Pak J Med Res
Vol. 58, No. 3, 2019

Original Article

Comparison of Vitrectomy Alone Versus Vitrectomy Plus Encircling Buckle for Primary Inferior Retinal Detachment

Ejaz Ahmed Javed
Department of Ophthalmology, Faisalabad Medical University/ Allied Hospital, Faisalabad.

Abstract

Objective: To observe the post-operative anatomical and visual results of primary vitrectomy alone versus vitrectomy plus encircling scleral buckle (SB) for the treatment of rhegmatogenous retinal detachment (RRD).
Study type, settings and duration: An analytic and comparative study, conducted in Department of Ophthalmology, Allied Hospital, Faisalabad from March 2017 to September 2018.
Methodology: This study was carried out on 50 Patients of RRD with inferior breaks at the Vitreo-Retina center of Eye Department Allied Hospital, FMU, Faisalabad. Each patient was informed and briefed about the study and enrolled after written informed consent .The study patients were divided into two groups named as group I and II, each having 25 patients of rhegmatogenous retinal detachments. The patients in Group I underwent pars-plana vitrectomy alone with silicon oil (SO) injection as internal tamponade and the patients in group II underwent PPV with 360^{o} encircling scleral buckle (SB) and silicon oil (SO) injection as additional internal tamponade. All the cases were operated by single surgeon and with the same vitrectomy machine (Pulsar-II).The essential post-operative parameters were single operation success rate(SOSR) after retinal reattachment. Each patient was followed for 3 months with an interval of 2 weeks between each visit.
Results: Single operation success rate (SOSR) in group I was 76% (19 out of 25 patients) and in group II it was 80% (20 out of 25 Patients). The retinal re-detachment occurred in 24% (6 out of 25 patients) in group I and 20% (5 out of 25 patients) in group II.
Conclusion: Both the surgical procedures had good results as group II had 80% Single operation success rate (SOSR) and group 1 had 76% SOSR .This study showed almost same post -operative results in both groups.
Key words: Rhegmatogenous retinal detachment, pars-plana vitrectomy, scleral buckling.

Introduction

Retinal detachment (RD) is separation of the neurosensory retina from retinal pigment epithelium (RPE) while rhegmatogenous retinal detachment (RRD) is full thickness defect in the sensory retina which permits sub-retinal fluid (SRF) derived from liquefied vitreous to gain access to the sub-retinal space.[1] The accumulation of sub-retinal fluid is a feature of all types of retinal detachments. The forces which keep the retina attached may be metabolic pump of retinal pigment epithelium (RPE), osmatic pressure of the choroid and mild forces of the inter photoreceptor matrix. The typical features of Rhegmatogenous retinal detachment (RRD) are the abnormal mobility of partially liquefied vitreous gel, tractional forces (which can cause a retinal break) and presence of retinal break which allow the passage of liquefied vitreous into the sub-retinal space.[2]

A study by EVRS (European Vitreo-retinal society) of retinal detachment has a huge number of non-randomized, retro-septic study group that proved the surgical strategy to treat un-complicated and complex RRD. The addition of SB was observed useless for un-complicated RRD and most of the subjects had more failure results as compared to Pars-plana vitrectomy (PPV).[3]

The buckle refers to deformation of a structure under stress. The encircling explants and

Corresponding Author:
Ejaz Ahmed Javed
Department of Ophthalmology
Faisalabad Medical University/ Allied Hospital, Faisalabad.
Email: eajaved1@yahoo.com

Received: 23 October 2018, **Accepted:** 23 September 2019,
Published: 15 October 2019

Authors Contribution

EAJ conceptualized the project with literature search, data collection, statistical analysis, drafting, revision and writing of the manuscript.

local explants all are being used synonymously as buckle and this procedure was called buckling.[4]

It is commonly believed by vitreo-retinal surgeons that inferior retinal detachment due to inferior retinal breaks are more difficult to gain final surgical success by PPV alone because shaving of inferior vitreous is difficult.[5]

The scleral buckling has its role in cases of inferiorly located retinal breaks where shaving of vitreous is difficult which may not be protected by internal tamponade like silicon oil or SF6 gas etc.[6] The European vitro-retinal society has suggested surgical strategy for simple rhegmatogenous retinal detachment and found that the use of SB was not useful for treating simple Rhegmatogenous retinal detachment (RRD).[7] The patients who underwent for scleral buckling (SB) got higher rates of failure as compared to PPV alone.[7] The complicated RRDs showed even good post-operative results with Pars-plana vitrectomy (PPV) alone.[7] It is proved in different published studies in various medical journals that scleral buckling (SB) when added to Pars-plana vitrectomy (PPV) may improve single surgical success rate after repair of primary Rhegmatogenous retinal detachment (RRD) while addition of scleral buckling (SB) did not improve final re-attachment success in other studies.[8]

Methodology

This study included 50 patients of primary Rhegmatogenous retinal detachment (RRD) with inferior retinal breaks at eye department of Allied Hospital, Faisalabad Medical University, Faisalabad. After getting approval by the Ethical Committee of the institution, the patients were enrolled to apply the technique of the surgery and so to observe the complications and potential post-operative risks. Tweenty five (25) patients (50%) were subjected to Pars-plana vitrectomy (PPV) + silicon oil without scleral buckling (SB). This group was labelled as group-I and 25 patients (50%) with SB+ PPV + SO and this was called group II. The study time period was expanded from March 2017 to September 2018.

Group I patients were operated under local anesthesia (peribulbar) while group II were operated under general anesthesia.

All the patients having the ocular status of either phakic, aphakicor pseudophakic with inferior single or multiple breaks, located between 4 ‘o’clock to 8 ‘o’ clock hours positions of the globe were included in this study.

All the cases were operated at Eye Department Allied Hospital Faisalabad by single surgeon, with pulsar II vitrectomy machine and with binocular indirect Ophthalmo-microscope (BIOM) fitted on karls kapps operating microscope.

The Patients with following characteristics were excluded from this study:

Rhegmatogenous retinal detachment due to superior retinal breaks, any RRD with proliferative vitreoretinopathy (PVR) of grade B or worse, traumatic retinal detachment, tractional retinal detachment, combined tractional with Rhegmatogenous Retinal detachment, Visual acuity less than perception of light (PL), vitreous hemorrhage, giant retinal tears, established macular disease, hazy cornea severe anterior segment disease, age less than 16 years and above 70 years.

A detailed and comprehensive examination including measuring visual acuity, slit lamp bio-microscope and indirect Ophthalmoscopy was carried out.

In group I the three pars plana ports by trocars of 23 G were made for Pars-plana vitrectomy (PPV) under topical and peribulbar Xylocaine + Bupicain injection. All the vitreous was shaved by pulsar-II vitrectomy machine on binocular indirect Ophthalmo-microscope (BIOM) fitted on Karls Kapps operating microscope after staining with triamcinolone acetate injection. Following this posterior vitreous detachment (PVD) was done, SRF was removed when required by fluid air exchange. Endolaser was applied around the breaks where needed. Silicon oil of 2000 centistokes was injected into the vitreous cavity. The post-operative positioning was maintained for 7 days.

All surgeries in group-II were done under general anesthesia. In group-II a 360° circumferential band (size 240) was passed under four rectos muscles after 360 peritomy and the band was stitched with 5/0 ethibond suture in between the rectus muscles. A 7mm selieve was used to tighten the band at temporal side of the globe. Pars-plana vitrectomy (PPV) was then done by 3 ports by 23G trocars with pulsar-II Optikon machine (Binocular indirect ophthalmo-microscope) fitted on karlskapps microscope. The triamcinolone injection was used for staining and better visualization of vitreous and finally for creating posterior vitreous detachment (PVD). The whole vitreous was shaved completely.

The perfluorocarbon (PFCL), heavy liquid, was used as intraoperative tool and Sub-retinal fluid (SRF) was removed with air fluid interchange. Photocoagulation was applied for retinopexy around the identifiable retinal breaks.

Silicon oil of (SO) 2000 centistoke was injected into the vitreous cavity. Appropriate Post-

operative position was ensured for each patient for a period of 7 days.

The Postoperative retinal attachment with single attempt of surgery at final follow-up time was called single operation success rate (SOSR). If retinal re-detachment occurred after final follow-up period then it was called early surgical failure. Final post-operative results included the anatomical and functional results and none of post-operative PVR.

We used Pearson's Chi-Square and Fisher exact test for comparing proportion of each observed variable in two groups. *p*-value ≤0.05 was decided whether to accept or reject the null hypothesis. Statistical software SPSS version 23 was employed for the analysis.

Results

There were 35 (70%) male and 15 (30%) female patients. Out of these there were 20 Aphakic, 20 Pseudophakic, and 10 Phakic patients. The group-I consisted of 25 patients for PPV+ Silicon Oil and group-II having 25 patients were operated for Scleral buckling (SB) 360 degrees + PPV + Silicon oil. All patients were followed for period of 03 months postoperatively with interval of two weeks in between each visit (Table-1).

Table 1: Comparison of pre-operative characteristics.

	Group-I	*Group-II*
Character	*PPV+SO n=25*	*PPV+SO+SB n=25*
Average age (Years)	51.0	48.0
Male	18	17
Female	07	08
Aphakia % 20	10	10
Psudophakia% 20	10	10
Phakia % 10	5	5
VA range	PL to 6/36	PL to 6/36
IOP mean	16	18
Breaks 1-2	14	16
Breaks 2 or many	11	9

There were 30 (60%) patients having one or two breaks while 20 (40%) patients had two or more breaks. In group-I, there were 10 (40%) aphakic eyes out of these 03 patients of (30%) developed failure. While out of 10 Aphakic eyes in group-II only 2 (20%) got failure. In group-I there were 10 Pseudophakic eyes and 2 (20%) got failure. Similarly the same results were found in group-II (Table-2).

There were 5 Phakic eyes in each I & II group and only one eye (4%) got into failure in each group. So out of 25 eyes in group I, 19 (76%) eyes showed final attachment called single operation success rate (SOSR). While 20 eyes (80%) out of 25 in group-II got attachment (SOSR). The incidence of postoperative PVR was found in 02 eyes (8%) in group I and zero in group II. While failure due to missed breaks was in one eye (04%) in each group. The reopening of original breaks was found in 03 eyes (12%) in group I and 04 eyes (16%) in group II (Table-3).

Table 2: Comparison of single operation success rate between group I and group-II.

	T	*Group-I*		*Group-II*		*p-Value*
		F N (%)	*S N (%)*	*F N (%)*	*S N (%)*	
Aphakic	10	3 (30)	7 (70)	2 (20)	8 (80)	0.606
Pseudop -hakic	10	2 (20)	8 (80)	2 (20)	8 (80)	1
Phakic	5	1 (20)	4 (80)	1(20)	4 (80)	1
Total	25	6 (24)	19 (76)	5 (10)	20 (80)	0.733

Total= T, Failure= F, Success= S

Table 3: Group 1 and group 2 results of single operation success rate (SOSR). (N= 25)

	Group-I N (%)	*Group-II N (%)*	*p-Value*
SOSR	19 (76)	20 (80)	0.733
Early failure	4 (16)	3 (12)	0.684
Late failure	2 (8)	2 (08)	1
Final attachment	19 (76)	20 (80)	0.733

Re-detachment due to missed breaks was found in one eye (04%) in each group.

The main cause of postoperative re-detachment in group 01 due to missed breaks was 01 eye (04%) while it was same (04%) in group II

The patients were followed for 3 months and none of them under went Silicon oil removal and so the complications due to silicon oil removal were not included in the results. Almost none of the patients developed significant lenticular changes during the follow up period of 3 months.

Discussion

In literature scleral buckling has been the method of choice for treating RRDs. In recent years scleral buckling is not considered best option to repair RRD. Now a days there is a dramatic increase in the use of pars plana vitrectomy (PPV) due to better vitrectomy instruments and wide-angle viewing system.[9]

The addition of a scleral buckle to treat a retinal detachment with vitrectomy imposes a trauma to conjunctiva and exposition of sclera

causing surface alteration of eye leading to refractive changes.[10]

In this study group I showed final attachment results (SOSR) 76% while group II showed 80%. So this small difference of results is negligible and has no statistically significant value. Also as addition of SB needs General anesthesia so the complications of general anesthesia may also be considered. Local ocular complications of the explants are also important. Kinor et al found almost equal results with PPV alone and PPV with scleral buckling in all type of retinal detachment with superior or inferior breaks.[11]

Anatomical success was achieved in 65.2% of the PPV group versus 74.3% of the PPV + scleral buckling group by study of Rush RB et al while 76% anatomical success rate was with PPV + SO in this study and it was 80% in PPV + SB + SO in this study.[12]

In a study which was published in 2017 by Ata-ur-Rasool et all showed 90 % reattachment in 3 ports PPV group and only 5 patients needed 2nd surgery. After a single operation anatomical achievement varied between 85 % to 95% in RRD cases.[13]

A study that was published in 2017, showed that there was no significant difference in the final anatomical and functional outcome in patients treated with vitrectomy for RRD with superior or inferior breaks .It showed that location of break does not affect the post-operative complications and final re-attachment.[14]

In this study, SOSR was achieved in 76% in group 1 and 80% in group 11. In group 1 for Phakic 80% (4 patients)/ Pseudophakic 80% (8 patients) and aphakic 70%(7 patients) while in group 11 it was 80% for phakic (4 patients) 80% in pseudophakic (8 patients) and 80% in aphakic (8 patients). The findings in this study were superior than those observed in the study by Heimann et al in which single operation success rate with PPV in phakic patients was 64% and in pseudophakic patient was 53%.[15] They found successful attachment in 64% in phakic eyes and 53% in Pseudophakic eyes. Another equal postoperative results after repair of RRD were found in a study by Ghoraba et al in 2016.They concluded that both techniques of operation had equal results of re-attachment. The application of 360° Scleral Buckling to PPV and silicon oil may not prove beneficial in RRD cases due to inferior retinal breaks.[16]

There are many known procedures for successful retinal detachment surgery e.g scleral buckling, pars plana vitrectomy and pneumaticretinopexy. Each procedure has its specific indications, results and complications. Now a days most of the vitro-retinal surgeons prefer the PPV alone for treatment of rhegmatogenous retinal detachment.

In brief the vitreo-retinal surgeons can choose many techniques to treat rhegmatogenous retinal detachment including scleral buckling alone or pars plana vitrectomy alone, or scleral buckling with pars plana vitrectomy and pneumatic retinopexy (with special indications). There is a lot of discussion in literature for selection of any technique to repair primary retinal detachment. But majority of vitreo-retinal surgeons think that PPV alone is suggested for successful repair of rhegmatogenous retinal detachment.[17]

However, we focused on the two major factor of anatomical and functional success after retinal detachment surgery and this data sufficiently addressed the success and complication rates of the combined approach verses simple PPV. The non-symmetrical eye with superior or inferior breaks was also a short coming factor in the data collection and analysis. We used only encircling silicone band with selieve of 7mm and nonof tyre or sponge was used as buckling, So, this type of retinopexy may also need clarification and is liable for discussion. The short follow up and non-consideration of silicon oil induced complications are also the limiting factors.

Also we did not address the number of laser spots which were applied around the breaks which also imposes a significant limiting factor.

In conclusion this study showed almost equal post-operative anatomical success results which are comparable to many international studies. This showed that PPV+ Oil is a procedure that is equally useful for all RRD with any location of break.

Researcher observed that practically an addition of SB for RRD repair might be unnecessary even for eyes undergoing PPV for RRD caused by inferior breaks especially, since inferior breaks does not constitute a risk factor for worst anatomical and functional results. Further research is required on this issue

Conflict of interest: None declared.

References

1. Bowing B. Clinical Ophthalmology and systematic approach, Retinal Detachment, Kansi 2016; 18th (ed) 16: 701-7.
2. Kirchhof B, Oh KT, Hartnett ME, Landers MB. Retina by Ryan SJ (5th ed) 2013; 3; 1616-21.
3. Lindsell LB, Sisk RA, Miller DM, Foster RE, Petersen MR, Riemann CD, et al. Comparison of outcomes: scleral buckling and pars plana vitrectomy versus vitrectomy alone for primary repair of

rhegmatogenous retinal detachment. Clin Ophthalmol 2016; 11: 47-54.
4. SullivanP. Techniques of scleral Bucking. Retina by Ryan SJ (5th ed) 2013; 3: 1669-95.
5. Dell' Omo R, Barca F, Tan HS, Bijl HM, Oberstein SY, Mura M. Pars plana vitrectomy for the repair of primary, inferior rhegmatogenous retinal detachment associated to inferior breaks. A comparison of a 25-gauge versus a 20-gauge system. Graefes Arch Clin Exp Ophthalmol. 2013; 251(2): 485-90.
6. Zubair S, Nadeem R, Muhammad A, Muhammad M, Irfan K. Vitrectomy combined Scleral Buckling in patients with Inferior Retinal Breaks. Pak J Ophthalmol 2014; 30(2): 82-6.
7. Adelman RA, Parnes AJ, Ducournau D. European Vitreo-Retinal Society (EVRS) Retinal Detachment Study Group. Strategy for the management of uncomplicated retinal detachments: the European vitreo-retinal society retinal detachment study report 1. Ophthalmology 2013; 120(9): 1804-8.
8. Totsuka K, Inui H, Roggia MF, Hirasawak K, Nodal Y, Ueta T. Supplemental scleral buckle in vitrectomy for the repair of rhegmatogenous retinal detachment: A Systematic Review of Literature and Meta-Analysis. Retina. 2015; 35(11): 2423-31.
9. Elige C, Christophe M, John C, Bruno M, Francos D. PPV and SB alone for patients with Retinal Detachment. Ophthalmology 2018; 9(6): 425-9.
10. Mazinani B, Baumgarten S, Schiller P, Agostini H, Helbig H, limburg E, et al. Vitrectomy with or without encircling band for pseudophakic retinal detachment a multicenter arm randomized clinical trial. Br J Ophthalmol 2016; 100(3): 405–10.
11. Kinori M, Moisseiev E, Shoshany N, Fabian ID, Skaat A, Barak A, et al. Comparison of pars plana vitrectomy with and without scleral buckle for the repair of primary rhegmatogenous retinal detachment. Am J Ophthalmol 2011; 152(2): 291-7.
12. Rush RB, Simunovic MP, Sheth S, Kratz A, Hunyor AP. Pars plana vitrectomy versus combined pars plana vitrectomy-scleral buckle for secondary repair of retinal detachment. Ophthalmic Surg Lasers Imaging Retina 2013; 44(4): 374-9.
13. Rasool A, Chaudhry N, Mahju T, Manan K. Anatomical outcome after pars plana vitrectomy using silicone oil versus C_3 F_8 gas tamponade for the management of rhegmatogenous retinal detachment. Ophthalmol Pak 2017; 7(2): 19-23.
14. Stavrakas P, Tranos P, Androu A, Xanthopoulou P, Tsoukanas D, Stamatiou P, et al. Anatomical and Functional Results Following 23-Gauge Primary Pars Plana Vitrectomy for Rhegmatogenous Retinal Detachment: Superior versus Inferior Breaks. J Ophthalmol 2017; 6: 1-7.
15. Heimann H1, Bartz-Schmidt KU, Bornfeld N, Weiss C, Hilgers RD, Foerster MH, et al. Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment: a prospective randomized multicenter clinical study. Ophthalmology 2007; 114(12): 2142-54.
16. Ghoraba HH, Zaky AG, Ellakwa AF. Long-term follow-up of vitrectomy, with or without 360° encircling buckle, for rhegmatogenous retinal detachment due to inferior retinal breaks. Clin Ophthalmol 2016; 10: 1145–51.
17. Wong CW, Wong WL, Yeo IY, Loh BK, Wong EY, Wong DW, et al. Trends and factors related to outcomes for primary rhegmatogenous retinal detachment surgery in a large Asian tertiary eye center. Retina 2014; 34(4): 684-92.