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Chandelier-Assisted Scleral Buckling for Rhegmatogenous Retinal Detachment Repair with Simultaneous Limited Vitrectomy for Vitreous Floaters

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Abstract

We hypothesize that limited vitrectomy to remove vitreous floaters during performing chandelier assisted scleral buckling in RRD cases can alleviate visual dissatisfaction and improve visual function. This is a prospective interventional comparative study. Patients with phakic primary RRD planned for scleral buckling surgery that had significant vitreous floaters detected by fundus examination were included. Using computer-generated random numbers, the patients enrolled in the study were divided into 3 groups: group 1: underwent traditional scleral buckling using indirect ophthalmoscope, group 2 :underwent chandelier-assisted scleral buckling and group 3 underwent assisted scleral buckling with limited vitrectomy for significant floaters. Contrast sensitivity test (CST), and the 25-Item National Eye Institute Visual Function Questionnaire (VFQ) were performed postoperatively at 1 and 6 months postoperatively. after exclusion of perioperative complications 75 patients were completed the follow up. Most of patients are at the fourth decade of life. Most of patients had localized retinal detachment with macula on and one Horseshoe tear. All patients show significant improvement of vision after 6 months post-operative. There was no significant difference in VA between 3 groups. At first month post-operative, CST was significantly better in vitrectomy group (64±14.58, group 3) compared with traditional SB (49.01±18.37, group1) and chandelier SB (54.2±6.8, group 2). After 6 months post-operative, three groups showed significant improvement in CST with maximum improvement in vitrectomy group (group 3). The VFQ-CS was significantly higher in Chandelier SB with limited vitrectomy (group 3) (81.36±8.7) than in traditional and chandelied SB groups (72.55±10.35 and 71.09±8.23 group 1and 2 respectively). One month after vitrectomy, Chandelier SB with limited vitrectomy (group 3) showed an improvement as compared to other groups in four subscales: near activities, social functioning, mental health, and driving. The VFQ-CS was significantly higher in Chandelier SB with limited vitrectomy (85.36±7.36, group 3) than in traditional SB and chandelied SB (76.63±10.61and 73±3.25 group 1 and 2 respectively). Chandelier SB with limited vitrectomy (group 3) showed an improvement as compared to other groups in four subscales: near activities, social functioning, mental health, and driving. In conclusion, floaters vitrectomy in SB improves visual function and quality of life after RRD repair. Inspite of there was no significant difference in VA improvement between 3 groups. CST and VFQ significantly improved after floeters vitrectomy (group 3) in comparison to other groups.

Keywords: Chandelier, scleral buckling, rhegmatogenous retinal detachment, vitrectomy, vitreous floaters

Full-length article **Corresponding Author*, e-mail: alnagdy28@gmail.com

1. Introduction

Repair of rhegmatogenous retinal detachment (RRD) includes different approaches that include pneumoretinopexy, scleral buckling (SB) and pars plana vitrectomy (PPV). SB consists of ab-externo approach in order to reattach the retina without removing the vitreous gel. SB is a valuable surgical option for RRD repair which harvests better anatomical and functional outcomes in phakic eyes [1, 2]. In recent years there has been a decline in SB procedures popularity. SB procedure decreased over years till reached only 5% of RRD repair in 2014 [3]. This decline seems to be related to several issues include; significant improvements in vitrectomy technologies, the operating time is shorter for vitrectomy compared with SB, and the use of indirect binocular ophthalmoscopy is relatively difficult and tiring. In 2012, endo-illumination with direct visualization under surgical microscope was firstly presented by Aras et al. (2012) [4]. Nam et al. (2013) reported that endo-illumination made SB easier and more convenient particularly in terms of fundus observation, using a surgical microscope that is capable of image inversion [5].

Vitreous floaters cause visual symptoms due to their dark shadows that move with head and eye movements (previously called muscae volitantes). Floaters symptoms are

more visible against bright background as a sunny sky. Floaters can emerge from alterations in endogenous structures within the vitreous body (primary floaters) like in posterior vitreous detachment (PVD) [6, 7], aggregation of collagen with aging [8] and myopia [9]; as well as from exogenous sources(secondary floaters) like vitreous hemorrhage, [10] inflammatory cells [11], and separated operculum [12, 13]. Most doctors considered floaters as a trivial problem and ask patients to adapt symptoms. On the contrary, many studies documented that vitreous floaters are a bothering problem with negative impact on patients' quality of life [14-16]. With this concept therapy for floaters is being considered [17-22].

Even though, there are multiple studies discussed the results of RRD objectively like anatomical reattachment of the retina and visual acuity, its impact on patients' quality of life cannot be assessed with traditional visual acuity measurement. With high anatomical success rates of RRD surgery lead to an increased attention toward the postoperative quality of vision [23-27]. This study was assumed to determine whether limited vitrectomy to remove vitreous floaters during performing chandelier assisted scleral buckling in RRD cases can alleviate visual dissatisfaction and improve visual function.

2. Subjects and Methods

This is a prospective interventional comparative study. Patients in this study were collected from the outpatient clinic of Mansoura ophthalmic center, Mansoura University, Egypt from January 2020 to October 2023. Inclusion criteria were phakic primary RRD cases planned for scleral buckling surgery that had significant vitreous floaters detected by fundus examination. Types of significant floaters included in this study are wises ring, packed bundle of collagen fibrils (spots, linear, spider web like or membranous), and avulsed retinal tissue (operculum). Exclusion criteria Proliferative vitroretinopathy grade C, patients did not complete follow up postoperatively, intraoperative complications that affect results (including significant hemorrhage, or iatrogenic cataract), any other condition that could impact vision (including corneal opacity, cataract, glaucoma, optic atrophy, macular pathology, posterior staphyloma, myopic degeneration or amblyopia) and postoperative visual acuity of 0.6 logMAR or worth. The study was reviewed and approved by the institutional review board (IRB) of Faculty of Medicine, Mansoura University (code MD.20.01.270). The study and the surgical procedure were first explained to the subjects eligible for intervention with a signed consent from every patient following the Declaration of Helsinki. Using computer-generated random numbers, the patients enrolled in the study were divided into 3 groups: group 1: underwent traditional scleral buckling using indirect ophthalmoscope, group 2 :underwent chandelier-assisted scleral buckling and group 3 underwent assisted scleral buckling with limited vitrectomy for significant floaters.

Surgery Group1 underwent traditional SB by indirect ophthalmoscope. Group 2 underwent chandelier-assisted SB using 25-gauge valved cannula with chandelier illumination (R-Evolution CR; Optikon 2000, Inc., Rome, Italy) was inserted through the pars-plana and under direct visualization through the surgical microscope using noncontact wide-angle viewing system (Resight; Carl Zeiss Meditec, Jena, Germany). Group 3 underwent chandelier-assisted SB like group2 with adding second 25-gauge valved cannula to remove significant floater with cutter probe (R-Evolution CR; Optikon 2000, Inc., Rome, Italy). Preoperative and Postoperative Examination Preoperatively, medical and ocular history of all patients was recorded. All patients underwent complete ophthalmic evaluations including manifest refraction recorded in logMAR, detailed examinations of the anterior segment using slit lamp, posterior segment examination using an indirect ophthalmoscope and a Volk supraQuad 160 contact lens (including extend of retinal detachment, macular detachment, number of breaks, site of breaks and vitreous floaters density), and B- scan ultrasound (15 MHz) to study retinal surface and vitreous floaters.

Postoperatively, at first day and first week patients were examined to assess intraocular pressure, sclerotomy wounds, intraocular infection, buckling effect, sub-retinal fluid, and ocular motility. Patients had complications affected follow up were excluded from study (including failure of primary retinal re-attachment, cataract, and significant vitreous hemorrhage). Afterward, the patients were examined at first and sixth months. Best corrected visual acuity testing, detailed anterior segment examination using slit lamp, detailed fundus examination using indirect and Volk superaQuad contact lens, contrast sensitivity test (CST), and the 25-Item National Eye Institute Visual Function Questionnaire (VFQ) were performed in each visit. Contrast and Glare Sensitivity Test. Mesopic contrast sensitivity assessment in the study was done postoperatively at one and six months later, preoperative evaluation CST was not performed. The test was carried out with Mesotest II (Oculus, Germany), which consists of Landolt C rings of different contrast levels presented in front of a low-brightness backdrop. There are 4 contrast levels: 1: 23/1: 5/1: 2.7/1: 2 which represent the ratio between light intensity of the optotypes and the backdrop. There are 8 tests (4 without and 4 with glare). Test 1, with contrast level 1: 23, is the most easily recognized. For statistical purposes, each level of the contrast test was given a score staring from 25% of 1: 23 level to 100 of 1: 2 levels. The subject receipts approximately 20 minutes to dark adapt pre-test. All subjects performed monocular test in a dark room while wearing correction if ametropic. Subjective analysis. Subjective assessment in the study was done by asking the patients to fill out a questionnaire postoperatively at one and six months later, preoperative evaluation of VFQ was not performed. The VFQ-25 Arabic version is a valid and reliable instrument for addressing and assessing vision-related quality of life (VRQOL) for Arabic-speaking [28]. Each patient was counseled about the subscales of VFQ and asked to full fill the online questionnaire at home if can. The staff supplied assistance to patient when required to full-fill interviewer format. Scoring VFQ with or without optional items for statistical analysis has two step processes: initial step, the original numeric values obtained from the survey are transformed to score from 0 to 100. The lowest possible score represented by 0 and the highest achievable score represented by 100. The second step, the items within each sub-scale is averaged to calculate the sub-scale scores. Composite Score Calculation: To calculate the overall composite score for the VFQ, you need to average the scores of the vision-targeted sub-scales, excluding the general health rating question.

Statistical analyses. Statistical analyses were performed using SPSS v23 statistical software (SPSS, Inc, Chicago, Illinois). Descriptive statistics (means correlation standard deviations) were calculated for quantitative variables. Two-sided Chi-square, and ANOVA test were used as appropriate for parametric data, and Mann-Whitney U and Kruskal Wallis tests were employed for non-parametric variables. Montecarlo test was used as correction for chisquare test. Wilcoxon signed rank test for comparison between pre-operative and post-operative values for non-normally distributed data. The significance level was calculated and $P<0.05$ was considered statistically significant, while $P>0.05$ was considered statistically non-significant.

3. Results

75 patients from three groups met inclusion criteria. Divided randomly into three groups each group contains 25 patients. Most of patients are at the fourth decade of life. Most of patients had localized retinal detachment with macula on and one Horseshoe tear. The pre-operative socio-demographic data of patients enrolled in the study are summarized in Table 1. The intra-and post-operative complications of patients are shown in Table 2. Visual acuity (VA) changes before and after the surgery is shown in Table 3. All patients show significant improvement of vision after 6 months post-operative. There was no significant difference in VA between 3 groups. At first month post-operative, CST was significantly better in vitrectomy group (64±14.58, group 3) compared with traditional SB (49.01±18.37, group1) and chandelier SB (54.2±6.8, group 2).

After 6 months post-operative, three groups showed significant improvement in CST with maximum improvement in vitrectomy group (group 3). Table 3 encompasses CST data results. The effect of combined surgery (Chandelier SB with limited vitrectomy, group 3) on the VFQ Subscales and the composite score (VFQ-CS) comparing to traditional SB (group 1) and chandelier SB (group 2) showed in table 5. No statistical differences could be found between traditional SB (group 1) and chandelier SB (group 2). The VFQ-CS was significantly higher in Chandelier SB with limited vitrectomy (group 3) (81.36±8.7) than in traditional and chandelied SB groups (72.55±10.35 and 71.09±8.23 group 1and 2 respectively). One month after vitrectomy, Chandelier SB with limited vitrectomy (group 3) showed an improvement as compared to other groups in four subscales: near activities, social functioning, mental health, and driving. Six months after vitrectomy, the differences in VFQ Subscales and VFQ-CS between studied groups are analyzed in table 6. There were insignificant changes in VFQ Subscales and VFQ-CS between traditional SB (group 1) and chandelier SB (group 2). The VFQ-CS was significantly higher in Chandelier SB with limited vitrectomy (85.36±7.36, group 3) than in traditional SB and chandelied SB (76.63±10.61and 73±3.25 group 1 and 2 respectively). Chandelier SB with limited vitrectomy (group 3) showed an improvement as compared to other groups in four subscales: near activities, social functioning, mental health, and driving.

4. Discussion

Visual acuity is used as the most important parameter of the visual presentation after RRD surgery. Nevertheless, Quality of life cannot be evaluated by BCVA alone. Contrast sensitivity function can be used as more accurate parameter of vision changes [29-31]. In this study, symptomatic vitreous floaters significantly decrease contrast sensitivity, even with visual acuity improvement after retinal re-attachment. In spite of maximum improvement of VA postoperatively in all patients, there are no significant changes between groups. In another hand, contrast sensitivity is significantly improved in patients had floater vitrectomy (group 3) compared to other groups. Clinical visual acuity testing is used100% contrast. In this study, patients with floaters have low contrast sensitivity 57% and 63% (group 1 and 2 respectively) in comparison to patient had floaters vitrectomy 75% (group3).Table 4. Contrast sensitivity function improvement was detected in each patient 1 month and 6 months after surgery in this study. JERRY SEBAG et al, documented contrast sensitivity in patients with floaters by 67% which normalizes after floaters vitrectomy compared with age-matched control subjects [32].

The definitive cure of vitreous floaters is removal by vitrectomy. Assumed the invasive nature of vitrectomy, there are risks of intraoperative and postoperative complications. Certainly, this study found that treating floaters with limited vitrectomy in combination with chandelier assisted SB (group 3) did not add significant complication in comparison to chandelier assisted SB (group 2). Table 2 Reportes of complications secondary to limited vitreous invasive by chandelier are few. The endophthalmitis is a serious complication which has been reported in some studies [33-34]. In our study no patients with endophthalmitis were detected. In our series, three groups achieved a nearly similar rate of anatomical success: 23 of 25 eyes (92%) in traditional SB (group 1), 24 of 25 eyes (96%) in chandelier SB (group 2), and 24 of 25 eyes (96%) in chandelier SB with vitrectomy (group 3). Cataract progression was reported in 3 patients in chandelier SB (group 2) and 5 patients in chandelier SB with vitrectomy (group 3).

Epiretinal membrane was documented in two eyes in chandelier SB (group 2) and one eye in chandelier SB with vitrectomy (group 3). Self-resolved vitreous hemorrhage was reported in one patient in chandelier SB with vitrectomy (group 3). Hyphema was showed intraoperatively in one eye in traditional SB (group 1) and one eye in chandelier SB with vitrectomy (group 3). Intraoperative vitreous prolapse through the sclerotomies occurred in 4 patients in chandelier SB (group 2) and 3 patients in chandelier SB with vitrectomy (group 3). The prolapsed vitreous strand was removed easily with the vitreous cutter. Five cases needed scleral vicryl suture to secure the sclerotomy. Traditional SB (group 1) had one patient with extrusion of buckle.

In 2019, Cohen et al. showed no significant difference of reattachment rate in traditional SB group 85.2% and 81.8% in chandelier SB group. In chandelier SB group one patient had a subretinal hemorrhage and 2 patients developed cataract, while in traditional SB group 2 patients developed cataract during 6 months postoperative follow up.

Table 1. comparison of socio-demographic characteristics between studied groups

	Traditional SB n(%)	Chandelier assisted SB n(%)	Chandelier assisted SB with limited vitrectomy n(%)	Test of significance	
Number of eyes	25	25	25		
Sex					P1=0.089
Male	15(60.0)	9(36.0)	13(52.0)	$\chi2$=2.98	P2=0.569
Female	10(40.0)	16(64.0)	12(48.0)	P=0.225	P3=0.254
Age (years)	34.24±11.15	36.64±9.39	37.48±11.41	F=0.619 p=0.541	P1=0.430 P2=0.287 P3=0.782
Side					P1=0.395
Right	13(52.0)	10(40)	11(44.0)	$\chi2$=0.753	P2=0.571
Left	12(48.0)	15(60)	14(56.0)	P=0.686	P3=0.774
Type of retinal tear					
Horseshoe tear	**20(80.0)**	**23(92.0)**	**21(84.0)**	$\chi2$=2.78 P=0.249	P1=0.221 P2=0.712 P3=0.733
Round hole with detached operculum	1(4.0)	0(0.0)	1(4.0)	$\chi2$=00 P=1.0	P1=1.0 P2=1.0 P3=1.0
Atrophic hole in lattice	**4(16.0)**	**2(8.0)**	**3(12.0)**	$\chi2$=0.176 P=0.916	P1=0.667 P2=0.667 P3=1.0
No. of retinal breaks					P1=0.074
1	25(100.0)	22(88.0)	20(80.0)	MC=5.32	P2=0.018*
2	0 (0.0)	3(12.0)	5(20.0)	p=0.07	P3=0.440
Clock hours of detachment	5.04±1.31	7.32±1.52	6.52±1.6	F=15.18 P<0.001*	P1<0.001* ,P2<0.001* ,P3=0.05*
Macular					
On	17(68.0)	16(64)	15(60.0)	$\chi2$=0.878	P1=0.765
Off	8(32.0)	9(36)	10(40.0)	P=0.645	,P2=0.555 ,P3=0.770

$\chi2$: Chi-Square test , F:One Way ANOVA test

p1: between Traditional SB& Chandelier assisted SB, p2: between Traditional SB & Chandelier assisted SB with limited vitrectomy, p3: between Chandelier assisted SB &Chandelier assisted SB with limited vitrectomy

Table 2. Peri-operative complication among studied group

	Traditional scleral buckling	Chandelier assisted SB	Chandelier assisted SB with limited vitrectomy	test of significance	
ocular pain	3(12.0)	2(8.0)	1(4.0)	MC=1.09 P=0.581	P1=1.0 P2=0.609 P3=1.0
cataract	0	5(20.0)	3(12.0)	MC=5.32 P=0.07	P1=0.05* P2=0.074 P3=0.702
Epiretinal membrane	0	1(4.0)	2(8.0)	MC=2.08 P=0.353	P1=1.0 P2=0.490 P3=1.0
Recurrent RD	2(8.0)	1(4.0)	1(4.0)	MC=.528 P=0.768	P1=0.552 P2=1.0 P3=1.0
success	23(92)	24(96)	24(96)		
Vitreous hemorrhage	0	1(4.0)	0	MC=2.03 P=0.363	P1=1.0 P2=.. P3=1.0
hyphema	1(4.0)	1(4.0)	0	MC=1.03 P=0.598	P1=1.0 P2=1.0 P3=1.0
extruded buckle	1(4.0)	0	0	MC=2.03 P=0.363	P1=1.0 P2=1.0 P3=1.0
Vitreous prolapse	0	3(12)	4(16)	MC=4.09 P=0.129	P1=0.235 P2=0.110 P3=1.0

MC :Monte Carlo test , *statistically significant

p1: between Traditional SB& Chandelier assisted SB , p2: between Traditional SB & Chandelier assisted SB with limited vitrectomy, p3: between Chandelier assisted SB &Chandelier assisted SB with limited vitrectomy

Table 3. Comparison of visual acuity among studied groups

	Traditional SB	Chandelier assisted SB	Chandelier assisted SB with limited vitrectomy	Test of significance	
	n=25 Median (min-max)	n=25 Median (min-max)	n=25 Median (min-max)		
Preoperative visual acuity	0.40 (0.0-2.2)	0.30 (0.1-1.8)	0.40 (0.2-2.0)	KW=0.219 P=0.804	P1=0.546 P2=0.942 P3=0.595
Visual acuity after 1 month	0.18(0.0-0.40)	0.18(0.1-0.6)	0.18(0.1-0.3)	KW=0.462 P=0.635	P1=0.778 P2=0.515 P3=0.352
Visual acuity after 6 months	0.10(0.0-0.30)	0.10(0.0-0.3)	0.10(0.0-0.20)	KW=0.454 P=0.637	P1=0.490 P2=0.356 P3=0.827
comparison of follow up data (Wilcoxon signed rank test)	p@<0.001* p#<0.001* p*<0.001*	p@<0.001* p#<0.001* p*<0.001*	p@<0.001* p#<0.001* p*<0.001*		

χ2: Chi-Square test, KW:Kruskal Wallis test

p1: between Traditional SB& Chandelier assisted SB , p2: between Traditional SB & Chandelier assisted SB with limited vitrectomy, p3: between Chandelier assisted SB &Chandelier assisted SB with limited vitrectomy

P@: Difference between pre & after 1 month , p#: difference :difference between pre & after 6 months , p*: difference between 1 & 6 months

Table 4. Comparison of contrast sensitivity test among studied groups

Contrast sensitivity	Traditional SB	Chandelier SB	Chandelier SB with limited vitrectomy	Test of significancE	
	n=25 Mean±SD	n=25 Mean±SD	n=25 Mean±SD		
After 1 month	49.01±18.37	54.2±6.8	64±14.58	F=7.28 P=0.001*	P1=0.399 P2=0.001* P3=0.04*
After 6 months	56.6±7.8	63±12.75	74.8±9.5	F=20.38 P<0.001*	P1=0.08 P2<0.001* P3=0.003*
Paired t test	p=0.001*	p=0.001*	p=0.001*		

χ2: Chi-Square test , F:One Way ANOVA test

p1: between Traditional SB& Chandelier assisted SB , p2: between Traditional SB & Chandelier assisted SB with limited vitrectomy, p3: between Chandelier assisted SB &Chandelier assisted SB with limited vitrectomy

Table 5. Comparison of VFQ-25 Subscale after 1 month between studied groups

VFQ-25 Subscale	Traditional SB n=25	Chandelier SB n=25	Chandelier SB with limited vitrectomy n=25	test of significance	
General health	72.0±30.52	75.0±27.95	79.0±29.15	KW=0.420 P=0.659	P1=0.904 P2=0.470 P3=0.400
General vision	70±36.08	66.0±35.27	76±32.65	KW=0.526 P=0.593	P1=0.685 P2=0.543 P3=0.312
Ocular pain	63±28.98	69±34.82	74±29.29	KW=0.782 P=0.461	P1=0.498 P2=0.216 P3=0.572
Near activities	63±32.37	65±32.27	85±22.82	KW=4.25 P=0.018*	P1=0.811 P2=0.01* P3=0.019*
Distance activities	89±20.51	85±22.82	91.0±18.92	KW=0.538 P=0.586	P1=0.499 P2=0.735 P3=0.312
Social functioning	76±22.22	71±23.58	88±16.32	KW=4.35 P=0.01*	P1=0.02 P2=0.047* P3=0.005*
Mental health	69±33.29	73±25.94	89±17.79	KW=4.00 P=0.02*	P1=0.594 P2=0.009* P3=0.036*
role difficulties	77±24.91	71.0±24.66	75±26.02	KW=0.367 P=0.694	P1=0.403 P2=0.780 P3=0.577
Dependency	85±25	80±29.7	85±22.82	KW=0.308 P=0.736	P1=0.499 P2=1.0 P3=0.499
Driving	73±27.88	72±24.28	88±20.56	KW=3.37 P=0.04*	P1=0.885 P2=0.03* P3=0.023*
Color vision	58.0±17.26	61±19.20	59.0±17.50	KW=0.180 P=0.836	P1=0.558 P2=0.845 P3=0.696
Peripheral vision	59±27.84	57±28.43	68.0±23.41	KW=1.21 P=0.305	P1=0.792 P2=0.236 P3=0.149
Composite score	72.55±10.35	71.09±8.23	81.36±8.7	KW=9.24 P<0.001*	P1=0.575 P=0.001* P=0.001*

KW:Kruskal Wallis test

p1: between Traditional SB& Chandelier SB , p2: between Traditional SB & Chandelier SB with limited vitrectomy, p3: between Chandelier SB &Chandelier SB with limited vitrectomy

Table 6. Comparison of VFQ-25 Subscale after 6 months treatment between studied groups

VFQ-25 Subscale	Traditional SB n=25	Chandelier SB	Chandelier SB with limited vitrectomy n=25	test of significance	
General health	74±24.45	79±23.58	84±20.25	KW=1.19 P=0.308	P1=0.441 P2=0.126 P3=0.441
General vision	75±36.08	74±32.66	79±31.19	KW=0.160 P=0.853	P1=0.915 P2=0.671 P3=0.595
Ocular pain	68±27.5	72±33.32	78±29.15	KW=0.699 P=0.500	P1=0.640 P2=0.244 P3=0.483
Near activities	71±32.02	72±29.15	94±13.07	KW=6.19 P=0.003*	P1=0.893 P2=0.003* P3=0.004*
Distance activities	93.0±16.96	95±12.5	94.0±13.07	KW=0.122 P=0.885	P1=0.623 P2=0.806 P3=0.806
Social functioning	87±17.85	81±18.09	96±9.35	KW=5.82 P=0.005*	P1=0.179 P2=0.046* P3=0.001*
Mental health	72.0±32.53	79±22.45	93±13.54	KW=4.91 P=0.01*	P1=0.308 P2=0.003* P3=0.04*
role difficulties	80±23.93	86±19.20	84±22.68	KW=0.481 P=0.620	P1=0.339 P2=0.523 P3=0.749
Dependency	92.0±17.26	95±12.5	96±11.81	KW=0.547 P=0.581	P1=0.453 P2=0.318 P3=0.802
Driving	81±24.24	75±23.94	93±15.34	KW=4.51 P=0.01*	P1=0.329 P2=0.049* P3=0.04*
Color vision	63.0±19.26	61±17.79	64.0±19.20	KW=0.166 P=0.848	P1=0.707 P2=0.851 P3=0.574
Peripheral vision	61±28.02	68±26.54	68±23.41	KW=0.601 P=0.551	P1=0.345 P2=0.345 P3=1.0
Composite score	76.63±10.61	73±3.25	85.36±7.36	KW=7.91 P=0.001*	P1=0.565 P=0.001* P=0.003*

KW:Kruskal Wallis test

p1: between Traditional SB& Chandelier SB , p2: between Traditional SB & Chandelier SB with limited vitrectomy, p3: between Chandelier SB &Chandelier SB with limited vitrectomy

In Cohen et al. study, eyes with preoperative multiple retinal tears were 8 of 27 eyes in traditional SB group and 12 of 22 eyes in chandelier SB group.[35] the similar anatomical success rate was documented in 2022 by Baldwin et al. 87% in traditional SB group and 87.5% in chandelier SB group. One patient experienced self-resolving vitreous hemorrhage in chandelier SB group. Baldwin et al. used guarded light pipe with Ngenuity 3D vision system in chandelier SB group [36]. Tomita et al. in 2015 presented insignificant difference regarding retinal reattachment rate (traditional SB 95.7% and chandelier SB 93.8%). In traditional SB group patients reported macular edema and subfoveal serous fluid and 5 patients developed epithelial edema intraoperative and needed corneal epithelium peeling, while, in chandelier SB group patients showed macular pucker and cataract progression [37].

Narayanan et al. published a similar rate of retinal reattachment in both groups: 85.71% (12 of 14 eyes) in traditional SB group and 92.85% (13 of 14 eyes) in chandelier SB group.one patient in each group had postoperative high intraocular pressure.one patient developed proliferative vitreoretinopathy in traditional SB group and 3 patients in chandelier SB group showed leakage at chandelier insertion site [38].

In previous study, Smretschnig et al. reported VFQ-CS after RRD surgery approximately 80 which is significantly lower than normal controls (VFQ-CS 85.5) [39]. After RRD repair VFQ- CS of approximately 80 has been reported in other studies [40- 41]. After macular off RRD repair, VFQ-CS was reported 76.3 in Smretschnig et al. study [39] 6 months postoperatively in comparison to 88.9 in Van de Put et al.study [42] 12 months postoperatively. This discovery may indicate a possible improvement in visual quality with time after surgery even in patients with a relatively sever decrease vision preoperatively. In our study, VFQ-CS after RRD surgery improved in all groups between 1 and 6 months; from 72.5 to 76.6 in traditional SB (group 1), from71 to 73 in chandelier SB (group 2), and from 81 to 85 in chandelier SB with vitrectomy (group 3). We observed that floaters vitrectomy (group 3) showed significant improvement in VFQ four subscales: near activities, social functioning, mental health, and drivinig than other 2 groups without floaters vitrectomy (group 1 and 2).

This significant difference in four subscales reported at 1 and 6 months postoperatively. Sebag et al reported improvement in 8 subscals after 1 month of floaters vitrectomy from preoperative (general vision, role difficulties, dependency, peripheral vision in addition to near activities, social functioning, mental health, and drivinig) [43]. Navarro et al. documented significant improvement on VFQ specifically on the subscales general vision, near activities, distance activities, mental health, role diffidulties and driving after 23-gauge PPV for patients have symptomatic PVD after phacoemulsification and multifocal PCIOL implantation.[44] Rostami et al. evaluated results of limited floaters vitrectomy and estimated significant improvement in VFQ-25 [45] and VFQ-39 [46].

5. Conclusion

Floaters vitrectomy in SB improves visual function and quality of life after RRD repair. Inspite of there was no significant difference in VA improvement between 3 groups. CST and VFQ significantly improved after floeters vitrectomy (group 3) in comparison to other groups. Treating floaters with limited vitrectomy in combination with chandelier assisted SB (group 3) did not add significant complication in comparison to chandelier assisted SB (group 2).

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