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A Comparative Study of Scleral Buckling and Pars Planar Vitrectomy for Primary Rhegmatogenous Retinal Detachment

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I. Introduction

Rhegmatogenous retinal detachment (RRD)is separation of neurosensory retina from retinal pigment epithelium with accumulation of subretinal 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 foe seepage of SRF and detachment.Majority of RRD cases are caused by more than one retinal break which needs to be kept in mind for appropriate surgical management. Myopia,peripheral retinal degenerations, PVD, ocular trauma, previous cataract surgery are important predisposing factors. Patients may have RRD or break or lattice in the fellow eye representing an important risk of bilateral visual loss.The surgical repair of RRD can reverse many of the pathological changes noted during retinal detachment, although the functional prognosis depends in the status of the macua and duration of detachment[1]. Wolfensberger has also shown that in "off- macula" retinal detachments the delay in visual recovery can be due to persistantsubretinal fluid at the macula and this may be related to the surgical technique[3]. The visual outcome of the macula-off detachments is also influenced by the height of the detachmentas well as the duration.[2]

Aims And Objectives: To evaluate Anatomical and Visual outcomes of surgery for primary rhegmatogenous retinal detachment in Scleral buckling and Pars Planar Vitrectomy groups.

II. Materials And Methods:

This was a prospective, non randomized, descriptive type of observational, pre-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 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. Patients were divided into two groups: Scleral buckling and PPV groups. Thorough pre-operative history, vision, I/O examination, etc were documented.

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.

Treatment Modalities Used In The Study: Phakic patients with clear media , anterior and identifiable causative retinal break and those not having PVR were taken for Scleral Bucking. Buckling was done with 287 tyre+240 band in caes with multiple breaks that were widely located. Those with single break or closely located breaks cofined to one clock hour, buckling was done with 505 sponge. Rest of the phakics underwent PPV +/- encirclage. Pseudophakics were taken for vitrectomy.

In PPV, 240 band was tied before vitrectomy. Standard 23 G PPV with 3 scleral ports was done. PVD induction was done in all patients with vitreous cutter using suction mode. In phakicsretinotomy was made nasally in those not having identifiable breaks and PfCl injected till anterior margin of retinotomy and SRF drained internally.360 degree endolaser was done after air fluid exchange. In pseudophakic group PfCl was used invariably used till anterior margin of break as media haze was there due to PCO, Scheling phenomenon was easily noted and most of the breaks were at base of vitreous. 360 degree endolaser was done under PfCl as with air madia haze gets further aggravated. ILM peeling was done in cases with long standing RD, large break, macular hole.

III. Results

Total no of patients included in the study were 322 out of them 308 had complete follow up. Total patients in phakic group were 172 and 136 were in pseudophakic group. Patients in bucking group were 59 and in vitrectomy group 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 atients 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 yrs of age, 2 developed new breaks with PVR grade C. out of 308 patients, only one developed endophthalmitis.

Table no 1: Comparision of Buckling and Vitrectomy

VARIABLE	SURGERY	N	Mean	Std. Deviation	"p" value
AGE(yrs)	PPV	249	43.87	20.32	0.000
	BUCKLING	59	29.49	15.80	
Duration of detachment(weeks)	PPV	249	9.32	10.27	0.955
	BUCKLING	59	9.41	10.77	
Pre operative vision(log MAR)	PPV	249	1.38	0.10	0.001
	BUCKLING	59	1.27	0.24	
No of breaks	PPV	249	3.43	22.80	0.654
	BUCKLING	59	2.10	1.14	
Vision at day 90(log MAR)	PPV	249	0.49	0.24	0.913
	BUCKLING	59	0.46	0.50	

Unpaired t test

There is statistically no significant difference in duration of detachment, pre operative vision, no of breaks and post operative BCVA at day 90. Age of patients was significantly lower in buckling group due to phakic status of the patients.Attachment rate in PPV group was 92.77%(231/249), and 88.13%(52/59) in Buckling group. Chi square test was applied giving p value 0.998 haveing nil statistical significance.

Table no 2: PREDISPOSING FACTORS

Predisposing factor	Buckling group%	PPV group%	"p value"
Myopia	54.28	38.15	0.037
Trauma	20.33	30.12	0.180
Acute PVD	15.25	2.8	0.000
PCR	0	28.5	0.432
Coloboma	0	2.8	0.414
others	3	1.6	0.713

Chi square test was applied giving significant p- value for myopia and PVD.

Table no 3: NO OF BREAKS IN BUCKLING AND VITRECTOMY GROUP

No of breaks	Buckling		PPV		TOTAL
	N	%	N	%	
1	18	30.50	102	40.96	120
≥2	41	69.50	147	59.04	188
Total	59	100	249	100	308

Both the groups had more than 1 break in more than half of cases. 69.50% in buckling group, 59.04% in PPV group. 61.04% of total cases had more than 1 break.

Table no 4: type of break

Type of break	Buckling	%	PPV	%	"p" value
Superotemporal	28/59	47.45	81/249	32.53	0.045
Inferotemporal	12/59	20.33	41/249	16.46	0.614
Temporal	5/59	10.20	32/249	12.85	0.480
superonasal	7/59	14.28	28/249	11.24	0.910
Inferonasal	1/59	1.6	17/249	6.82	0.229
Superior	4/59	6.7	48/249	19.27	0..35
Inferior	19/59	32.20	59/249	23.69	0.236
360 degree	3/59	5.08	10/249	4.01	0.994
FTMH	1/59	1.6	1/249	0.4	0.833
Nasal	1/59	1.6	1/249	2.8	0.979

Most common break location in our study is superotemporal(32.83%). Superotemporal was more common in buckling and superior in PPV *(significant p- value).*

Table no 5: fellow eye in Buckling and PPV

Fellow eye	Buckling	%	PPV	%	Total
CNVM	1	1.6	0	0	1
Lattice	15	25.42	46	18.47	61
NAD	38	64.40	171	68.67	211
RD	5	8.47	25	10.04	30
Coloboma	0	0	7	2.8	2
Total	59		249		308

Chi-square=6.867 with 5 degrees of freedom; p=0.254 (ststistically not significant)

IV. Discussion

History of detachment surgery started with ***Gonin***, it started with buckling and with time buckling is getting replaced by PPV. In our study most common location of break was superotemporal**. Lim JW**et all in 2011 also reported superotemporal quadrant as most common location[16]. We got more than one break in more than 50% patients (61.04%).***Chaturvedi V*** et all also reported same procedure for PPV as ours with slightly higher attachment rate(95%) than our study[12]. ***Storey P***et all also reported use of encirclage with PPV with significantly higher rates of anatomical success compared to PPV alone[13]. Data from ***Retina 1 Project Report 3*** established the indications for adding SB to PPV. They used encirclage in younger patients , posterior and unidentifiable break, phakic eyes and eyes with attached posterior vitreous, total RD. No anatomic and visual differences werefound between PPV and PPV+SB.***Mehta S*** etall in 2011 suggested adding encirclage to PPV to be beneficial in phakic RD[15]Not using encirclage during PPV could not be addressed as predictive factor for failure due to insufficient data in our study.

The additional benefit of doing encirclage to PPV is in terms of supporting vitreous base during vitrectomy and providing external tamponade to vitreoretinal traction in post-operative period as complete removal of vitreous is not possible from here and post-operative vitreous base contraction do occur. It also provides better control in more challenging situations. It may be more beneficial in pseudophakic eyes as most of them have multiple small breaks at vitreous base. Also these eyes have PCO and reflections from IOL impending the peripheral view further demanding an external tamponade.

Orlin Aet all in [8], ***Rush RB*** et all in 2013 [9]***Ghoraba HH***[10] et all in 2014 did not found any statistically significant difference of using encirclage to PPV.

Mehta S (2011) et all showed that PPV+SB may be associated with a decreased risk for retinal re-detachment when compared to PPV for repair of phakic RRD. In pseudophakic eyes, the anatomic success rate between the two techniques appears to be similar.[15]

Phakic patients with clear media and identifiable break were taken for buckling. Thorough examination with indirect ophthalmoscope was done preoperatively and at the starting of surgery. Breaks were barraged by cryo and were marked on sclera. 505 songe was used for detachment with single or closely spaced retinal breaks less than one clock hour in total extent. For cases of multiple distantly located breaks external tamponade was provided using 287 tyre placed circumferentially, length according to the no. of quadrants having breaks and distance from limbus according to location of break from limbus. 240 band was tied over it circumferentially.

Anatomical attachment rate in our study was 88.13% which is slightly lower than ***Shankar*** et al (2014) study having 90.77% anatomical results [11] and higher (82%) than ***Stephen*** et al (2002) study.[12] We didn`t get any statistically signification difference between scleral buckling and PPV group in attachment rate and BCVA at day 90. We got **92.77%**attachement in vitrectomy and **88.13%** in buckling. BCVA at day 90 was **8.49+0.24** in vitrectomy group and **0.46+0.50** in buckling group. It was not statistically significant.

Retina 1 project; ***report*** 1 in 2008 resulted that Primary vitrectomy is related to neither a higher complexity of cases nor better anatomical results [135]***Wrong CW*** et al (2014) had similar anatomical attachment rate but better visual outcome in buckling group. EVRS study in 2013 suggested SB for phakics and PPV for pseudophakics.[65]***Soni C*** et al in 2013 had similar results as do ***Brazitikos PD***et al[11] in 2005 and suggested PPV in pseudophakics due to less operating time, accurate diagnosis of breaks, higher reattachment rate with a single sugery, and no postoperative axial length changes.

V. Conclusion

No significant differences between vitrectomy and buckling group were found, unless the complicating factors are well addressed. Persistent SRF is often seen in buckling group which is associated with delayed visual recovery but not sub-optimal outcome as compared to the vitrectomy group. Again no significant difference in fellow eye was observed. Superotemporal break was more common in buckling and superior break

as more frequent in vitrectomy though multiple breaks were there in vitrectomy group at vitreous base. Overall, most common location of break was superotemporal and more than 50% pateints had more than 1 break.

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