Original Article

Clinical Risk Factors for Proliferative Vitreoretinopathy-II

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Purpose: To evaluate clinical variables as risk factors for proliferative vitreoretinopathy (PVR).

Material and Methods: This cross sectional comparative study was conducted at Khyber Institute of Ophthalmic Medical Sciences, Hayatabad Medical Complex, Peshawar from 1st August 2002 to 31st Dec. 2002. Fifty patients of rhegmatogenous retinal detachment (RRD) were included randomly in this study. They were evaluated for the presence of both risk factors and PVR grading. Chi-square test was used to measure the difference in exposure rates and odds ration was calculated to estimate the strength of association between risk factors and outcome.

Results: Large retinal breaks ($p<0.05$) was found to be statistically significant risk factor for PVR grade C or more.

The exposure rates in myopia >5D, signs of anterior uveitis, vitreous hemorrhage and number of retinal breaks were statistically not significant ($p>0.05$).

Conclusion: Large retinal breaks are associated with high risk of high grade PVR, so this factor should be considered as important prognostic factor in the management of RRD.

Rhegmatogenous retinal detachment (RRD) is an ophthalmic emergency that may cause severe visual loss if not detected early and treated in time. One of the most challenging hurdles on achieving good outcome is development of proliferative vitreoretinopathy (PVR), which is an important cause of failure of retinal reattachment surgery.

The exact pathogenesis of PVR is still under active research. Workers have compared it to normal wound healing or tissue repair process but at an abnormal site[1]. Damage to the blood ocular barrier is considered critical to the formation of PVR because serum derived chemoattractants and mitogens have been found in these membranes.

Retinal pigment epithelium (RPE) cells are essential in the formation of PVR because they are always found in preretinal membranes of RRD[2,3]. This may explain the greater frequency of PVR in RRD of long duration, giant retinal tears and multiple retinal tears. RPE cells undergo metaplastic changes into macrophages or fibrolast like cells[4]. The tobacco dust seen in vitreous is formed of pigment clumps and in part represents migrating RPE cells.

Retinal glial cells are also found in PVR membranes. They are thought to be derived from Muller cells or astrocytes and form more rigid membranes than RPE cells[5,6].

Fibroblasts or fibrocytes are also found in PVR membranes. In case of penetrating injuries they are thought to arise from different sources like optic nerve head, perivascular fibrocytes, glia or hyalocytes. Other inflammatory cells like monocytes and lymphocytes are also found[7-9].

Research workers are also trying to determine risk factors for both preoperative and postoperative PVR[10-11]. These include clinical, surgical and biochemical risk factors. It is interesting to note that many of these variables are known risk factors for retinal detachment itself.

This study was conducted to evaluate various clinical variables including high myopia, signs of anterior uveitis, vitreous hemorrhage, number of retinal breaks and size of retinal breaks as risk factors of preoperative PVR.

MATERIAL AND METHODS

A total of 50 patients of RRD, admitted at Khyber Institute of Ophthalmic Medical Science (KIOMS), HMC, Peshawar were included in the study. A comprehensive performa was designed and completed for every patient.

Initially a detailed history about the nature and duration of visual complaints, previous ocular surgery, trauma and family history of RD was taken. It was followed by a thorough ocular examination of the eye including checking of pupillary reactions, refractive errors and anterior segment examination with the help of a slit lamp. Phakic status of the eye and signs of anterior uveitis were also evaluated. It was followed by a detailed posterior segment examination with fully dilated pupils with the help of an indirect ophthalmoscope, slit lamp examination using 78D or 90D lens and Goldman 3-mirror contact lens.

It was a cross sectional comparative study. After describing the data obtained, cross tabulations were made between dependent variable (PVR) and independent variables (risk factor under study). Chi-square test was applied for statistical significance. Odds ration was calculated to estimate the strength of association between risk factor and outcome (PVR).

RESULTS

A total of 50 cases of RRD were included in our study. 34 (68%) were male and 16 (32%) were female patients. Mean age was 47.5 years and age range was 12-82 years. Patients presented as early as with in 2 week of onset of symptoms to as late as > 1 year of onset of symptoms. Mean duration between onset of symptoms and presentation was 10.8 weeks (min=2 week and max=85 weeks). 39 (78%) patients were emetropic, 3(6%) having myopia <5D and 8 (16%) having myopia >5D. 41 (82%) had no signs of anterior uveitis and 9 (18%) had signs of anterior uveitis. 46 (92%) had no vitreous hemorrhage and 4 (8%) had vitreous hemorrhage. Frequency distributions of number and size of retinal breaks and PVR are shown in Tables 1,3 respectively.

Table 1: Retinal breaks (Frequency distribution)

No of Retinal breaks	Patients n (%)
0	1 (2)
1	34 (68)
2	9 (18)
3	4 (8)
4	2 (4)
Total	50 (100)

Table 2: Size of retinal breaks (Frequency distribution)

Size of retinal breaks	Patients n (%)
Dialysis	9 (18)
Gaint tears	1 (2)
Large tears	9 (18)
Small tears	31 (62)
Total	50 (100)

Table 3: PVR (Frequency distribution)

Grade	Frequency n (%)
A	3 (6)
B	28 (56)
C	18 (36)
D	1 (2)
Total	50 (100)

For the sake of understanding of statistical analysis, the grades of PVR were divided into two groups i.e. (A+B) and (C+D). It is also logically acceptable when the management of PVR is taken into consideration. Similarly, patients having either no refractive error or myopia <5D were taken as "NO" myopia and those having myopia >5D as myopia "YES". Patients were divided into two groups on the basis of number of retinal breaks found i.e. with 1 and more than 1 breaks. They were also divided into two groups depending upon the size of retinal breaks i.e. small and large, giant tears and dialysis were included in the later group.

Relationship between PVR and the risk factors under study are shown in cross tabulation tables 4-8. Tests for statistical significance i.e. Chi-square value and degree of freedom (df), p-value and odds ration (OR) are shown along with each table.

It is evident from the preceding tables that there is a statistically significant ($p<0.05$) difference between the grades of PVR of those with small retinal breaks and those with large retinal breaks. The cases were four times (OR=3.9) more exposed to the risk factor (large retinal breaks) than the controls.

In case of rest of the risk factors i.e. high myopia, signs of anterior uveitis, vitreous hemorrhage and number of retinal breaks, the exposure rates were not statistically significant ($p>0.05$) between cases and controls.

DISCUSSION

Our study has shown that large retinal break is a significant risk factor for PVR Grade C or more. This is in accordance with the results of other international studies[12-15].

The rest of the variables studied are apparently not significant risk factors for grade C & D but it is in contrast to the findings of certain other studies e.g. uveitis, vitreous hemorrhage and multiple retinal breaks have been reported significant by La Heij et al[12] and Girard et al[13] as risk factors of high grade PVR. These differences may be because of small sample size of our study. If studied carefully it can be seen that all these significant risk factors are associated with dispersion of RPE cells in the vitreous and breakdown of blood retinal barrier which are the main factors involved in the pathogenesis of PVR.

Myopia was not significant risk factors for PVR Grade C or more which is also supported to some externt by Cardillo et al[16]. There is a possibility that these patients are often concerned about their vision or might have lost vision in one eye due to RD, so they present very early. It should be recalled that these variables are known risk factors for retinal breaks leading to RRD.

We would like to recommend that special attention should be given to the management of RRD having high risk features to prevent postoperative PVR and ultimate surgical failure. Therefore, the trend towards primary vitrectomy with internal tamponade even for cases of PVR Grade B, in some of the cases may be justified.

Table 4: Myopia: PVR cross tabulation

Myopia	**PVR**		**Total n(%)**
	A+B n(%)	**C+D n(%)**	
No	25 (50)	17 (34)	42 (84)
Yes	6 (12)	2 (4)	8 (16)
Total	31 (62)	19 (38)	50 (100)

Chi-square value=0.68, df= 1, p>0.05

Table 5: Anterior uveitis: PVR cross tabulation

Anterior uveitis	**PVR**		**Total n(%)**
	A+B n(%)	**C+D n(%)**	
No	25 (50)	16 (32)	41 (82)
Yes	6 (12)	3 (6)	9 (18)
Total	31 (62)	19 (38)	50 (100)

Chi-square value=0.01, df= 1, p>0.05

Table 6: Vitreous Hemorrhage: PVR cross tabulation

Vitreous Hemorrhage	**PVR**		**Total n(%)**
	A+B n(%)	**C+D n(%)**	
No	30 (60)	16 (32)	46 (92)
Yes	1 (2)	3 (6)	4 (8)
Total	31 (62)	19 (38)	50 (100)

Chi-square value=2.526, df= 1, p>0.05

Table 7: No. of retinal breaks: PVR cross tabulation

No of breaks	PVR		Total n(%)
	A+B n(%)	C+D n(%)	
1	22 (44)	13 (26)	35 (70)
>1	9 (18)	6 (12)	15 (30)
Total	31 (62)	19 (38)	50 (100)

Chi-square value=0.036, df= 1, p>0.05

Identification of such risk factors and their prognostic values will assist vitreoretinal surgeons in better planning and better predicting the results of their surgical techniques. It will also help patients better understanding the value of going through the agony of surgical interventions.

Carefully designed case control studies or cohort studies will augment the role of various risk factors in the development of PVR.

Table 8: Size of retinal breaks: PVR cross tabulation

Size of breaks	PVR		Total n(%)
	A+B n(%)	C+D n(%)	
Small	23 (46)	8 (16)	31 (62)
Large	8 (16)	11 (22)	19 (38)
Total	31 (62)	19 (38)	50 (100)

Chi-square value=5.148, df= 1, p<0.05, OR=3.9

CONCLUSIONS

In our study patients of RRD with large retinal breaks were at increased risk of developing high grade PVR. Patients with high myopia, signs of anterior uveitis, vitreous hemorrhage and number of retinal breaks were not at increased risk of developing high grade PVR.

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