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Sd-Oct Study of Pateints Who Underwent Repair for Primary Rhegmatogenous Retinal Detachemnt And Its Impact On Functional Outcome

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I. Introduction:

Rhegmatogenous retinal detachment (RRD)is separation of neurosensory retina from retinal pigment epithelium with accumulation of sub-retinal fluid within the potential space in between. RRD is caused by a full thickness break in the neurosensory retina which initiates separation of the neurosensory retina from the underlying retinal pigment epithelium. Vitreous synresis needs to be there for seepage of SRF and detachment.

OCT enables noncontact, noninvasive imaging of the anterior eye as well as of morphologic features of the human retina including the fovea and optic disc[1-2]using near infrared low coherent light passing through a Michelson interferometer to obtain two dimensional images of the retina and optic nerve head. OCT has gained popularity not only in medical retina, such as in cases of macular hole, retinal detachment, epiretinal membrane.

Optical coherence tomographyis of two types- Time domain OCT and Spectral- domain or Fourier Domain OCT.The time domain OCT 3000 become available in 2002, with an axial resolution of 10µm and scan velocity of 400 axial scans per second. In 2004, higher resolution Spectral Domain OCT (SD-OCT) was introduced in clinical practice with reported resolution of 1 to 5 µm as well as improved visualization of retinal morphologic and pathologic features.[3]

II. Aims And Objectives

To study SD-OCT features of macula of patients who underwent surgery for primary rhegmatogenous retinal detachment and its impact on the functional outcome.

III. Materials And Methods

This was a prospective, descriptive type of observational,post operative hospital based case series study done at Upgraded Department of Ophthalmology, SMS Medical College, Jaipur. 320 eyes of patients attending SMS Eye OPD diagnosed with uncomplicated Primary RRD who underwent repair were recruited from January 2014 to September 2017. 14 patients who do not completed follow-up were excluded from the study. 308 patients were analysed.

INCLUSION CRITERIA: Patients with Primary RRD with follow up of post operative 3 months

EXCLUSION CRITERIA: RD due to perforating injury, RD with PVR grade C-1 or higher, exudative and tractional RD.

Thorough pre-operative history, vision, I/O examination, SD-OCT etc were documented. 23 G pars planar vitrectomy with /without encirclage and silicon oil tamponade and scleral buckling using 204 band + 287 tyre or 505 sponge was used .Post operative vision, central macular thickness(CMT), outer nuclear layer thickness, intara-retinal/ subretinal fluid, IS/OS junction, sub retinal deposits, epiretinal membrane were assessed using SD-OCT in post operative period.We used OCT to assess foveal microstructural details that may affect functional recovery. IS/OS junction, SRF, SRD, CME,ERM,Macular Hole, Height of detachment were noted. The correlations between SD-OCT findings at 3 months follow up and best corrected visual acuity were studied.

IV. Results:

Total no of patients included in the study were 322 out of them 308 had complete follow up. Total patients in phakics were 172 and 136 were pseudophakic . Patients in bucking were 59 and in vitrectomy were 249. In scleral buckling group we got Primary attachment rate in 52(88.13%) patients. Those who failed to attach : 3 had PVR grade 3, 1 had open break, 1 developed new break, 1 had re-detachment as break was at margin of indent, 1 required revision of buckling due to slowly increasing fluid at 3 months.SRF was not drained in 11 patients, two patients had subretinal bleed encroaching fovea.

In PPV group total patients were 249. We achieved 92.77%(231) primary anatomical attachment rate. Those who failed to attach had: 4 had no encirclage,1 had coloboma RD, 1 had FTMH, 4 had more than 6 breaks, 1 had retained sub-retinal PfCl, 5 were below 16 years of age, 2 developed new breaks with PVR grade C. out of 308 patients, only one developed endophthalmitis.

Table no1 : OCT findings

OCT findings	**Buckling**		**PPV**		**"p" value**
	N	%	N	%	
CME	1	1.6	21	8.4	0.126
IS/OS disruption	10	16.94	43	17.26	0.894
SRD	14	23.72	53	21.28	0.815
Macular/paramacular hole	0	0	7	2.8	0.414
CNVM	0	0	3	1.2	0.912
ERM	0	0	21	8.4	0.043
PfCl bubble	0	0	7	2.8	0.414
Corneal decompensation	0	0	1	0.4	0.432

ERM formation was significant in PPV group. CNVM, ERM, PfCl bubble and corneal decompensation were exclusively found only in PPV group. CME was 8.4% in PPV but this vaue was not statisticaly significant from Buckling group.

In buckling group , out of 59 only 1 patient was pseudophakic, having significant p value.

Table no 2: relation of SRF post operatively in buckling to best corrected visual acuity in log MAR

Day 1

Day 1	Buckling	PPV	Total
-	9	239	248
+	50	10	60
Total	59	249	308

Chi square=127.679 with 1 degree of freedom; p value =0.000

Day 7	Buckling	PPV	Total
-	21	239	260
+	38	10	48
Total	59	249	308

Chi square= 127.679 with 1 degree of freedom; p=0.000

Day 30	Buckling	PPV	Total
-	35	243	278
+	24	6	30
Total	59	249	308

Chi square=75.161 with 1 degree freedom;p=0.000

Day 90	Buckling	PPV	Total
-	43	245	288
+	16	4	20
Total	59	249	308

Chi square=47.015 with 1 degree freedom;p=0.000

Table no 3: relation of SRF with BCVA

Day	No of patients	%	Mean BCVA (log MAR)
1	43	82.69	1.0
7	31	59.61	0.8
30	17	32.69	0.6
90	9	17.30	0.5

SRF was a significant finding in buckling group. It was present on day 1,7,30,90. It decreased with time with subsequent improvement in vision. Thereby, delayed SRF absorption leads to delayed visual recovery.

V. Discussion:

The high percentage of anatomic re-attachment rates after pars planarvitrectomy and buckling do not correspond with the similar rates of visual acuity improvement.Post operative factors like ERM, IS/OS junction disruption, CME influence the final visual acuity. As also proved in ***Manish Nagpal***et al[4], ***Soo*Geun Joe** et at (2013)[5], ***Lecleire-Collet A*** et al (2006)[6], ***Smith***(2008)[7]. Foveal microstructure details can be measured by SD-OCT unlike time domain machines which documented only gross pathologies like ERM, CME etc. Longer the duration of & more the height of detachment translates into more degeneration of photoreceptor cells finally leading to a poorer visual outcome.Several reports have been published highlighting the association between foveal structural change and visual acuity gain. Introduction of spectral domain OCT has facilitated improved analysis of foveal microstructures. In our study we got inverse relation of these OCT finding and final visual

acuity. In patients with CME it was more in vitrectomy group and got resolved with local steroids with full visual recovery.

Sub-Retinal Fluid

Sub-retinal fluid have more protein concentration in long standing cases and with smaller break limiting SRF mixing with vitreous. In vitrectomy, there is almost complete internal drainage of SRF with use of PfC1, flute needle and FAE, but in buckling complete drainage is neither possible nor recommended as it can lead to devastating complications. Therefore, here it needs to be absorbed via RPE, which has already become sub-functional and atrophic due to high concentration of macromolecules especially in late presentations. This leads to late absorption of fluid.We assessed persistant sub-macular fluid in our study, which was statistically significant in buckling group at day 1,7,30,90. It was also associated with delayed recovery, but not sub-optional. A similar study in 2011 by ***Feraoun MN*** et al [8] and ***Ricker LJ*** et al [9] in 2011 had similar results.***Rashid S*** et al in 2013 [10] suggested progressive absorption of SRF leads to improvement in vision as we also got in our study.***Woo SJ*** et al in 2011 suggested poor vision in patients with delayed SRF absorption due to photoreceptor disruption which is against our study [11]***Manish Nagpal*** et al (2014) in his study reported that all eyes of SB and 3 eyes of PPV had a minimal subfoveal fluid at 30 days follow-up that had no effect on visual acuity[4]

VI. Conclusion:

SD-OCT is invaluable in assessing sub-optimal visual recovery which can be due to m ydriad facors like CME, ERM, IS/OS junction abnormalities etc. Most of the mentioned pathologies on SD-OCT are amenable to correction with surgery or medical management except sub-foveal IS/OS junction alternations.

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