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Incidence of Rhegmatogenous Retinal Detachment and the Course of Posterior Vitreous Detachment Causing Retinal Breaks in Patients with Myopia

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Abstract

Purpose: To study the incidence of rhegmatogenous retinal detachment in phakic and pseudophakic myopic patients and also to study the course of posterior vitreous detachment causing retinal breaks in myopia patients.

Methods: 19 Patients presented with Rhegmatogenous retinal detachment (RRD) were examined and documented. Patients of different age groups presented with various complaints were examined. Retrospective study done, cases presented from June 2022 to December 2023 were collected from electronic data of the institute. Proper history, BCVA, Slit Lamp examination, fundus examination and documentation done. All myopia patients were examined, underwent peripheral fundus examination irrespective of degree of myopia, refractive status of patients was taken into account for screening the retina, both central and peripheral retina. Phakic as well as pseudophakic patients also underwent fundus examination if the refractive error was myopia. Posterior vitreous detachment (PVD) has major role in causing retinal pathology like retinal breaks in myopia patients during its course near sites of adhesions.

Results: Myopia is definitely a risk factor for rhegmatogenous retinal detachment, some percentage of myopia patients will escape from the retinal detachment and maintain good vision. All myopia patients have risk, but the outcome is good in mild to moderate degree of myopia compared to severe degree of myopia. Presentation of breaks is also different in different degrees of myopia. In paediatric cases, retinal detachment will remain unnoticed usually due to delayed presentation, risk of Proliferative Vitreo retinopathy (PVR) is severe, all these factors will cause irreversible blindness.

RRD in myopia was commonly noted in middle age group, male gender and slightly in phakic patients more compared to pseudophakic patients.

Conclusions: Myopia is the major non traumatic cause of RRD, hence screening in myopia has important role to detect the retinal breaks as early as possible and treat to prevent the retinal detachment, which can cause severe blindness.

Keywords: Myopia; Pathological Myopia; Rhegmatogenous Retinal Detachment (RRD); Retinal BREAKS; Posterior Vitreous Detachment (PVD); Barrage Laser; Sub Retinal Fluid (SRF).

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INTRODUCTION

Cataract and Glaucoma incidence is high compared to RRD but risk of blindness is more with RRD. Asian population has greater prevalence compared to other other countries in the world. Refractive status will usually help in screening the patients to detect the retinal changes. Aim of our study is to see the RRD in myopia patients with severity of myopia, characteristics features of retinal detachment, different types of breaks, retinal denerative changes, Axial length of globe and associated with any systemic disorders. Many epidemiological studies conducted in Asia but characteristics of RRD was not described in detail in most of the studies.

MATERIALS AND METHODS

Study Population

Patients who reported to our hospital with refractive error having mild, moderate and severe myopia from June 2022 to December 2023 were enrolled in the study. Number of patients examined were 541. Every day the attendance of myopia patients was 2 to 3 in number. All patients were identified, examined underwent BCVA, Slit Lamp examination, indirect ophthalmoscopy, Auto refraction and documentation. RRD is defined as collection of sub retinal fluid beneath retina in sub retinal space through the retinal break, if the sub retinal fluid is not extending more than 2 Disc Diameters we call it as sub clinical retinal detachment. In patients where the details were not clear due to complicated cataract which can occur in myopia patients, B Scan Ultra Sonography done to conclude the retinal detachment.

Inclusion Criteria

All cases of myopia

Phakic and pseudophakic patients

Congenital myopia

Acquired myopia

All age group patients

Associated with systemic disorders

Exclusion Criteria

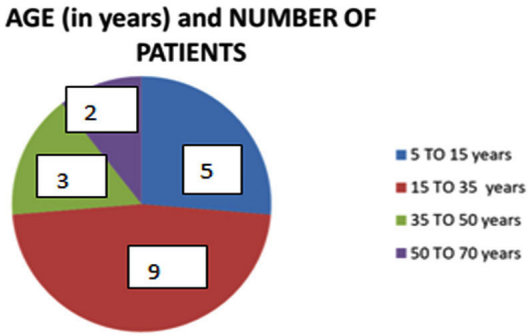
Trauma cases

Data Collection

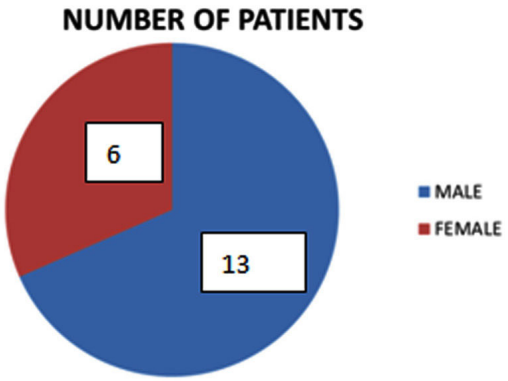
Information of age, gender, unilateral or bilateral involvement, configuration of retinal detachment, number, size, types and location of retinal breaks, refractive error of other eye, PVR changes, lattice or other chorio retinal changes in the fundus, any associated macular hole or central degenerative changes.

RESULTS

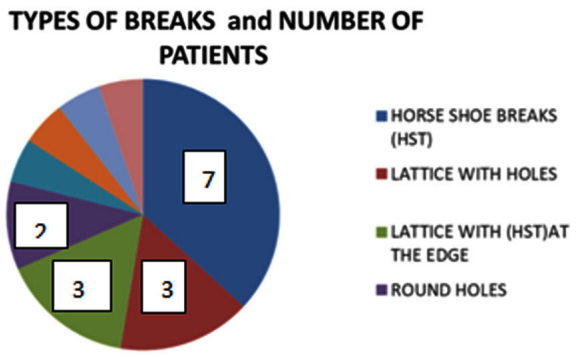
Age	Number of Patients
5 to 15	5 (26.3%)
15 to 35	9 (47.36%)
35 to 50	3 (15.78%%)
50 to 70	2 (10.52%)



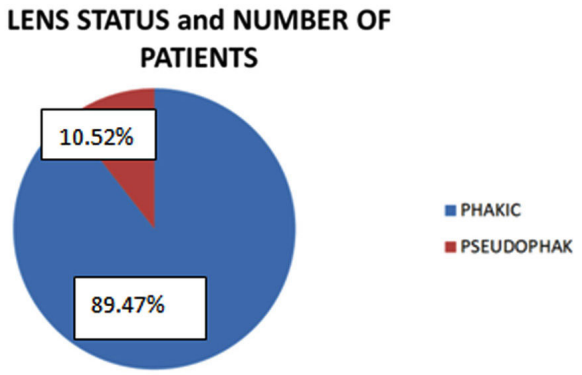
Gender	Number of Patients
Male	13 (68.42%)
Female	6 (31.57%)



Types of Breaks	Number of Patients
Horse Shoe Breaks (Hst)	7 (36.84%)
Lattice With Holes	3 (15.78%)
Lattice With (Hst) at the Edge	3 (15.78%)
Round Holes	2 (10.52%)
Retinal Dialysis	1 (5.26%)
Grt	1 (5.26%)
Breaks Not Identified	1 (5.26%)
Macular Hole Associated Rrd	1 (5.26%)

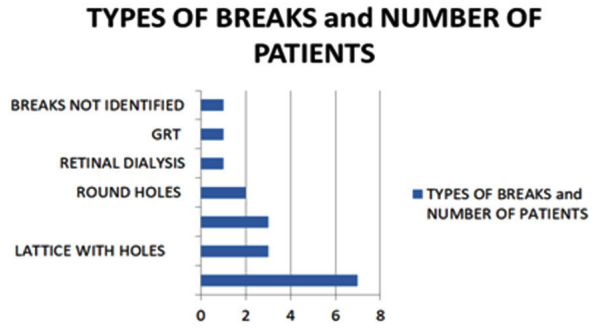


Lens Status	Number of Patients
Phakic	17 (89.47%)
Pseudophakic	2 (10.52%)



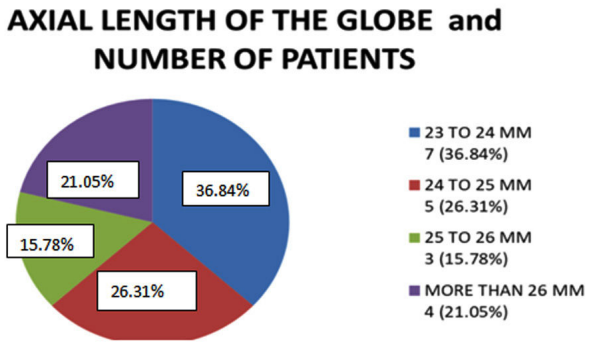
Characteristic Features of RRD	Number of Patients
Sub Total Superior Rrd	9 (47.36%)
Sub Total Inferior Rrd	5 (26.31%)
Total Rrd	5 (26.31%)

Number of Breaks	Number of Patients
Single Break	7 (36.84%)
Multiple Breaks	4 (21.05%)
Multiple Lattice With Holes	3 (15.78%)
String of Hst	2 (10.52%)
90 Degrees Grt	1 (5.26%)
Retinal Dialysis	1 (5.26%)
Breaks Not Identified	(5.26%)

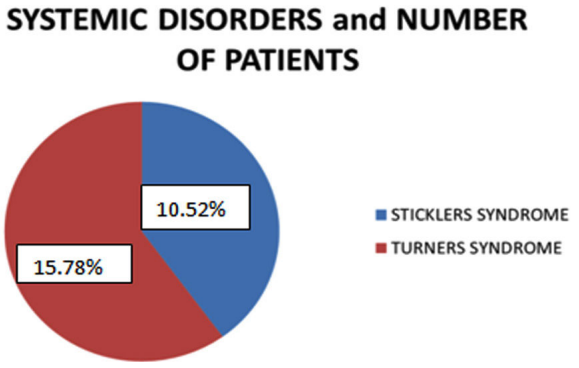


Degree of Myopia	Number of Patients
Mild to Moderate Myopia (0.5 To 4 Dioptres)	6 (31.57%)
Myopia (More Than 4 Dioptres)	9 (47.36%)
Pathological Myopia	4 (21.05%)

Axial Length of the Globe	Number of Patients
23 to 24 Mm	7 (36.84%)
24 to 25 Mm	5 (26.31%)
25 to 26 Mm	3 (15.78%)
More than 26 Mm	4 (21.05%)



Systemic Disorders	Number of Patients
Sticklers Syndrome	2 (10.52%)
Turners Syndrome	3 (15.78%)



DISCUSSION

The most striking point of this study is more number of cases are reported in middle age, there was raise in two age group individuals.[1] The mean age of patients with RRD in 2016 (61 years) was similar to the mean age of 60 years observed in 2009, study done in Netherlands, in our study mean age was 40 years, slightly younger compared to the study done in Netherlands.[2]

Incidence is more commonly noted in male patients like other studies (68.42%), though myopia

is almost equal in gender presentation but risk of RRD noted more in male population compared to female.[3] Retinal detachment can affect any age group of patients, in our study paediatric and adolescent group was also had same percentage of patients like younger and middle age group. Risk in paediatrics is usually was congenital myopia where the children were remained unnoticed and presented with chronic retinal detachment. Incidence of RRD in our study is 3.51%.

The prevalence of myopia varies considerably in different ethnic groups, where as in Asian population its percentage is 10%, slightly high compared to western countries.[4]

Every year there is 0.8% increase in prevalence in India, overall there is increase of 10.53% prevalence in all age groups for the next three decades, risk of epidemic of myopia in India after few decades. To prevent this epidemic many interventions, need to be planned.[5] Most of the studies predict risk of incidence is high after three decades probably due to lifestyle.

Existing literature on the increase incidence of myopia shows three factors responsible for the RRD, one is thinning of the retina causing small holes, second is early vitreous liquefaction and third increase in the axial length causes stretching of the retina leading to tears, piece of the retina pulled back of the eyeball.

Risk of RRD is high with high myopia, when the refractive error is more than 6 dioptres' study reported in the American Journal of Epidemiology suggests that 55% of all RDs are caused by myopia (Sharma, Grigoropoulos, & Williamson, 2004). In our study moderate degree of myopia (2 to 4 diopters) showed high incidence of RRD. Although many studies showed increase incidence of RRD in high myopia, our study revealed moderate degree of myopia with high incidence, multiple lattice degeneration with multiple holes were responsible for RRD, reason could be patients with high myopia were not reported to our institute. Incidence of RRD is related to the degree of myopia, because all the retinal changes which occur due to elongation and stretching of the globe are prone to develop retinal breaks. Moderate-to-high myopia may be a predisposing factor to more frequent development of retinal disease.[6]

The incidence is 0.015% in myopia less than 5 D, 0.07% in myopia less than 10 D, 0.075% in myopia more than 10 D, where as in myopia more than 15 to 20D risk of RRD is 15 to 110 times greater.

Is incidence is related to the severity of myopia or prevalence of myopia, very important topic to debate, because our study though not done in detailed, we had cases of RRD in moderate degree of myopia more than high myopia. Measurement of refractive error with auto refractometer and prescription of glasses were ideal or not, need to be assessed with other methods like fundus examination and axial length measurement of the globe to relate with the severe myopia which is increasing the incidence of RRD.[7]

According to literature, classic risk factors for RRD include older age, cataract surgery, and myopia[8], in our study myopia was most important risk factor noted. Older age as a risk factor could be due to liquefaction of vitreous and vitreous detachment which occurs physiologically, but trauma and myopia can cause early changes in vitreous as well as changes in normal vitreo retinal adhesions which are responsible for the RRD.

Retinal break means full thickness defect in retinal causing seepage of liquefied vitreous in to the sub retinal space there by causing detachment of neuro sensory retina from the retinal pigment epithelium. Different types of breaks are noticed, most common break causing RRD in our study was Horse shoe tear (HST). Young male patients having refractive error less than 6 D with HST had RRD in our study, where as other studies demonstrated phakic RRD from atrophic holes in lattice degeneration with the mean age of 32 years and 48% of the patients having greater than –6.00 D of myopia.[9]

Para vascular linear retinal breaks in chorio retinal atrophy patches are not visible in pathological myopia patients, usually they are along the posterior vascular arcades few disc diameters from the disc, size is also roughly two disc diameters. We could not able to locate these types of breaks in our patients, we need to do meticulous indirect ophthalmoscopy to detect the breaks, treatment of these types of breaks at the time of RRD repair will help in sealing the breaks, otherwise risk of redetachment is always therein pathological myopia cases.

RRD repair in patients with pathological myopia is usually not successful, Retinal pigment epithelium (RPE) function will be very poor due to reduced thickness of RPE compared to RPE in emmetropes. Hence repair of RRD in these patients is really challenging to attach the retina. RRD may occur in any degree of myopia but the severe myopia can cause complicated RRD.[10] RRD in severe myopia will be very difficult to manage because they

have risk of GRT, multiple small breaks, folded retina and small invisible breaks in posterior pole particularly in the are as of staphylomas.

Post cataract surgery cases show increased risk when there is vitreous loss, posterior capsular dehiscence and also post Nd Yag posterior capsulotomy. Incidence of RRD is decreased after small incision and Phacoemulsification cataract surgery. Previously the incidence was high with Intra capsular cataract extraction, in our study both the cases of pseudophakic RRD underwent small incision cataract surgery 2 years back and had intact posterior capsule. Risk of posterior hyaloid detachment after cataract surgery occurs immediately or after some time of cataract surgery due to excess mobility of vitreous and lack of support, has tendency to develop retinal tear which can lead to RRD.[11] In previous studies, the risk of RD by phacoemulsification in highly myopic ranges from 2.4 to 18%. With the current techniques, the risk of RD is close to that of the highly myopic non-operated population corresponding to near 2%.[12] Incidence of RRD is almost reduced after phacoemulsification technique, but cataract surgery in high myopia is better to postpone till the vision drops below a useful level. Status of lens is very important factor in RRD.

Existing literature shows there is no correlation between intra operative vitreous loss and retinal detachment[13], whereas Nd Yag or surgical capsulotomy has more association with incidence of retinal detachment, this association could be due to disturbance of anterior vitreous with high energy laser shots, so when ever opening is done in posterior capsule it is better to use low energy levels and avoid multiple laser shots, sometimes high energy can also cause macular damage and lead to macular holes.

Different mechanisms have been described in literature for different age group of patients, in young age myopia induced vitreous detachment where as in elderly individuals age related vitreous liquefaction and detachment are major mechanism factors for RRD.[14] Bimodal incidence of RRD has been reported in East Asian population, incidence of RRD due to myopia related vitreous changes will occur in young individuals and again there is peak in 5th or 6th decade due to senile induced vitreous changes which can lead to RRD. In our study we could see more incidence in middle age patients, there was not bimodal incidence, we need to concentrate even in elderly individuals where there is risk of RRD and also study the cases of myopia who have skipped the risk of RRD in young age or middle age are more vulnerable for RRD in 5th or 6th decade.

In our study one young adult presented with RRD after refractive surgery laser in situ keratomileusis[15], patient was examined in detail, indirect ophthalmoscopy done, peripheral retinal examination done and documented, no peripheral retinal breaks noted, patient underwent refractive surgery, one week after refractive surgery patient noticed sudden drop in vision, RRD with break noted in the superior quadrant, in refractive surgeries risk of iatrogenic retinal break is seen at the time of creating flap, intra ocular pressure is raised at the time of creating corneal flap, this increase in intra ocular pressure can induce retinal breaks at the sites of physiological vitreo retina adhesions, and can lead to retinal detachment. Proliferative vitreo retinopathy (PVR) was severe in paediatric cases and in patients with total RRD.

Our study is very much limited; we could not concentrate on Posterior vitreous detachment (PVD) induced retinal pathology in patients with myopia, like when, where and how PVD progresses with the retinal changes and cause RRD. Many studies have predicted the course of PVD causing retinal pathology which in turn lead to retinal breaks and cause RRD.[16] PVD occurrence in myopia as well as in patients who underwent ocular surgeries has major role in inducing the retinal pathology. Clinically it is very difficult to assess the PVD, some studies have shown that in some cases PVD can also cause delayed retinal breaks, I mean not immediately after the PVD[17], particularly in cases of lattice degeneration, there may be delayed retinal breaks formation, proper reasoning has not mentioned, physiological retinal thinning and stretching associated with lattice degeneration responsible for delayed retinal breaks, anyhow we need to study the progress of PVD in detail, expertisation is required to study the course of PVD and capture the delayed retinal breaks.

CONCLUSION

Round atrophic holes in lattice degeneration and Horse shoe tears were more common in young myopic patients with phakic retinal detachments. In India, changes in life style, well designed eye care services and anti-myopia strategies are required to plan and counteract myopia, decrease the incidence of RRD and prevalence of myopia. Large well-designed studies should be planned, including proper information on the refractive

status or axial eye length, lens status, traumatic injuries, and intraocular surgeries during follow-up. Ophthalmologist and Optometrist should take responsibility to educate the parents and patients about the causes of blindness associated with myopia and also treat the patients with proper therapies to reduce the risk of RRD, and risk of blindness in society. Frequent screening in all age groups of patients with myopia helps in early detection of breaks and management. Other eye examination should be done regularly to prevent the risk of RRD. Proper prescription of glasses, regular follow up and guide lines to prevent progression of myopia should be mentioned in every school for teachers and parents.

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