Original Article

Clinical Risk Factors for Proliferative Vitreoretinopathy-I

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

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

Results: Duration of retinal detachment (RD)>1month ($p<0.05$) was found to be statistically significant risk factor for PVR grade C or more.

The exposure rates in closed globe injury, aphakia & pseudophakia and peripheral retinal degenerations were statistically not significant ($p>0.1$).

None of the patients was giving a family history of RD so this variable was out of comparison procedure.

Conclusion: Duration of RD >1 month is 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 one of the common ophthalmic emergencies in our country. It may cause severe visual loss if not detected early and treated in time.

A lot of current research is going on to improve the outcome of retinal reattachment surgery. A number of sophisticated instruments and techniques are developed to overcome the problems in the field of microsurgical vitreoretina. One of the most challenging hurdles on achieving a better outcome is that of proliferative vitreoretinopathy (PVR), which is considered as one of the most common cause of failure of surgical retinal reattachment.

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 chemo attractants 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 fibroblast-like cells[4]. The tobacco dust seen in vitreous is formed of pigment clumps & 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 enter into the eye through the wound. In case of non-traumatic RRD, 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.

Research workers are also trying to determine risk factors for both preoperative & postoperative PVR7,8. 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.

Our study focuses on evaluation of certain clinical variables as risk factors of preoperative PVR. These variables may contribute to the development of complicated RD and ultimately postoperative PVR.

This study was conducted to evaluate various clinical variables including duration of symptoms, closed-globe injury, aphakia or pseudophakia, peripheral retinal degenerations and family history of RD as risk factors of preoperative PVR.

MATERIALS AND METHODS

A total of 50 patients of RRD, admitted at Khyber Institute of Ophthalmic Medical Sciences (KIOMS), HMC, Peshawar were included in the study. A comprehensive proforma was designed & 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 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 indirect examination using 78D or 90D lens and Goldmann 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 factors under study). Chi-square test was applied for statistical significance. Odds ratio 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. 39 (78%) were male and 11 (22%) were female patients. Mean age was 36.8 years and age range was 7-85 years -85yrs. Patients presented as early as with in 1 week of onset of symptoms to as late as >1 year of onset of symptoms. Mean duration between onset of symptoms and presentation was 12.8 weeks (min=1week & max=95weeks). 43(86%) were phakic, 4(8%) aphakic & 3(6%) were pseudophakic. 27(54%) had no peripheral retinal degeneration (PRD) & 23(46%) had PRD. 47(94%) had no history of closed-globe injury & 3(6%) had a history of closed-globe injury. None of the patients had a family history of RD. Frequency distribution of PVR is shown (Table 1).

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 were divided into two groups regarding their duration of symptoms i.e. those presenting within one month & those presenting after one month. Patients either aphakic or pseudophakic were both taken as "APHAKIC".

Relationship between PVR and the risk factors under study are shown in Cross tabulation (Tables 2-5). Tests for statistical significance i.e. Chi-square value & degree of freedom (df), p-value and Odds ratio (OR) are shown along with each table.

Table 1: PVR (Frequency distribution)

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

Total	50 (100)

It is evident from the preceding tables that there is a statistically significant ($p<0.05$) difference between the grades of PVR of those presenting within first month of visual symptoms to those presenting after one month. The cases were 5.7 times (OR=5.689) more exposed to the risk factor (duration of >1month) than the controls.

Table 2: Duration: PVR cross tabulation

Duration	**PVR**		**Total n(%)**
	A+B n(%)	**C+D n(%)**	
< 1 month	16 (32)	3 (6)	19 (38)
> 1 month	15 (30)	16 (32)	31 (62)
Total	31 (62)	19 (38)	50 (100)

Chi-square value= 6.41, df= 1, $p<0.05$, OR= 5.68

Table3: Status of lens: PVR cross tabulation

Lens Status	**PVR**		**Total n(%)**
	A+B n(%)	**C+D n(%)**	
Phakic	27 (54)	16 (32)	43 (86)
Aphakic	4 (8)	3 (6)	7 (14)
Total	31 (62)	19 (38)	50 (100)

Chi-square value= 0.082 df= 1, $p<0.05$

Table 4: Closed-Globe injury: PVR cross tabulation

Closed-globe injury	**PVR**		**Total n(%)**
	A+B n (%)	**C+D n(%)**	
No	30 (60)	17 (34)	47 (94)
Yes	1 (2)	2 (4)	3 (6)
Total	31 (62)	19 (38)	50 (100)

Chi-square value= 1.113, df= 1, $p<0.05$

Table 5: Peripheral retinal degeneration (PRD): PVR cross tabulation

PRD	**PVR**		**Total n(%)**
	A+B n (%)	**C+D n(%)**	
No	15 (30)	12 (24)	27 (54)
Yes	16 (32)	7 (14)	23 (46)
Total	31 (62)	19 (38)	50 (100)

Chi-square value= 1.035, df= 1, $p<0.05$

In case of rest of the risk factors i.e. aphakia & pseudophakia, closed-globe injury and peripheral retinal degenerations, the exposure rates were not statistically significant ($p>0.05$) between cases and controls.

None of the patients was giving a family history of RD so this variable was out of comparison procedure.

DISCUSSION

In our study, patients from almost all age groups were included (Mean = 36.8 years) but those with age around 60 years were predominant (Mode = 60 years), which may indicate that RRD is mainly a disease of old age. Male patients were predominant (78%), but as it is a hospital-based study with no defined drainage territory, nothing significant can be concluded from this result.

Our study has shown that a duration of visual symptoms of >1 month is a significant risk factor for PVR Grade C or more. This is in accordance with the results of other international studies[8-11]. 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. Hooymans et al[12] & Nagasaki et al[11] have shown aphakia & pseudo-phakia 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.

Closed-globe injury and peripheral retinal degenerations were not significant risk factors for PVR Grade C or more which is also supported to some extent by Cardillo et al[13]. 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 & 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.

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.

CONCLUSIONS

Our study has clearly shown that patients of RRDs with duration of more than one month are at increased risk of developing high grade PVR. Patients with aphakia or pseudophakia, history of closed-globe injury, peripheral retinal degenerations and family history of RD were not at increased risk of developing high grade PVR.

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