

Evaluating Surgical Prognosis in Retinal Detachment and Determine the Role of Predictive Factors in Iraqi Healthcare

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Abstract: Background and Purpose: Retinal detachment (DR) is an ophthalmological emergency. This study is motivated to assess surgical prognosis outcomes of retinal detachment and enrol predictive factors data, and it is related to Iraqi healthcare. **Methods:** We conducted a study on 80 patients aged 30-70 years who presented with retinal detachment. All patients underwent surgery by vitrectomy. Demographic and surgical data were collected from hospitals in Baghdad, Iraq, between February 2023 and March 2024. Functional outcomes of the eye were assessed using BCVA, which measured the visual acuity of the patients and macular OCT of the patients after surgery. **Results:** We enrolled all data of 80 patients with RRD who underwent a vitrectomy procedure. Patients with age ≥ 50 were the most suffered of RRD in 62.5%, males had 70%, and females had 30%; the period of symptoms was found to be 9.82 ± 4.17 days of all total patients observed in this study. In the assessment of visual acuity by BCVA, we noticed males got 1.62 ± 1.01 in preoperative and 0.62 ± 0.44 in postoperative, while females got 2.08 ± 1.22 in preoperative and 0.78 ± 0.58 in postoperative. **Conclusion:** According to the study, visual results in patients having complex rhegmatogenous retinal detachment vitrectomy are strongly predicted by preoperative BCVA and symptom duration. Results from optical coherence tomography macular imaging were impacted by the discontinuity of the ellipsoid zone after operation.

Keywords: Rhegmatogenous Retinal Detachment (RRD); Vitrectomy Approach; Visual scale (BCVA); and Optical Coherence Tomography (OCT).

BACKGROUND

The retina is the sensory tissue of the eye, located at the back of the eyeball [Sodhi, A. A. *et al.*, 2008; Feltgen, N. *et al.*, 2024; Lumi, X. *et al.*, 2015]. It consists of a set of 10 layers that allow the light signals entering the eye to be converted by photoreceptors into electrical potentials that are transmitted to different regions of the brain by a complex architecture of nerve fibres. [Lumi, X. *et al.*, 2016; Heimann, H. *et al.*, 2001; Scott, I. U. *et al.*, 1999; Heimann, H. *et al.*, 2006; Dugas, B. *et al.*, 2009]

When fluid builds up between the neurosensory retina and the retinal pigment epithelium, the two layers separate, a condition known as retinal detachment [Brandlhuber, U. *et al.*, 2015; Pastor Jimeno, J. C. *et al.*, 2008; Kim, J. D. *et al.*, 2013; Gerding, H. *et al.*, 2013]. The most common subtype of retinal detachment, known as rhegmatogenous detachment, can occur at any age, but it is most common between the ages of 60 and 70, with a slight predominance of males. [Suzuki, N. *et al.*, 2014; Mitry, D. *et al.*, 2012; Wickham, L. *et al.*, 2011; Schocket, L. S. *et al.*, 2006]

Additionally, it should be mentioned that other visual conditions, such as myopia or prior surgical procedures, favor its development [Cho, M. *et al.*, 2012; Leisser, C. *et al.*, 2016]. About 30% of

people have previous surgeries of cataracts, and 50% of the myopic population get retinal detachments. [Sridhar, J. *et al.*, 2015; Gharbiya, M. *et al.*, 2012; Matlach, J. *et al.*, 2015]

PATIENTS AND METHODS

All 80 patients with rhegmatogenous retinal detachment in this study underwent vitrectomy; their ages ranged from 30-70 years. All patient data were obtained from hospitals in Baghdad, Iraq, during the period from February 2023 to March 2024.

The inclusion criteria were satisfied by RRD patients who received vitrectomy as their primary treatment. Patients with RRD undergoing scleral buckle, pneumatic retinopexy, and PPV with scleral buckle were not included. Furthermore, people with retinal detachments related to previous ocular injury and those with other retinal disorders that may affect macular function were not included. In addition, people who had retinal cryopexy following PPV were not included.

Preoperative parameters collected from the patient's records were age, sex, axial length (AL) of the operated eye, signs, BCVA, presence of intraocular lens (IOL) and crystalline lens, macular

status (on/off), as well as the existence of PVR grade C1 or higher.

The IOL Master Optical Biometer offered the AL measurement in retinal detachments with the macula and clear optic media on. Using a 10 MHz frequency probe, A-scan ultrasonic biometry was carried out in detachments having opaque optical medium or macula off. The selection of tamponade (air, a kind of gas, or silicon oil) was one of the intraoperative parameters that was observed.

The surgical method used a non-contact wide-angle viewing system and a 3-port PPV with 23 or 25-gauge instruments. To enable peripheral vitrectomy without coming into contact with the crystalline lens, trocars were positioned. Around the retinal tear, or 360 degrees around the retinal periphery, endolaser photocoagulation was used. At the end of the procedure, silicon oil (SO) endo tamponade or an air-gas combination (whether it is 20% sulfur hexafluoride-SF₆ and 10–15% perfluoropropane-C₃F₈) were utilized. Patients

with prolonged retinectomies or huge tears, RRD of the only functioning eye, and those unable to maintain a facedown position following the treatment were all candidates to SO. If vision was inadequate because of lens opacity, a combination of cataract surgery as well as vitrectomy was performed. In the postoperative period, functional outcomes for visual acuity were measured by BCVA as well as enrolled complications and adverse factors.

Calculations were made to determine the mean and standard deviations in numerical variables and the frequencies of categorical variables. Hierarchical linear regression was used to examine the data in order to assess the impact of preoperative as well as postoperative variables on postoperative BCVA. Version 22.0 of SPSS was used to perform the statistical analysis.

RESULTS

Table 1: Basics Clinical Characteristics Of Patients.

Clinical features	Variables	Participants [n = 80]	%
Age	< 50	30	37.5%
	≥ 50	50	62.5%
Sex	Male	56	70%
	Female	24	30%
Previous surgery	Yes	14	17.5%
	No	66	82.5%
Laterality	Right	45	56.25%
	Left	35	43.75%
Period of symptoms, days		9.82 ± 4.17	
Symptoms	Sudden or gradual onset of floaters	34	42.5%
	Flashes of light	27	33.75%
	Shadow or curtain coming down over part of your visual field	13	16.25%
	Others	6	7.5%
Status of the macula	Off	52	65%
	On	28	35%
Duration of macular detachment (weeks)		7.2 ± 5.1	

Table 2: Identify Endotamponade Materials Of Vitrectomy Surgery

Endotamponade material	Number of patients	%
Silicone	28	35%
C3F8	36	45%
SF6	16	20%

Table 3: Enrolment Data Examination Of Retinal Detachment Within Preoperative And Intraoperative

Items	Variables	N = 80	%
Preoperative	Number of tears founded		
	0	28	35%
	2	42	52.5%
	4	6	7.5%
	6	4	5%
Intraoperative	Number of tears founded		
	0	4	5%
	2	44	55%
	4	20	25%
	6	12	15%
Detached retinal area			
	2 clock hours	6	7.5%
	4 clock hours	11	13.75%
	6 clock hours	56	70%
	8 clock hours	7	8.75%
	10 clock hours	6	7.5%
Location of retinal detachment			
	Inferior	28	35%
	Superior	24	30%
	Temporal	12	15%
	Superior, nasal	8	10%
	Superior, inferior, temporal	5	6.25%
	Superior, inferior, nasal	3	3.75%

Table 2: Determining Ocular Factors Related To Patients In Before And After Operation

Items	Factors	Participants, 80	%
Before operation	Lens status		
	Phakic	44	55%
	Pseudophakic	32	40%
	Aphakic	4	5%
	PVR status		
	None	13	16.25%
	PVR with grade A	44	55%
	PVR with grade B	11	13.75%
	PVR with grade C	12	15%
After operation			
	Presence of Cystoid macular edema		
	Yes	16	20%
	No	64	80%
	Presence of Epiretinal membrane		
	Yes	44	55%
	No	36	45%
	Discontinuity of ellipsoid zone		
	Yes	32	40%
	No	48	60%

Table 3: Determining Visual Acuity Of Patients By Bcva During Preoperative And Postoperative

Items	Males, (mean ± SD)	Females, (mean ± SD)
Preoperative BCVA (logMAR)	1.62 ± 1.01	2.08 ± 1.22
Postoperative BCVA (logMAR)	0.62 ± 0.44	0.78 ± 0.58

Table 4: Identify The Impact Of Preoperative Patients' Factors On Visual Acuity Best Corrected (Bcva) After Surgery

Factors	OR	CI 95%	P – value
Age	1.04	0.02 – 3.88	0.810
Symptom's duration	0.9	0.04 – 2.21	0.040
Preoperative BCVA	0.082	0.002 – 2.08	0.093
Lens status	0.143	- 0.303 – 0.440	0.331
Macular status	0.110	- 0.087 – 0.757	0.242
Presence of PVR	0.062	- 0.160 – 0.123	0.670

DISCUSSION

The anatomical success rate with RRD management has significantly increased due to improved surgical techniques, a better understanding in the pathological mechanisms underlying the formation of retinal detachments, and advancements in technology that enable more complex, precise, and fewer traumatic surgical treatment. [Nakanishi, H. *et al.*, 2009]

Patients receiving PPV with primary RRD have a high morphological success rate, but the functional result differs significantly. Previously, preoperative features have been examined primarily as prognostic variables for a visual result. Preoperative macula status, preoperative BCVA, duration of symptoms, degree of retinal detachment, number of retinal quadrants involved, prior lens intraocular surgery other than RD, high myopia, preoperative hypotony, and presence of PVR have all been linked to the postoperative visual acuity outcome in previous reports. [Delolme, M. P. *et al.*, 2012; Okuda, T. *et al.*, 2002; Lim, L. S. *et al.*, 2015; Kobayashi, M. *et al.*, 2017; Dell’Omo, R. *et al.*, 2015; Terauchi, G. *et al.*, 2015]

According to our findings, there is a statistically significant correlation between postoperative BCVA and the length of symptoms, preoperative BCVA, and the integrity of the EZ shown on OCT imaging. The preoperative BCVA was the most statistically significant of these predictive signs, according to hierarchical regression analysis.

In the American investigation [Abraham, J. R], which included 517 eyes receiving PPV and scleral buckling in RRD, the length of symptoms was also substantially related to the functional result. According to their findings, a lower ultimate BCVA was associated with a shorter duration for

symptoms. The period with symptoms is 10.8 days for patients with a BCVA > 20/40, 13.9 days for patients having a final VA among 20/50 and 20/100, and 27.9 days for patients who had a final VA less than 20/100.

A study of 81 patients in the Netherlands found that the duration of symptoms had a comparable impact on the functional result following PPV for macula-off RRD. Compared to individuals with prolonged symptom duration, those with symptoms lasting six days or fewer had superior postoperative BCVA. [Machemer, R; Giani, A. *et al.*, 2019]

In our investigation, postoperative OCT macular results demonstrated that 39% of patients had discontinuity in the EZ zone, 15% had CME, and 2% had a macular hole. In earlier research [Coscas, G. *et al.*, 1991; Hubschman, J. P. *et al.*, 2020; R Core Team, 2020], EZ distortion was found of 40% of the patients in Cho's study, which had 12 patients, and 53% of the patients in the German study [Cheng, K. C. *et al.*, 2016], which involved 30 patients. According to Spanish research, 17 individuals had greater percentages with EZ distortion (82%) conducted. However, compared to our study, these trials had a significantly fewer number of patients. We documented ERM alterations in 53% of patients after we initially recognized each hyper-reflective layer in the inner surface of each retina as ERM.

CONCLUSION

Preoperative BCVA and symptom duration are statistically significant predictive factors for the ultimate visual outcome of patients receiving vitrectomy for complicated rhegmatogenous retinal detachment (RRD), according to the findings of our study. The just postoperative factor associated with a poorer visual result after surgery

was the discontinuity of the ellipsoid zone in optical coherence tomography macular imaging. Age for the individuals, axial length of the eye, lens status, macular status, as well as proliferative vitreoretinopathy status all had statistically significant associations with the functional result, despite being included as preoperative indicators of outcomes.

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