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ORIGINAL ARTICLE

Outcomes of Different Surgical Interventions for Upper Bullous Rhegmatogenous Retinal Detachment: A Comparative Study

Mahmoud Ahmed Abo Elkhair[1], Mohammad Mahmoud Abdul-Kader[1], Gamal Naguib Elmoteey[1] and Sameh M. Fouda[1].
1: Department of Ophthalmology, Faculty of Medicine, Zagazig University.

Corresponding author:
Mahmoud Ahmed Abo Elkhair,

E -mail;
Badawy42@hotmail.com

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ABSTRACT

Background: Upper bullous retinal detachment is surgically challenging problem. Multiple surgical techniques have been advocated to tackle upper bullous retinal detachment yet there is no consensus in the best surgical approach. This study aims at assessing the effectiveness and safety of scleral buckle compared to chandelier assisted scleral buckle and primary vitrectomy with gas endo tamponade in achieving retinal reattachment in patients with upper bullous detachment.

Methods: sixty-nine eyes with upper bullous detachment were included in this study. They were treated with either Standard Scleral Buckle (Group 1), Chandelier assisted Scleral Buckle (Group 2) or Pars Plana Vitrectomy with gas endo tamponade (Group 3). Pre-operative, intra-operative and post-operative data including best corrected visual acuity, IOP and persistence of subretinal fluid, intraoperative and post-operative complications were recorded. Patients were followed up for at least 6 months.

Results: There was no statistically significant difference between the three groups regarding successful reattachment rates. The primary success rate was 92.3 % in group 1, 95.7% in group 2 and 82.6 % in group 3 with final success rate of 100% in all groups. However, 10 patients in group 2 had required reoperation either for surgical failure, recurrence or removal of epi macular membrane compared to 6 patients in vitrectomy group and 6 patients in scleral buckle group ($P < 0.001$).

Conclusions: There is no surgical advance of one technique over the other for management of this complex type of detachment. However, CSB may subject patients to secondary interventions to maintain visual outcome.

Keywords: Upper Bullous Detachment; Scleral Buckle; Chandelier Assisted buckle; Pars plana vitrectomy.

INTRODUCTION

The prevalence of rhegmatogenous retinal detachment (RRD) ranges from 6.3 to 17.9 per 100,000[1]. The problem of RRD is exaggerated when it is bullous, as the wide separation between the retinal layers poses surgical challenge during breaks localization and cryotherapy. These difficulties increase the risk of failure and malposition of buckles. Also, non-drainage procedure is not preferred as it increases the intraocular pressure threatening the optic nerve integrity [2].

This condition was treated previously by drain air cryo-explant (DACE) technique. However, difficult visualization after injection of air increases the possibility of explant malposition, missed retinal breaks, and recurrence of retinal detachment [3].

Pneumatic cryo-explant is another technique that was introduced to overcome difficult visualization during surgery encountered with DACE in which air was injected intra vitreally a day before performing scleral buckle. However, it had the disadvantages of being two-stage surgery, prolonged postoperative head positioning, and incomplete absorption of SRF [4].

In a recent study, drain fluid cryo-explant (DFCE) technique has been introduced. In this technique, fluid was injected intravitreally instead of the air used in DACE, while draining the subretinal fluid (SRF). This was followed by cryotherapy and placement of a scleral explant. This helped to reposition the detached retina and maintain the eye volume and pressure without interference with visualization during surgery [5].

Although rhegmatogenous retinal detachment (RRD) has been managed by several methods, scleral buckling remains the surgical procedure of choice for RRD without proliferative vitreoretinopathy (PVR) [6].

However, except in situations where high grade proliferative vitreoretinopathy (PVR), giant retinal tears, posterior retinal breaks, or hazy ocular media that preclude successful scleral buckling as the primary procedure, there has not yet to be any clear consensus on which of these techniques are optimal [7].

Several factors are associated with the decline in the percentage of RD that is repaired with scleral buckling. These include complications associated with scleral buckling surgery and improvements in technology such as high speed and small gauge vitreous cutters and advanced fluidics that have led to increased adoption of vitrectomy for the repair of this condition [8,9,10].

Along with the advantages of PPV like the easier trans conjunctival pars plana access, shorter surgical time in most cases compared to traditional not localized scleral buckle, decreased postoperative inflammation, and increased patient's comfort [11]. However, pars plana vitrectomy in young myopic patients could be complicated with iatrogenic retinal tears along with difficult posterior hyaloid separation [12].

An important advantage of chandelier assisted scleral buckle besides helping accurate localization and cryo treatment of retinal breaks in certain detachment with higher grades of complexity as upper bullous detachment is that using the chandelier system would make recording of the critical steps more accessible to the many teaching institutions enhancing the surgical exposure of trainees to this technique [13, 14].

We aim in this study in evaluating the safety and efficacy of 3 different surgical techniques which are slandered scleral buckle, chandelier assisted scleral buckle and pars plana vitrectomy for management of upper bullous rhegmatogenous retinal detachment.

METHODS

This prospective randomized controlled clinical trial was conducted at Zagazig University Hospitals - Ophthalmology Department after being reviewed and approved by the Ethics Committee of the Zagazig University Hospital in the period between June 2020 and December 2022. Written informed consent was obtained from all participants. The study was done according to the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

69 Phakic eyes with bullous rhegmatogenous retinal detachment with PVR no more than grade B and patient age more than 18 years old have been enrolled into the study. Patients were evaluated clinically, and eligible eyes were randomly assigned to treatment with either standard scleral buckle SSB (Group 1), chandelier assisted scleral buckle CSB (group2) or primary vitrectomy PPV (Group 3) each contained 23 eyes using simple randomization method.

Complete ophthalmic examinations were performed on all patients including assessing visual acuity, slit lamp examination, and obtaining intra-occular pressure by goldmann applanation tonometry. Fundus examination using indirect ophthalmoscope has been carried out and all of the data has been recorded on fundus drawing chart.

For the Scleral buckling group all patients received general anesthesia (GA). The operation started by 360-degree conjunctival periotomy, isolation and hanging of the recti muscles with 3/0 silk sutures with exposure of peri equatorial sclera, then examination of retina using indirect ophthalmoscope and sterile 20 D lens with indentation to externalize location of the retinal breaks and marking of the scleral site have been performed. This has been followed by applications of cryo probe with observation until obtaining the desired effect. Maintaining the indentation by the cryo probe for some time allows for displacement of subretinal fluid away from area of indentation at the break with approximation of the choroid to the retina allowing effective cryotherapy. Scleral suture passes were designed according to the location and size of the break or breaks using 5/0 polyester non absorbable sutures to insert the explant. Drainage of sub retinal fluid and intraocular air injection followed by tightening of scleral sutures over the explant to achieve the required buckle height were done sequentially. Examination of optic nerve perfusion and if required anterior chamber paracentesis with a 27-gauge needle were done to ensure optimal intra ocular pressure for optic nerve perfusion followed by closure of the conjunctiva with 7/0 polyglycolic acid absorbable sutures.

For Chandelier assisted scleral buckling group also general anesthesia has been used then the operation started like SSB by 360-degree conjunctival periotomy, isolation and hanging of the recti muscles. Then insertion of 23-gauge endo illumination probe 4 mm from the limbus 90 degrees from break location was done as all cases were phakic. Localization and cryotherapy of the retinal break using resight system of Lumera 700 surgical microscope (*Zies Meditech*) and scleral indentation with marking of the scleral site has been performed. Then the surgery continued in the same way as in group one. Removal of the endo illumination probe was done making sure that no vitreous is trapped at the sclerotomy site then closure of the sclerotomy site and conjunctiva with 7/0 delayed absorbable sutures (figure 1).

For the Primary vitrectomy group GA was not needed in most cases being replaced by periocular local anesthesia. Standard 23-gauge pars plana vitrectomy has been performed for all eyes in the group using sulfur hexafluoride 20 % as a tamponading agent (figure 2).

Topical steroid, anti-biotic drops and ointment installation and patching have been done after all surgeries.

For the assessment of outcomes, all eyes were examined at postoperative day 1 and week 1 to exclude any early postoperative complications and assess reattachment state and then at weeks 2, and 4, months 2, 3, 4, and 6 months for detailed ophthalmological examination.

The primary outcome measure is success of retinal reattachment which is either primary success that is reattachment for at least 2 months after single surgical intervention or final success that is reattachment till the end of 6 months despite need for second operation and no residual intravitreal tamponade. The Secondary outcome measures are change in mean BCVA till the end of 6 months, follow up and reported intraoperative and Postoperative complications rates.

Surgical failure is defined as persistent retinal detachment after surgical intervention. However, recurrence is defined as retinal re detachment after successful repair.

STATISTICAL ANALYSIS

Data were analyzed using IBM SPSS Statistics Version 22. Data were tested for normality using the Kolmogorov-Smirnov test and Shapiro-Wilk test. Quantitative data were presented as mean and standard deviation or median and range as appropriate while qualitative data were presented as numbers and percentages. Analysis of variance test was used to compare numerical variables between groups. Chi-square or fisher exact as appropriate was used to compare categorical variables between groups. P value set significant at 0.05 levels. All tests were two-tailed.

RESULTS

The demographic and preoperative data has been shown in table 1. There was no significant statistical difference (p>0.05) as regard to number of retinal breaks. In the scleral buckling group 15 cases were operated using segmental circumferential buckling, while 8 cases were operated using radial buckling. While, in the chandelier assisted scleral buckling group 14 cases were operated using segmental circumferential buckling, while 9 cases were operated using radial buckling with no statistical difference in buckling approach between the two groups. The mean operation time has been reported with mean time of 66.9 minutes in group 1. 74.8 minutes in group 2 and 52.2 minutes in group 3 with statistically significant difference (p 0.001). Also, there is no statistically significant difference in the rate of occurrence of lens trauma, choroidal hemorrhage, perforation, or iatrogenic retinal breaks between the studied groups have been found as shown in table 2. However vitreous incarceration at sclerotomy or drainage site has been reported in 1 case in group 1, 5 cases in group 2 two of them were at sclerotomy site and the other three were at the drainage site, and 1case in group 3. Those cases of vitreous incarceration at drainage site were complicated by iatrogenic breaks were treated by removal of prolapsed vitreous, cryotherapy at the site of incarceration and being in the bed of the scleral explant was supported by the buckle.

Table 4 shows that the primary success rate was 92.3 % in group 1, 95.7% in group 2 and 82.6 % in group 3 with final success rate of 100% in all groups. Primary surgical failure was reported in 2 eyes in group 1, 1eye in group 2 and 4 eyes in group 3 However, recurrence was reported in 1 eye in group 1, 4 eyes in group 2 and 2 eyes in group 3 with no significant statistical difference.

The changes in the post- operative BCVA (log MAR) among the studied groups there showed statistically significant difference in the degree of change over time in each group independently from first week till 2nd month post- operative with less or no change till 6th month. In the first and second weeks there was statistically significant difference in the post-operative BCVA (logMAR) (p <0.001) denoting earlier visual recovery in group 2 then group 1 and finally group 3. This was related to the presence of intravitreal gas (SF6). The final mean BCVA (log MAR) at 6 months follow up was 0.63 ± 0.46 in group 1, 0.53 ± 0.26 In group 2 and 0.68 ± 0.30 in group 3 with no statistical difference denoting similar visual outcome between different surgical approaches under study (table 3).

This study showed 4 cases of epimacular membrane that occurred after scleral buckling (17.4 %), 5 cases that occurred after chandelier assisted buckling (26.1%) and only 1 case in pars plana vitrectomy group 4.3 %. There was no significant statistical difference between the 3 groups when compared together. However, when comparing group 1 to 3 or group 2 to 3

10 patients in chandelier assisted scleral buckle group had required secondary surgical intervention 1 eye for surgical failure, 4 eyes for recurrence of sub retinal fluid, 5 eyes for removal of visually significant epi macular membrane without detachment. Six patients in vitrectomy group had required secondary surgical intervention 4 of them required silicone oil injection due to primary surgical failure and 2 eyes for recurrent detachment also 6 patients in scleral buckle group required secondary intervention, 2 of them underwent PPV for surgical failure, 1 for recurrence, 3 eyes required removal of visually significant epi macular membrane without detachment in the follow up period with significant statistical difference (P <0.001). This implies statistical significance for the total interventions between the studied groups (p <0.001), but this significance doesn't extend towards every individual cause when compared alone between the groups as demonstrated in table 5.

Table 1: Demographic data & Preoperative characteristics of the detachment among the studied groups:

	Group 1 No=23 F (%)	Group 2 No=23 F (%)	Group 3 No=23 F (%)	X^2 Test	P
Age (y) • Mean ±SD. • Range	39.9±12.9 19-60	40.7±13.4 18-60	40.4±13.3 18- 60	(0.02)	0.07
Sex • Male • Female	13 (56.5) 10 (43.5))	11 (47.8) 12 (52.2	12 (52.2) 11 (47.8)	0.35	0.84
Laterality • Lt • Rt	11 (47.8) 12 (52.2	12 (52.2) 11 (47.8)	13 (56.5) 10 (43.5)	0.35	0.84
No of breaks • 1 • 2 • 3	19 (82.6) 3 (13.1) 1 (4.3)	20 (87.0) 3 (13.0) 0 (0.0)	16 (86.6) 5 (21.7) 2 (8.7)	3.20	0.53
Duration till treatment (Days) • Median (mean ±SD) • Range	2 (2.3±1.5) (1-6)	2 (2±1.1) (1-5)	2(2.6±1.8) (1-6)	0.09	0.11
Macula • On • Off	5 (21.7) 18 (78.3)	4 (17.4) 19 (82.6)	4 (17.4) 19 (82.6)	0.19	0.91
PVR grade • A • B	19 (82.6) 4 (17.4)	20 (87.0) 3 (13.0)	18 (78.3) 5 (21.7)	0.61	0.74
Choroidal detachment	4 (17.4)	4 (17.4)	3 (13.0)	0.22	0.89

SD: standard deviation Lt: left Rt: right PVR: proliferative vitreoretinopathy

Table 2: Intraoperative data among the studied groups:

	Group 1 No=23 F (%)	Group 2 No=23 F (%)	Group 3 No=23 F (%)	X^2	P
Buckle orientation • Radial • Segmental circumferential	8 (34.8) 15 (65.2)	9 (39.1) 14 (60.9)	-	0.093	0.760
Perforation	2 (8.7)	1 (4.3)	0 (0.0)		(0.24)
Choroidal hemorrhage	2 (8.7)	2 (8.7)	0 (0.0)	2.12	0.35
lens trauma	0 (0.0)	2 (8.7)	2 (8.7)	2.21	0.35
Vitreous incarceration	1(4.3)	5 (21.7)	1 (4.3)	5.08	0.08
Iatrogenic breaks	1(4.3)	3 (13.1)	2 (8.7)	1.095	0.578
Operation time (min) • Mean ±SD.	66.9±7.9	74.8±8.0	52.2±7.1	(9.39)	<0.001*

• Range	55-85	60-90	40-65		

Table 3: The success rates among the studied groups:

	Group 1 No=23 F (%)	Group 2 No=23 F (%)	Group 3 No=23 F (%)	X^2	P
Final success##	23 100	23 100	23 100	-	-
Primary success#	21 92.3	22 95.7	19 82.6	2.22	0.33
Primary Surgical Failure ###	2 (8.7)	1 (4.3)	4 (17.4)		
Recurrence ####	1 (4.3)	4 (17.4)	2 (8.7)		

Table 4: Changes in the post- operative BCVA (logMAR) among the studied groups:

	Group 1 Median Mean ±SD. Range	Group 2 Median Mean± SD. Range	Group 3 Median Mean ±SD. Range	P
Pre-operative	1.9 1.6±0.6 (0.2-2.0)	1.9 1.6±0.6 (0.3-2.0)	2.0 1.7±0.6 (0.3-2.0)	0.76
1st week	1 1.04 ± 0.49 (0.3-2)	0.80 0.95 ± 0.4 (0.5-2.0)	1.2 1.5 ± 0.41 1-2	<0.001*
2nd week	0.8 0.77 ± 0.33 (0.2-1.8)	0.6 0.58 ± 0.19 0.3-1.2	1 0.98 ± 0.18 0.5-1.2	<0.001*
2nd month	0.50 0.61 ± 0.41 0.2-2	0.5 0.64 ± 0.38 0.2-1.2	0.8 0.86 ± 0.47 0.2-2	0.11
6th month	0.50 0.63 ± 0.46 0.2-2	0.50 0.53 ± 0.26 0.2-1	0.50 0.68 ± 0.30 0.2-1.2	0.98
P	0.00*	0.00*	0.00*	

Table 5: Complication and causes for secondary interventions among the studied groups:

		Group 1 No=23 F (%)	Group 2 No=23 F (%)	Group 3 No=23 F (%)	X^2	P
Infection		0 (0.0)	0 (0.0)	0 (0.0)	--	--
Refractive changes		5 (21.7)	6 (26.1)	2 (8.7)	4.58	0.33
Epi-macular membrane		4 (17.4)	5 (21.7)	1 (4.3)	3.01	0.22
Secondary interventions	**Total**	6 (26.1)	10 (43.5)	6 (26.1)	44.5	**<0.001***
	Primary surgical failure	2 8.7	1 4.3	4 17.4	2.025	0.484
	Recurrent detachment	1 4.3	4 17.4	2 8.7	2.025	0.484
	Epi-macular membrane	3 13.1	5 21.7	0 0.0	5.595	0.084

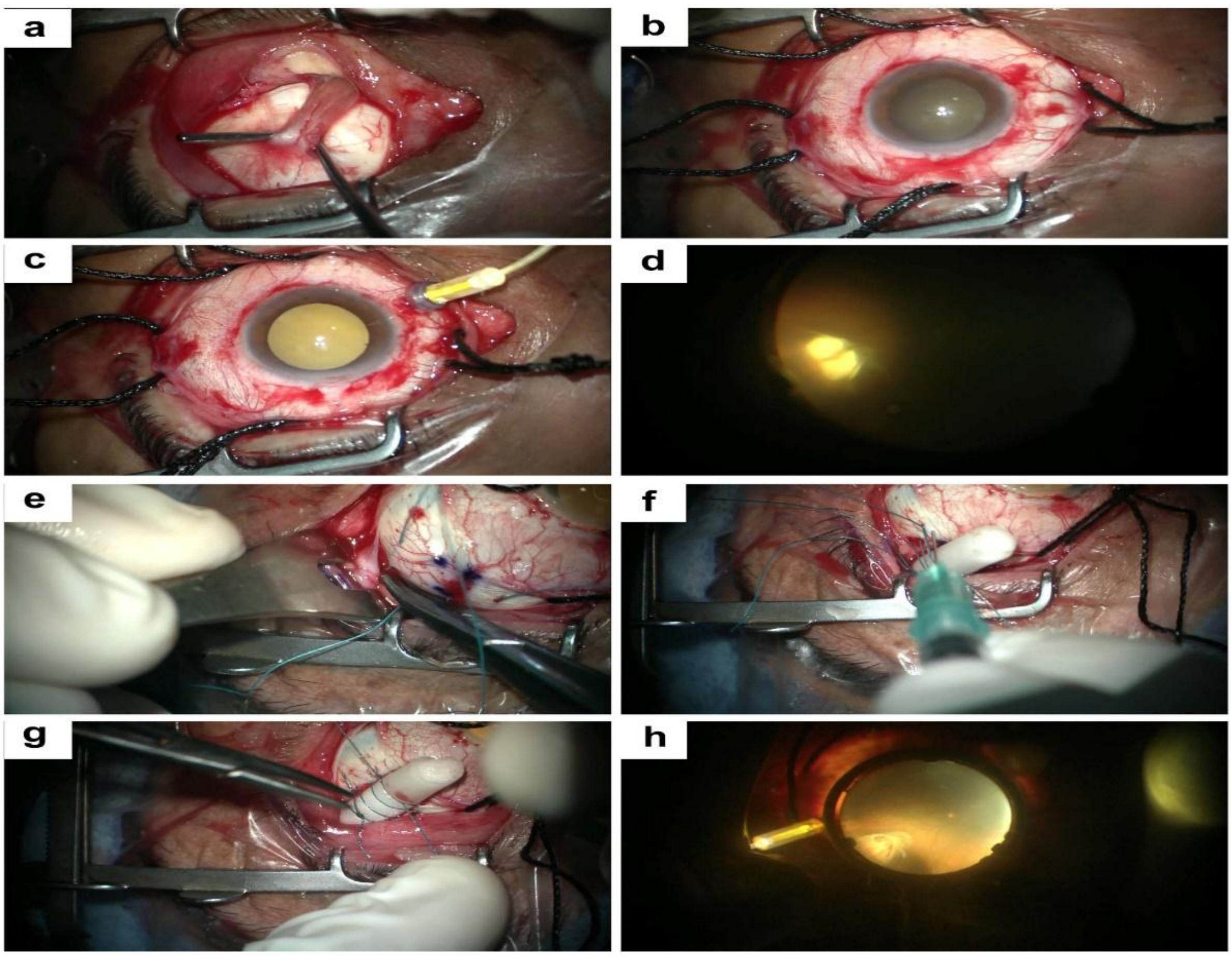

Figure 1: Steps of chandelier assisted scleral buckle **(a)** isolation of recti muscles with strabismus hook. **(b)** hanging of the recti muscles with silk thread **(c)** insertion of endo illumination probe 4 mm from the limbus **(d)** localization and cryotherapy of the retinal break **(e)** scleral sutures designed around break location **(f)** drainage of subretinal fluid **(g)** tightening of redial scleral buckle **(h)** break closed by redial buckle and dry retina at end of the operation

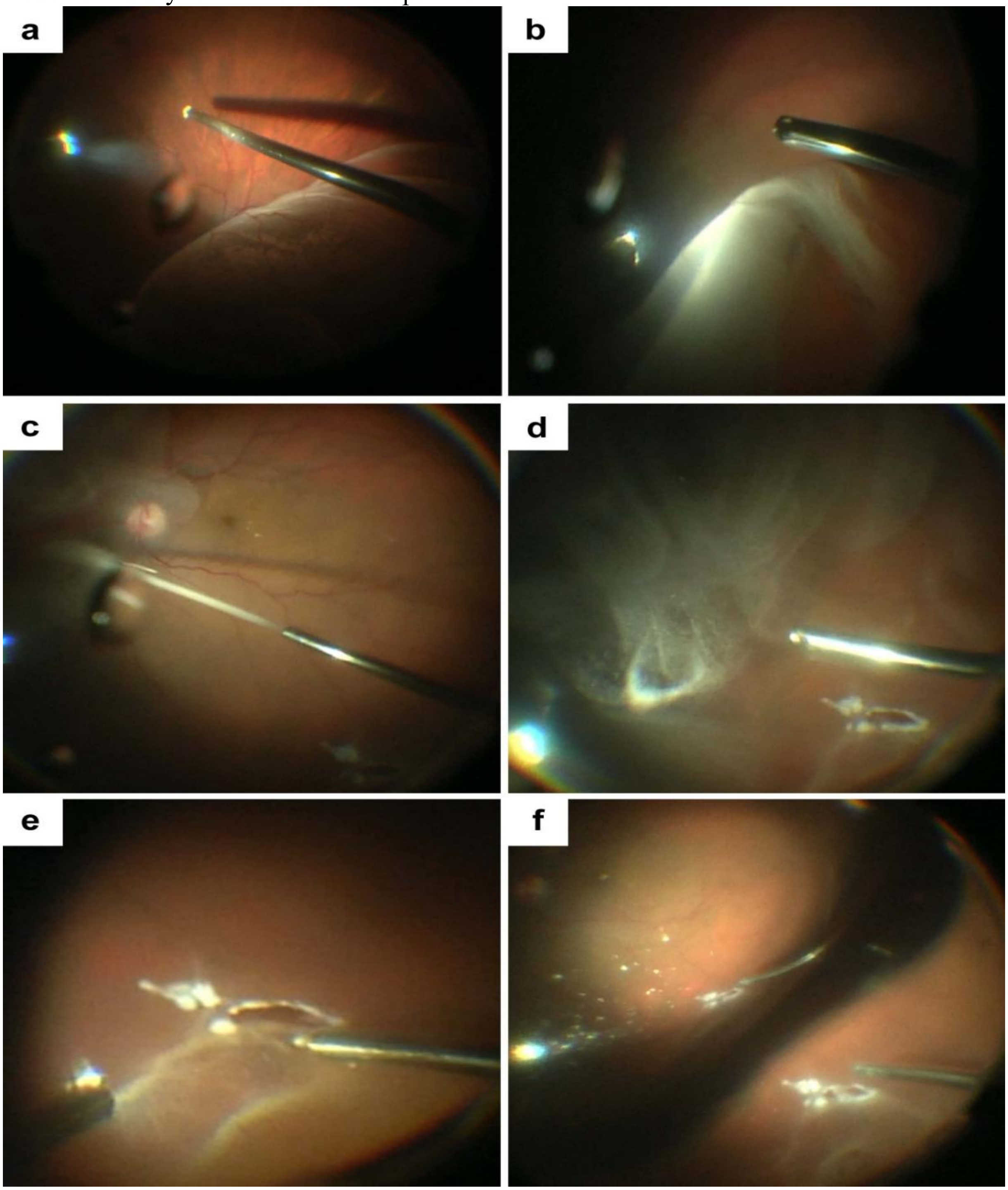

Figure 2: Steps of pars plana vitrectomy **(a)** 23-gauge core vitrectomy. **(b)** vitrectomy close to retinal break **(c)** intra occular triamcinolone acetonide injection **(d)** completing vitrectomy after TAAC injection with shaving vitreous around break**(e)** endo diathermy of retinal break **(f)** Fluid air exchange.

DISCUSSION

Several studies investigated the outcomes of PPV versus SB or CSB for management of primary rhegmatogenous retinal detachment in two-ar[med construction and few have directed their research to upper bullous detachment. In this study we constructed a 3 arm study to compare the outcome of the previous surgical interventions in a specific type of primary rhegmatogenous retinal detachment which is upper bullous detachment.

Maitry et al [15], Znaor l et al [16] and Dhoot AS et al [17] reported the results of multiple recent retrospective studies comparing scleral buckling and pars plana vitrectomy for treatment of primary rhegmatogenous retinal detachment.

From these studies Oshima et al [18] which included 55 eyes in SB group and 47eye in PPV group also Erakgun et al [19] that included 38 eyes in SB group and 40 eyes in PPV group. Others included larger sample sizes like Kobashi et al [20] with 271 eyes in each group and Rush et al [21] that included 121 in scleral buckle group and 444 eyes in PPV group.

Like our study Azad et al [22] included patients with PVR no more than grade B. Other studies included pseudo phakic and aphakic patients and variable complexity RD like Cankurtaran et al [23], Ahmadieh et al [9], Arya et al [24] and Sharma et al [25].

However, Albalkini et al [26], Tomita et al [27], li et al [28], Narayanan et al [29], Cohnen et al [30] and Jose Antonio Roca et al [31] compared the outcome of standard scleral buckling to chandelier assisted scleral buckling in management of rhegmatogenous retinal detachment,

Albalkini et al [26] included fifty eyes in his study close to Cohnen et al [30] that included forty-nine eyes while Tomita et al [27] included thirty-nine eyes and li et al [28] included ninety-four eyes. Most of the eyes were phakic except two eyes in cohnen study and one eye in Tomita study that were pseudophakic.

The PVR grade was similar to our study in most of those mentioned studies except ten eyes in Albalkini et al study that had PVR grade c.

Our reattachment rates were similar to Oshima et al [18] with reported 91% primary success rate and 100 % final success rate in between studied groups also Kobashi et al [20] reported 93.7 % primary success rate and final success rate of 100% in scleral buckle group compared to 96.3 % primary success rate and final rate of 100 %. Also, Tomita et al [27] reported 95.7 % versus 93.8 % primary success rate between studied groups with 100% final success rate in both groups also li et al has reported close results as regards primary success rate and similar final success rate to above studies.

In the opposite side Erakagun et al [19] repotted 79 % success rate for scleral buckling versus 95% for PPV with significant statistical difference as primary success rate however final success rate was 100 % in each group. Park et al [32] also reported statistically significant lower primary success rate for SB versus PPV (77.8 % versus 94.7 %) with final success rate of 100%. Albalkini et al [26] reported final success rate of 100 % for standard scleral buckle versus 91 % foe chandelier assisted scleral buckle but primary anatomical success was reported to be 80.6 % versus 78.3 % both reported not to be statistically significant. In the later study the decreased final success rates may be explained by presence of ten eyes with complex retinal detachment in the study group with PVR grade c.

Our study has reported a higher recurrence rate with CSB group (4 cases) compared to 2 cases in PPV group and 1 case in SSB group however this was not statistically significant. PVR has been the cause for recurrence in all cases in the studied groups which started to present 6 to 8 weeks post operative. However primary surgical failure was reported more in PPV group than group 1 and 2. The main causes for failure were missed retinal breaks and vitreous incarceration at drainage site in 1st and 2nd groups however in group 3 iatrogenic breaks and incompliance to positioning after gas were the reasons for failure.

All failed and recurrent cases have been subjected to PPV with silicon oil tamponade that was removed 4 months post operative.

Best corrected visual acuity results were similar to final visual outcome reported by Oshima et al [18] that was 0.42 log Mar in SB versus 0.45 logMAR in PPV group also Erakgun et al [19] reported mean final visual acuity 0.55 logMAR in Sb group and 0.6 for PPV group with p value of 0.9 indicating statistical insignificance.

Also, Ahmadieh et al [9] reported mean visual acuity in log MAR 0.96 for sb and PPV groups. However, studies compared SB to CSB like Albalkini et al [26], Tomita et al [27], li et al [28], Narayan et al [29] or Cohen et al [30] have shown no significant statistical difference as regards to final BCVA between studied groups.

So, in terms of visual acuity there is no solid rule for the better outcomes of specific surgery over the other as it is known that the type of surgery is not the determinant for the visual outcome.

Our study showed significantly shorter operation time in vitrectomy group compared to the other 2 groups. This may be attributed to the fact that we were in the process of adopting scleral buckle techniques recently in contrast to PPV. However, Albalkini et al [26] found no significant statistical difference in surgical time between the groups, although it was shorter in CSB.

Other reports found a significantly shorter time with CSB like Narayan et al [29], Tomita et al [27] and li et al [28] attributed to wide, clear, and erect surgical field, easy breaks are to be found and perform cryopexy.

In our study iatrogenic retinal break was reported only in 2 cases in PPV group with (8.6 %) from eyes in the group e cases in CSB group and 1 case in SSB group. Also, Ehrlich R et al [34], recorded 29 cases of iatrogenic breaks out of 184 cases (15.7%) in his study. Jalil et al [35], stated that iatrogenic creation of retinal breaks during surgery occurs in up to 17% of cases in his study.

Our study showed no significant statistical difference in the rate of occurrence of refractive change among the studied groups, but more patients are associated with buckling procedures than in vitrectomy groups. However, Sharma et al [25] found that the mean change in the refractive state of the eye in the SB group was − 1.38 D, while the pars plana vitrectomy group showed a mean change of about − 0.85 D.

Many factors may be blamed or the occurrence of myopia postoperatively after PPV. This study hypothesized that PPV, with the use of gas tamponade, could push the IOL anteriorly, resulting in a myopic shift [25].

However, Albalkini et al [26] reported in the SSB group, 4 of the 21 successful eyes had postoperative ERM (Stage 1) on spectral-domain optical coherence tomography (SD-OCT), but not clinically detected. In the CSB group, a macular pucker was detected clinically in 4 of the 18 successful eyes. However, SDOCT detected postoperative ERM in 8 eyes.

Two of those eight eyes had preoperative extrafoveal ERM (Stage 1) on SD-OCT and progressed postoperatively to Stage 4. The other six eyes did not have preoperative epimacular membrane. Two of them developed postoperative Stage 4 ERM, while the other 4 eyes developed postoperative Stage 1 ERM on SD-OCT,. The 4 eyes which developed postoperative macular pucker showed progressive deterioration of their visual acuity requiring PPV with ILM peeling.

Albalkini et al believe the use of chandelier light is the main contributing factor in the pathogenesis of postoperative ERMs in the CSB group. The scleral wound allows entry of conjunctival or episcleral cells into the vitreous cavity. Moreover, the incarcerated or entrapped vitreous in the sclerotomy site, which is detected in 12 eyes (52.1%) in UBM and 3 of the 4 eyes with macular pucker, acts as a scaffold for cells to proliferate and enhance the development or progression of ERM.

In our studies 4 cases of epimacular membrane has been recorded in the SSB group three of which required surgical management however 5 cases have been reported in CSB group and all of which required surgical intervention this in opposite to Albalkini et al study was not statistically significant. Also, vitreous incarceration has been reported in 5 patients in CSB group. Three of them the incarceration site was at the sclerotomy site, in the other two, the incarceration was at the drainage site.

This concludes that CSB may fulfill sufficient successful reattachment rates, also permits young surgeons to observe and learn scleral buckle techniques. There are still some considerations about increased incidence of PVR causing recurrence and epimacular membranes leading to more surgical interventions. This has been tied in theory to vitreous invasion by the endo illumination probe with incarceration, but this has to be verified by other studies as it was not confirmed statistically in our study.

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