Original Article

Internal limiting membrane peel: Does it change the success rate of primary vitrectomy without belt buckle in rhegmatogenous retinal detachments?

Prashant K Bawankule, Shilpi H Narnaware[1], Dhananjay V Raje[2], Moumita Chakraborty[2]

Purpose: To compare the anatomic success of pars plana vitrectomy (PPV) after internal limiting membrane (ILM) peeling at macular area and macular plus peripapillary area versus no peeling in rhegmatogenous retinal detachments (RRD). **Methods:** A prospective observational study between July 2014 and March 2017 conducted on 289 eyes of 287 patients with RRD were randomly assigned to three treatment procedures, viz., PPV with no ILM peeling, PPV with macular peeling, and PPV with macular plus peripapillary peeling. Recurrent RD (ReRD) was treated as an event and accordingly the overall primary (PS) and final success (FS) rates were obtained. The risk of ReRD associated with peeling procedures after adjusting for risk factors were obtained using Cox-proportional hazard analysis. **Results:** The PS percentage for no peel, macular, and macular plus peripapillary procedures were 77.78% (70/90), 82.18% (83/101), and 94.89% (93/98; maximum), respectively, which was statistically significant with a *P* value of 0.003. The FS percentage for no peel, macular, and macular plus peripapillary were 93.33%, 95.04%, and 100%, respectively, which was significantly different with a *P* value of 0.048. With reference to no peeling, the adjusted hazard ratio for macular peeling was 0.841 [95% CI: 0.44–1.60] while 0.235 [95% CI: 0.088–0.626] for macular plus peripapillary peeling. **Conclusion:** The anatomic success rate of PPV with macular plus peripapillary ILM peeling was significantly higher as compared to no peel category. The hazard of ReRD in patients undergoing macular plus peripapillary peel was significantly reduced as compared to no peel procedure.

Access this article online

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_1685_18

Quick Response Code:

Key words: Cox-regression, hazard ratio, macular peel, macular plus peripapillary, primary/final success

Rhegmatogenous retinal detachment (RRD) is the most common vision-threatening retinal condition requiring urgent care.[1] The three critical preconditions for the development of RRD are: liquefied vitreous, tractional force producing a retinal break, and access of fluid into the subretinal space through retinal breaks.[2,3] The aim of RRD treatment is to identify, localize, and close the retinal tears/breaks, as well as also removing any traction on the edges of the tear.[3] A traction has three components: (1) anteroposterior, (2) circumferential, and (3) tangential. Vitrectomy relieves the anterioposterior and circumferential tractions. The encircling band and base excision relieves the circumferential traction. Membrane peeling relieves the tangential traction on the surface of retina. The internal limiting membrane (ILM), as a cause of tangential traction, is well established and is responsible for the development of macular hole. Peeling of the ILM relieves the tangential traction and thereby increases the rate of closure of the macular hole to its full thickness.[4] ILM, as a cause of tangential traction in retinal detachment (RD) and proliferative vitreoretinopathy (PVR) and its relief by ILM peeling during vitrectomy, has not been addressed in any previous study. In addition, it is well established that 10%–15% cases of vitreous surgery developed epiretinal membrane.[5] Peeling of the ILM will also avert the need of further procedures for the same. In this prospective study, vitrectomy was followed by posterior vitreous detachment (PVD) induction and base excision. None of our patients received scleral buckle or encircling band. As, age of patient, lens status, duration of detachment, position of break, and presence of preoperative PVR influence the anatomical outcomes of primary PPV, the analysis evaluates the influence of these factors on the anatomical PS and FS rates of vitrectomy with ILM Peel for RRD.

Methods

Study design

A prospective, observational study was conducted on 289 eyes of 287 patients with primary RRD between July 2014 and March 2017 at a tertiary care centre, by a single retinal surgeon. After obtaining informed consent, each eye was treated with one of the three procedures, viz. (a) PPV with no ILM peel, (b) PPV with macular peel, and (c) PPV with macular plus peripapillary peel. For the purpose of the study, patients undergoing vitrectomy in cases of primary RRD, patients with subtotal or total RRD, patients with giant retinal

Vitreo-Retinal Surgeon, [1]Vitreo-Retinal Surgeon and ROP Specialist, Sarakshi Netralaya, Nagpur, [2]Data Analysis Group, Maharashtra, India

Correspondence to: Dr. Shilpi H Narnaware, Vitreo-Retinal Surgeon and ROP Specialist, Sarakshi Netralaya, 19, Rajiv Nagar, Wardha Road, Nagpur - 440 025, Maharashtra, India. E-mail: shilpi.narnaware@gmail.com

Manuscript received: 10.10.18; Revision accepted: 09.04.19

Cite this article as: Bawankule PK, Narnaware SH, Raje DV, Chakraborty M. Internal limiting membrane peel: Does it change the success rate of primary vitrectomy without belt buckle in rhegmatogenous retinal detachments? Indian J Ophthalmol 2019;67:1448-54.

tear, retinal dialysis, multiple retinal breaks, posterior breaks, RRD with vitreous haemorrhage, and RDs with preoperative PVR (all grades) were included in the study. Patients who were unfit to undergo scleral buckle procedure were included in the studies. PVR stage was graded as defined by the recent classification methods of the Retina Society Terminology Committee (1991).[6] Patients with RD and with PVR ≥ C1 were classified as complicated RD. Patients who got operated within 28 days of presentation were treated as fresh RD and beyond that were considered as old RD. Patients less than 18 years of age were treated as pediatric. Superior RD was defined as when breaks are located between the 2 o'clock and 10 o'clock hours, while inferior RD, if breaks are located between 4 to 8 o'clock. Patients with history of trauma, combined detachments, history of any previous retinal surgery, and patients with incomplete follow-up period were excluded from the study. The study was performed according to ethical standards of the Declaration of Helsinki and was approved by the institutional ethics committee.

Surgical procedure

In all cases, 23 Gauge PPV with Alcon constellation was performed using a noncontact wide-angle viewing system (Oculus BIOM 5). After obtaining informed consent from the patient, surgery was performed mostly under local anaesthesia. Trocars were placed in a way that allows peripheral vitrectomy to be performed without touching the lens, and also switching between the three entry sites, if necessary. Core vitrectomy was followed by PVD induction. Membranes were peeled. Base excision was done in all the cases. No cases received encircling/scleral buckle. The first group did not undergo ILM peel. In groups 2 and 3, ILM was stained with brilliant blue dye. ILM was peeled at macular area in group 2 between arcades [Fig. 1a]. In group 3, both macular plus peripapillary ILM (peel in superior, inferior, and nasal to the disc as well) were peeled [Fig. 1b]. PFCL was used to flatten the retina and then PFCL – Air exchange was done. Endolaser photocoagulation was performed using a curved probe and was applied around the retinal tear and 360° to the vitreous base. The choice of tamponading agent used, that is, C3F8 or silicon oil (1000 centistokes), was based on the number of breaks, types of breaks, location of breaks, and severity of PVR. Silicon oil removal was done 8–10 weeks later in attached retina, while earlier in recurrent RD (ReRD) under oil. Patients from each treatment category were examined postoperatively at 6 weeks, 4 months, 8 months, and 12 months after the last surgery. Patients were considered "lost to follow up or incomplete follow up" if they did not turn up till 6 months after surgery. One patient in the no peel and three from the macular peel groups were lost to follow up.

Statistical methods

Patient characteristics like age, gender, and duration of RD till the first presentation were obtained and summarized according to measurement scale. Other clinical features like the lens status, location, and complexity were summarized in terms of frequencies. The mean age was compared across groups using one-way analysis of variance, while the comparison of categorical features was performed using Pearson's Chi-square test. Primary success (PS) was defined as the probability of nonoccurrence of RD four months after the surgery in patients treated with C3F8 tamponade and as nonoccurrence of RD four months after silicon oil removal in patients who had silicon oil insertion. RRD under oil was considered primary failure. Thus, if n_1 is the initial number of patients and r_1 is the number of patients without recurrence of RD, then the PS rate was defined as r_1/n_1. If n_2 is the number of patients undergoing second surgery due to recurrence of RD and r_2 is the number of successes after second surgery, then the FS rate was defined as:

$$Final\ success\ rate = 1 - [(1 - \frac{r_1}{n_1}) * (1 - \frac{r_2}{n_2})]$$

Where $n_2 = n_1 - r_1 - c_1$. Here, c_1 is the number of censored cases after first surgery. Censored cases were defined as patients who were lost to follow up after six months of first surgery and were not included in calculating the PS. In other words, the FS rate is defined as the nonoccurrence of RD at four months after last retinal reattachment procedures. These success rates were obtained according to various clinical parameters for each procedure type. The recurrence of RD was considered as an outcome event and accordingly, the time to recurrence for patients with event was recorded. The risk of event, that is, hazard ratio (HR) associated with the demographic and clinical factors were determined through univariate Cox-proportional hazard analysis. Graphical visualization of recurrence patterns corresponding to levels of significant factors was obtained

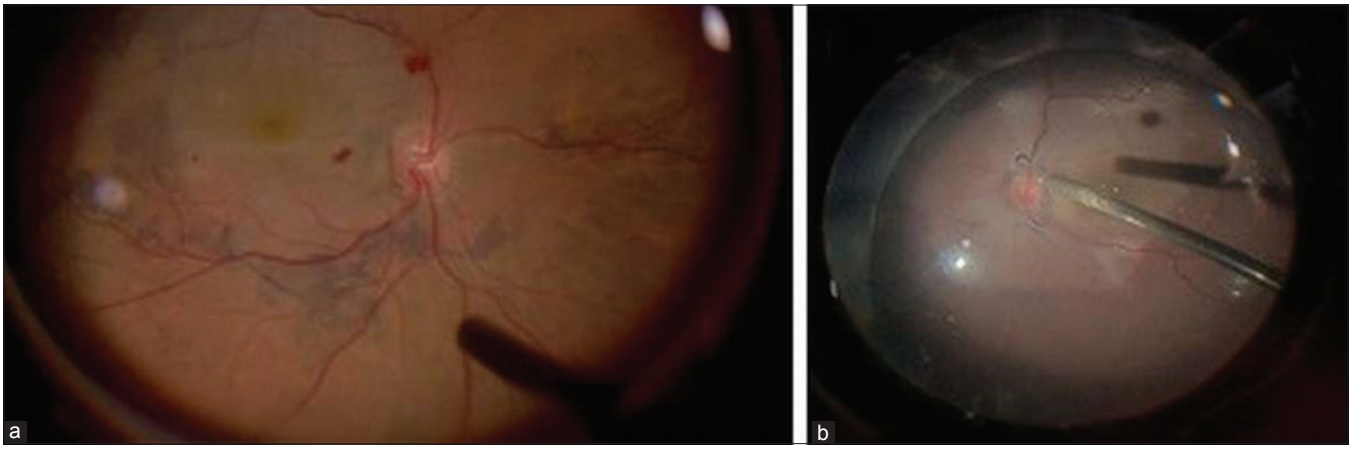

Figure 1: Intraoperative image of macular ILM peel (a) and macular plus peripapillary peel (b)

through Kaplan–Meier plots. Multivariate Cox-proportional hazard analysis was performed by considering statistically significant demographic and clinical factors along with the procedure to obtain the adjusted HRs for macular and macular plus peripapillary procedures, as compared to no peel. All the analyses were performed using SPSS ver 20.0 (IBM Corp. Armonk, USA) and the statistical significance was tested at 5% level.

Results

In this prospective study, 289 eyes treated for RD were included and analysed for recurrence of RD. Patient characteristics were summarized according to no peel (90), macular peel (101), and macular plus peripapillary peel (98) procedures, as shown in Table 1. The mean age of patients across the three groups differed significantly ($P = 0.043$). However, gender distribution as well as duration till first presentation (old/fresh RD) did not differ significantly across the groups ($P > 0.05$). The distribution of patients with regard to clinical characteristics was homogeneous across groups ($P > 0.05$). In other words, the baseline characteristics of patients in the three groups were statistically similar.

The effectiveness of three procedures was evaluated in terms of PS and FS rates. Overall, the PS rate for no peel, macular, and macular plus peripapillary groups were 77.78%, 82.18%, and 94.89% (maximum), respectively, and the difference of percentages across the groups was statistically significant with P value of 0.003. The FS rate was 93.33%, 95.04%, and 100% in the no peel, macular peel, and macular plus peripapillary peel groups and the difference of proportions among them was statistically significant with P value of 0.044. The success rates were also obtained according to the levels of factors as shown in Table 2. For patients aged >18 years, the PS rate was significantly higher in macular plus peripapillary group (96.77%) as compared to other two groups ($P = 0.002$). The PS and FS rates had hardly any influence of gender and treatment types and

Table 1: Distribution of patients according to demographic and clinical factors and ILM procedures

Risk factors	Levels	All patients (*n*=289)	Procedure			*P*
			No peel (*n*=90)	Macular (*n*=101)	Macular per-papillary (*n*=98)	
Age (years) [mean±SD]			49.22±17.65	54.89±16.38	50.62±14.85	0.043‡
Gender [No. (%)]	Female	90 (31.14)	29 (32.22)	31 (30.69)	30 (30.61)	0.965*
	Male	199 (68.86)	61 (67.78)	70 (69.31)	68 (69.39)	
Duration [No. (%)]	Old	83 (28.72)	31 (34.44)	25 (24.75)	27 (27.55)	0.319*
	Fresh	206 (71.28)	59 (65.56)	76 (75.25)	71 (72.45)	
Lens status [No. (%)]	Phakic	108 (37.37)	39 (43.33)	31 (30.69)	38 (38.78)	0.185*
	Pseudophakic	181 (62.63)	51 (56.67)	70 (69.31)	60 (61.22)	
Location [No. (%)]	Inferior	77 (26.64)	22 (24.44)	24 (23.76)	31 (31.63)	0.387*
	Superior	212 (73.36)	68 (75.56)	77 (76.24)	67 (68.37)	
Complexity [No. (%)]	PVR <Grade C	211 (73.01)	65 (72.22)	71 (70.3)	75 (76.53)	0.599*
	PVR ≥Grade C	78 (26.99)	25 (27.78)	30 (29.7)	23 (23.47)	

*Obtained using Pearson's Chi-square test; ‡Using one-way ANOVA, ILM=Internal limiting membrane; PVR=Proliferative vitreoretinopathy

Table 2: Success rates of retinal surgeries according to demographic and clinical factors for three ILM procedures

Risk factors	Levels	ILM									*P** (PS)	*P** (FS)
		No peel			Macular			Macular Peripapillary				
		n	Primary success	Final success	*n*	Primary success (PS)	Final success (FS)	*n*	Primary success	Final success		
Overall		90	70 (77.78%)	84 (93.33%)	101	83 (82.18%)	96 (95.04%)	98	93 (94.89%)	98 (100.0%)	0.003	0.044
Age (in years)	<=18 (Child)	6	3 (50.00%)	5 (83.33%)	3	1 (33.33%)	3 (100.0%)	5	3 (60.00%)	5 (100.0%)	0.766	0.488
	> 18 (Adult)	84	67 (79.76%)	79 (94.05%)	98	82 (83.67%)	93 (94.89%)	93	90 (96.77%)	93 (100.0%)	0.002	0.067
Gender	Male	61	44 (72.13%)	56 (91.80%)	70	55 (78.57%)	65 (92.86%)	68	64 (94.12%)	68 (100.0%)	0.004	0.063
	Female	29	26 (89.65%)	28 (96.55%)	31	28 (90.32%)	31 (100.0%)	30	29 (96.67%)	30 (100.0%)	0.535	0.345
Duration	Old	31	22 (70.97%)	30 (96.77%)	25	18 (72.00%)	25 (100.0%)	27	25 (92.59%)	27 (100.0%)	0.091	0.428
	Fresh	59	48 (81.35%)	54 (91.52%)	76	65 (85.53%)	71 (93.42%)	71	68 (95.77%)	71 (100.0%)	0.032	0.055
Lens status	Phakic	39	26 (66.67%)	35 (89.74%)	31	26 (83.87%)	31 (100.0%)	38	35 (92.11%)	38 (100.0%)	0.016	0.025
	Pseudophakic	51	44 (86.27%)	49 (96.08%)	70	57 (81.42%)	65 (92.86%)	60	58 (96.67%)	60 (100.0%)	0.027	0.108
Location	Superior	68	55 (80.88%)	63 (92.65%)	77	63 (81.82%)	73 (94.81%)	67	64 (95.52%)	67 (100.0%)	0.023	0.093
	Inferior	22	15 (68.18%)	21 (95.45%)	24	20 (83.33%)	23 (95.83%)	31	29 (93.55%)	31 (100.0%)	0.052	0.499
Complexity	PVR <Grade C	65	52 (80.00%)	61 (93.85%)	71	61 (85.91%)	68 (95.77%)	75	72 (96.00%)	75 (100.0%)	0.014	0.112
	PVR ≥Grade C	25	18 (72.00%)	23 (92.00%)	30	22 (73.33%)	28 (93.33%)	23	21 (91.30%)	23 (100.0%)	0.192	0.404

*Obtained using Pearson's Chi-square test. ILM=Internal limiting membrane; PVR=Proliferative vitreoretinopathy

also with old RRDs. The PS and FS rates for fresh RRDs were significantly different across procedures with *P* values 0.032 and 0.055, respectively. In the phakic category, both the PS and FS rates were significantly higher in macular and macular plus peripapillary groups as compared to no peel group (*P* = 0.016 and *P* = 0.025, respectively). The PS rate was also different in pseudo-phakic category across procedures (*P* = 0.027). The superior location showed significantly different PS with a *P* value of 0.023. For uncomplicated cases, PS was significantly different across procedures (*P* = 0.014).

The relevance of each risk factor in the recurrence of RD was obtained in terms of HR as shown in Table 3. The HR for patients aged >18 was 0.27 (95% CI: 0.11–0.64; *P* value: 0.003), implying that the risk of RD recurrence was significantly less in adults as compared to children. With regard to gender, the HR associated with males was 2.37 (95% CI: 1.06 – 5.34; *P* value: 0.036) times more as compared to females. For fresh cases, the HR obtained was 0.54 (95% CI: 0.29-0.98; *P* value: 0.044) compared to old, indicating that RD recurrence was significantly less in fresh category as compared to old. The HR for pseudo-phakic category was less, that is, 0.63 (95% CI: 0.35–1.14; *P* value: 0.129) with reference to phakic category; however, the effect was statistically insignificant. The type of location had hardly any effect on the recurrence of RD as indicated by the HR of 0.84 (95% CI: 0.44–1.60; *P* value: 0.591) corresponding to superior type. Complicated RD had significantly higher risk of recurrence as indicated by the HR of 1.95 (95% CI: 1.06–3.59; *P* value: 0.033) compared to uncomplicated RD. The Kaplan–Meier plot for overall cumulative failure (RD recurrence) was obtained along with 95% confidence interval indicated in gray color as shown in Fig. 2. Also, plots were obtained for the three procedures that showed significant difference of failure patterns with a *P* value of 0.0036 [Fig. 3]. The mean recurrence time was maximum for macular plus peripapillary group, that is, 11.33 ± 3.92 months whereas it was minimum for the no peel group, that is, 10.0 ± 3.58 months.

Further, the unadjusted HRs were obtained for macular and macular plus peripapillary groups with reference to no peel, as shown in Table 4. For macular, the unadjusted HR

Table 3: Hazard of retinal detachment corresponding to various demographic and clinical factors following univariate analysis

Risk Factors	RD occurred/total patients [no. (%)]	Hazard ratio (HR) (95% CI for HR)	*P*
Age (in years)			
<= 18 (Child)	6/14 (42.86)	1.00	
> 18 (Adult)	37/275 (13.45)	0.27 (0.11,0.64)	0.003
Gender			
Female	7/90 (7.78)	1.00	
Male	36/199 (18.09)	2.37 (1.06, 5.34)	0.036
Duration			
Old	18/83 (21.69)	1.00	
Fresh	25/206 (12.14)	0.54 (0.29,0.98)	0.044
Lens status			
Phakic	21/108 (19.44)	1.00	
Pseudophakic	22/181 (12.15)	0.63 (0.35, 1.14)	0.129
Location			
Inferior	13/77 (16.88)	1.00	
Superior	30/212 (14.15)	0.84 (0.44, 1.60)	0.591
Complexity			
PVR <Grade C	26/211 (12.32)	1.00	
PVR ≥Grade C	17/78 (21.79)	1.95 (1.06,3.59)	0.033

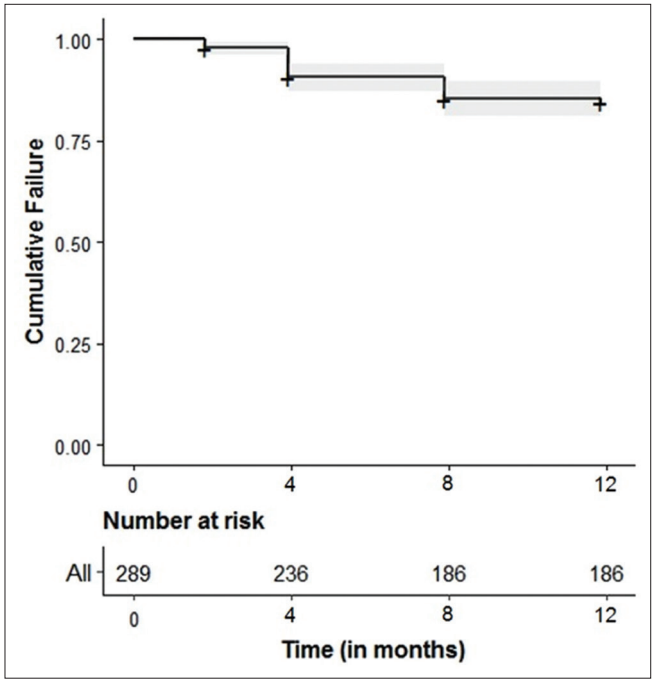

Figure 2: Kaplan–Meier plot showing overall cumulative failure (RD recurrence) along with 95% confidence band

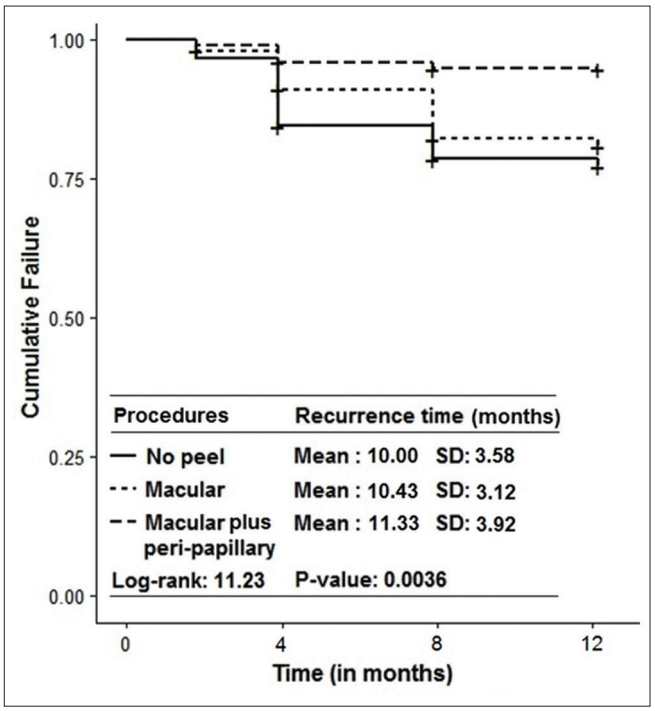

Figure 3: Kaplan–Meier plot showing cumulative failure (RD recurrence) according to three treatment procedures

Table 4: Unadjusted and adjusted hazard of retinal detachment associated with two surgical procedures with reference to no peel

Model	Macular		Macular plus peripapillary	
	Hazard ratio (95% CI for HR)	*P*	Hazard ratio (95% CI for HR)	*P*
Unadjusted	0.796 (0.421,1.505)	0.483	0.223 (0.084,0.594)	0.002
Adjusted for complexity	0.784 (0.415, 1.483)	0.455	0.229 (0.086, 0.611)	0.003
Adjusted for lens status, duration, and complexity	0.841 (0.440, 1.604)	0.597	0.235 (0.088, 0.626)	0.003

was 0.796 (95% CI: 0.421–1.505; *P* value: 0.483), implying that the risk associated with macular peel was lesser as compared to the no peel group, although statistically insignificant. For macular plus peripapillary peel, the unadjusted HR was 0.223 (95% CI: 0.084–0.594; *P* value: 0.002), implying that the risk of RD recurrence was significantly less as compared to the no peel group. Subsequently, the HRs were adjusted considering the complexity as a single confounder in the multivariate Cox-regression model. For macular group, the adjusted HR was 0.784 (95% CI: 0.415–1.483; *P* value: 0.455) as compared to the no peel group. Reduction in HR was 1.51% (<10%) indicating hardly any effect of complexity on the HR. For macular plus peripapillary, the adjusted HR was 0.229 (95% CI: 0.086–0.611; *P* value: 0.003) with reference to the no peel group. This change in HR was also negligible. Further, adjustment with lens status, duration, and complexity, the HR for macular peel was 0.841 (95% CI: 0.440–1.604; *P* value: 0.597), indicating approximately a 5.6% increase as compared to the crude estimate. For the macular plus peripapillary group, the HR was 0.235 (95% CI: 0.088–0.626; *P* value: 0.003), which was statistically significant. The change in the risk levels by including all factors was 5.38%, which is still <10%.

Discussion

Primary vitrectomy for RRD is now an established procedure due to better intraoperative control of complicated RRD and avoidance of complications and morbidity typically associated with scleral buckles.[7,8] Although primary vitrectomy with and without belt buckle have a success rate of approximately 87% and 81%, respectively,[9] the 100% success rate is eluding us. This study evaluates the success rates in patients representing Central India. The distribution of patients across three groups was similar with reference to different risk factors, indicating the absence of any bias in patient selection. The primary anatomical success rate of 96.3% and the FS rate of all patients were reported by Kobashi *et al.* in the PPV group.[10] Orlin *et al.* reported the primary surgical anatomical success rate of 83% and the FS rate of 100%.[11] A data collected by Jackson *et al.* from United Kingdom centres showed the PS rate of 87% in the PPV group.[12] Another study from Taiwan obtained a PS rate of 86.2%.[13] A randomized controlled trial (RCT) from UK reported a PS rate of 84.4% in RD patients who underwent PPV.[14] Wong *et al.* examined the PS and FS rates for PPV cases and found rates of 78.6% and 95.2%, respectively.[15] The anatomical FS rates in other reported studies range between 96.6% and 100%.[14,16,17] The PS and FS rates of macular plus peripapillary ILM peeling as well as macular ILM peeling were higher as compared to the no peeling. The adjusted HR for macular peel and macular plus peripapillary peel suggested that the risk of recurrence in these procedures was less as compared to no peel, although the statistical significance was achieved only for macular plus peripapillary procedure (*P* value: 0.003).

Pediatric RD is a complex RD. It is well established that late presentation and difficulty in inducing complete PVD in such cases lead to recurrence in primary vitrectomy. A study by Gurler *et al.* observed a success rate of 80%, while case series by Rejdak *et al.* observed the success rate of 87%.[18,19] In the present study also, we observed poor PS rates in pediatric cases as compared to adults, though the FS rate was 100% in both the peel groups. Compared to no peel, in the macular peel group, the risk of RD recurrence was less, and similar was the observation for macular plus peripapillary group. In the adult category, the PS rate of the macular plus peripapillary group was significantly higher, while the FS rate, though higher, was not statistically significant. The risk of RD recurrence was significantly lower in macular plus peripapillary group than the no peel group.

In the fresh RD category, the hazard of RD recurrence was significantly low for macular plus peripapillary procedure. We believe that in the fresh RD category, as PVD might be incomplete and PVR process not mature, perhaps ILM peel might help by ensuring complete PVD and also contribute toward removal of subclinical tangential traction.

There are contradictory reports on the success rates in phakic and pseudophakic patients.[20-23] In phakic patients, the difficulties/inadequacy in the base excision, because of fear of lens touch, the success rates are reported in the range of 86%–92%.[24] An improved success rate of 96.3% was observed by Hamauda Ghoraba *et al.* by use of belt buckle.[25] However, in our study, in phakics also, higher PS and FS rates were observed in macular plus peripapillary peel group without using belt buckle. A better access to vitreous base in pseudophakic eyes allows for a better completion of the recommended complete shaving of the vitreous base compared to phakic eyes.[26] A reattachment rate of 97.78% from the cases undergoing single PPV surgery in primary pseudophakic RRD has been observed in series by Stangos *et al.*[27] However, a pseudophakic with belt buckle study revealed the PS rate was 86.7%.[9] In our study, in pseudophakics, the PS and FS rates were higher in peripapillary plus macular peel group. Even the HR was significantly lower in both the macular and macular plus peri-papillary in phakic RRD group.

The success rate in inferior RD (without belt buckle) was lesser with belt buckle,[11] while in study by L Wickham *et al.*, the PS rate for PPV with belt buckle vs. without belt buckle was 89% vs 73%.[28] In our study, none of the cases received belt buckle. The PS rate for macular plus peripapillary procedure was 93.55% in inferior RD and 95.52% in superior RD cases, whereas the FS rate was 100% in both the categories. The PS difference across procedures was statistically insignificant for inferior RD, but it was more than other studies.[9,28] The HR indicated that the risk was significantly lower for both the locations in macular plus peripapillary group.

The anatomical results of surgery in complicated RRD are certainly lower. There are contradictory reports in literature regarding the outcomes of PPV for complex RRD. The FS rate of 79% has been reported by Regler *et al.*[29] while, series reported by Ozdek *et al.* showed a success rate of 87.8%.[30] Quiram *et al*. have stated an anatomical PS rate of 60% and FS rate of 93%.[31] In our study, we observed that the PS rate was higher in macular plus peripapillary group, though it was not statistically different from other procedures. The HR was statistically significant as compared to noncomplex RRDs.

Conclusion

The success of primary vitrectomy with and without belt buckle is established. In our study, primary vitrectomy without belt buckle and with ILM peel showed better success rate as compared to previous studies. The rate of recurrence, as indicated by HR, also showed significant reduction for macular plus peripapillary procedure. Thus, better success with addition of this step into surgical procedure probably helps by: (a) relief of tangential traction, (b) ensures completion of PVD, and (c) no substrate for reproliferation at posterior pole.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Feltgen N, Walter P. Rhegmatogenous retinal detachment – An ophthalmologic emergency. Dtsch Arztebl Int 2014;111:12-22.
2. Sodhi A, Leung LS, Do DV, Gower EW, Schein OD, Handa JT. Recent trends in the management of rhegmatogenous retinal detachment. Surv Ophthalmol 2008;53:50-67.
3. Kuhn F, Aylward B. Rhegmatogenous retinal detachment: A reappraisal of its pathophysiology and treatment. Ophthalmic Res 2014;51:15-31.
4. Lois N, Burr J, Norrie J, Vale L, Cook J, McDonald A, *et al*. Internal Limiting Membrane peeling versus no peeling for idiopathic full thickness macular hole: A pragmatic randomised controlled trial. Invest Ophthalmol Vis Sci 2011;52:1586-92.
5. Heo MS, Kim HW, Lee JE, Lee SJ, Yun IIH. The clinical features of macular pucker formation after pars plana vitrectomy for primary rhegmatogenous retinal detachment repair. Korean J Ophthalmol 2012;26:355-61.
6. Machemer R, Aaberg TM, Freeman HM, Irvine AR, Lean JS, Michels RM. An updated classification of retinal detachment with proliferative vitreoretinopathy. Am J Ophthalmol 1991;112:159-65.
7. Heimann H, Hellmich M, Bornfeld N, Bartz-Schmidt KU, Hilgers RD, Foerster MH. Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment (SPR Study): Design issues and implications. SPR Study report no. 1. Graefes Arch Clin Exp Ophthalmol 2001;239:567-74.
8. Ah-Fat FG, Sharma MC, Majid MA, McGalliard JN, Wong D. Trends in vitreoretinal surgery at a tertiary referral centre: 1987 to 1996. Br J Ophthalmol 1999;83:396-8.
9. Kinori M, Moisseiev E, Shoshany N, Fabian ID, Skaat K, Barak A, *et al*. Comparison of pars plana vitrectomy with and without scleral buckle for the repair of primary rhegmatogenous retinal detachment. Am J Ophthalmol 2011;152:291-7.
10. Kobashi H, Takano M, Yanagita T, Shiratani T, Wang G, Hoshi K, *et al*. Scleral buckling and pars plana vitrectomy for rhegmatogenous retinal detachment: An analysis of 542 eyes. Curr Eye Res 2014;39:204-11.
11. Orlin A, Hewing NJ, Nissen M, Lee S, Kiss S, D'Amico DJ, *et al*. Pars plana vitrectomy compared with pars plana vitrectomy combined with scleral buckle in the primary management of noncomplex rhegmatogenous retinal detachment. Retina 2014;34:1069-75.
12. Jackson TL, Donachie PH, Sallam A, Sparrow JM, Johnston RL. United Kingdom national ophthalmology database study of vitreoretinal surgery: Report 3, retinal detachment. Ophthalmology 2014;121:643.
13. Ho HD, Liou SW, Tsai CY, Tsai RJ, Lin HC. Trends and outcomes of treatment for primary rhegmatogenous retinal detachment: A 9-year nationwide population-based study. Eye 2009;23:669-75.
14. Heimann H, Bartz-Schmidt KU, Bornfeld N, Weiss C, Hilgers RD, Foerster MH. Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment: A prospective randomized multicenter clinical study. Ophthalmology 2007;114:2142-54.
15. Wong CW, Wong WL, Yeo IY, Loh BK, Wong EY, Wong DW, *et al*. Trends and factors related to outcomes for primary rhegmatogenous retinal detachment surgery in a large Asian tertiary eye center. Retina 2014;34:684-92.
16. Mitry D, Awan MA, Borooah S, Siddiqui MA, Brogan K, Fleck BW, *et al*. Surgical outcome and risk stratification for primary retinal detachment repair: Results from the Scottish retinal detachment study. Br J Ophthalmol 2012;96:730-4.
17. Koriyama M, Nishimura T, Matsubara T, Taomoto M, Takahashi K, Matsumura M. Prospective study comparing the effectiveness of scleral buckling to vitreous surgery for rhegmatogenous retinal detachment. Jpn J Ophthalmol 2007;51:360-7.
18. Gurler B, Coskun E, Oner V, Comez A, Erbagci I. Clinical characteristics and surgical outcomes of pediatric rhegmatogenous retinal detachment. Int Ophthalmol 2016;36:521-5.
19. Rajdek R, Nowakowski D, Wrona K, Maciejewski R, Junemann AG, Nowomiejski K. Outcomes of vitrectomy in paediatric retinal detachment with proliferative vitreoretinopathy. J Ophthalmol 2017;2017:8109390. doi: 10.1155/2017/8109390
20. Eckardt C. Twin lights: A new chandelier illumination for bimanual surgery. Retina 2003;23:893-4.
21. Sakaguchi H, Oshima Y, Nishida K, Awh CC. A 29/30-gauge dual-chandelier illumination system for panoramic viewing during microincision vitrectomy surgery. Retina 2011;31:1231-3.
22. Chalam KV, Gupta SK, Agarwal S. Illuminated curved vitrectomy probe for vitreoretinal surgery. Ophthalmic Surg Lasers Imaging 2007;38:525-6.
23. Haug SJ, Jumper JM, Johnson RN, McDonald HR, Fu AD. Chandelier-assisted external subretinal fluid drainage in primary scleral buckling for treatment of rhegmatogenous retinal detachment. Retina 2016;36:203-5.

24. Mohamed YH, Ono K, Kinoshita H, Uematsu M, Tsuiki E, Fujikawa A, *et al*. Success rates of vitrectomy in treatment of rhegmatogenous retinal detachment. J Ophthalmol 2016;2016:2193518. doi: 10.1155/2016/2193518.
25. Ghoraba HH, Zaky AG, Ellakwa AF. Long-term follow up of vitrectomy, with & without 360 degree encircling band for rhegmatogenous retinal detachment due to inferior retinal breaks. Clin Ophthalmol 2016;10:1145-51.
26. Teke MY, Balikoglu-Yilmaz M, Yuksekkaya P, Citirik M, Elgin U, Kose T, *et al*. Surgical outcomes and incidence of retinal redetachment in cases with complicated retinal detachment after silicone oil removal: Univariate and multiple risk factors analysis. Retina 2014;34:1926-38.
27. Stangos AN, Petropoulos IK, Brozou CG, Kapetanios AD, Whatham A, Pournaras CJ. Pars-plana vitrectomy alone vs vitrectomy with scleral buckling for primary rhegmatogenous pseudophakic retinal detachment. Am J Ophthalmol 2004;138:952-8.
28. Wickham L, Connor M, Aylward GW. Vitrectomy and gas for inferior break retinal detachments: Are the results comparable to vitrectomy, gas, and scleral buckle?. Br J Ophthalmol 2004;88:1376-9.
29. Regler R, Sachs HG, Hillenkamp J, Helbig H, Framme C. Long-term evaluation of anatomic and functional results after complicated retinal detachment treated with pars plana vitrectomy and heavy silicone oil tamponade. Klin Monbl Augenheilkd 2009;226:707-12.
30. Ozdek S, Yuksel N, Gurelik G, Hasanreisoglu B. High-density silicone oil as an intraocular tamponade in complex retinal detachments. Can J Ophthalmol 2011;46:51-5.
31. Quiram PA, Gonzales CR, Hu W, Gupta A, Yoshizumi MO, Kreiger AE, *et al*. Outcomes of vitrectomy with inferior retinectomy in patients with recurrent rhegmatogenous retinal detachments and proliferative vitreoretinopathy. Ophthalmology 2006;113:2041-7.