was involved in 17 (56.60%) patients while it was on left side in 13 (43.33.0%) patients. A similar mean age of 42.9±16.8 years has been reported by Tareen et al. (2016) among patients presenting with rhegmatogenous retinal detachment at Jinnah Post Graduate Medical Centre Karachi with male to female ratio of 1.5:1. They also observed more frequent involvement of right eye and reported it in 53.4% cases[20]. Hussain et al. (2016) reported similar mean age of 47±1.28 years among patients presenting with rhegmatogenous retinal detachment at Lady Reading Hospital, Peshawar. There was male predominance with male to female ratio of 2.1:1[21]. Hashmi et al. (2016) also reported similar male predominance with male to female ratio of 2.1:1 and more frequent involvement of right eye (53.3%) at Aga Khan University Hospital, Karachi. They however, reported much younger mean age of 32.97±17.17 years among such patients[22]. A similar mean age of 40.12±20.43 years has been reported by Takkar et al. (2015) in Indian such patients with much higher male to female ratio of 4.3:1[23]. Much higher mean age of 61±9 years has been reported by Lindsell et al. (2017) with male to female ratio of 2.3:1 among American such patients[17].

We observed that the frequency of successful anatomical outcome was only different at 3 months follow-up and both the groups were comparable after 6 months of surgery. Tareen et al. (2016) in a recent study reported similar insignificant difference in the anatomical outcome of PPV and SB compared to PPV alone (89.8% vs. 85.4%; p-value=0.524) at Jinnah Post Graduate Medical Centre Karachi[20]. Our results are also similar to those of Siqueira et al. (2007) who also observed insignificant difference between PPV+SB and PPV alone (87.0% vs. 85.7%; p-value=1.00) in patients with rhegmatogenous retinal detachment[19]. Similar insignificant difference has been reported by Lindcell et al. (85.0% vs. 83.0%; p-value=0.76) and Rush et al. (89.74% vs. 80.99%; p-value=0.994)[17,24].

We also observed this combined surgical procedure to be associated with better visual acuity at 3 and 6 months follow-up. Our observation is supported by the previous study of Lindsell et al. who also reported higher mean visual acuity with PPV+SB at 3 (0.70 vs. 0.45; p-value=0.006) and 6 (0.55 vs. 0.39; p-value=0.082) months follow-up compared to insignificant difference at baseline (1.19 vs. 1.03; p-value=0.340)[17].

In the light of this evidence, this combined surgery consisting of pars plana vitrectomy and scleral buckling offers better early re-attachment rates and is associated with better visual acuity on short and long term follow-up. Though these results favor the use of this novel approach in future practice, there is need for future studies comparing potential complications of scleral buckling with PPV with PPV alone. This information would help in the selection of more appropriate treatment plan in patients with rhegmatogenous retinal detachment. Such a study is highly recommended in future research.

CONCLUSION

Combining pars plana vitrectomy with scleral buckling was found to improve early anatomical outcome and was associated with higher visual acuity in patients with rhegmatogenous retinal detachment. Thus it can be advocated that in future practice scleral buckling should also be performed in addition to pars plana vitrectomy to improve the anatomical and functional outcome. This study by no means is an exhaustive study due to limitations of time and resources. Further studies need to be conducted to find out the anatomical success after removal of silicone oil.

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