Epidemiology of Primary Rhegmatogenous Retinal Detachments: An 11-Year Report from the North of Portugal

Epidemiologia dos Descolamentos de Retina Regmatogénicos Primários: Estudo de 11 Anos no Norte de Portugal

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ABSTRACT

INTRODUCTION: Rhegmatogenous retinal detachments occur when a break in the retina allows the passage of fluid into the virtual space between the neurosensory retina and the retinal pigment epithelium. The purpose of this study was to conduct an epidemiological analysis of all cases of primary rhegmatogenous retinal detachments diagnosed in our hospital during the last 11 years.

METHODS: A retrospective study was conducted including 306 eyes. Cases of traumatic retinal detachments, cases in which the existence of an ocular or systemic pathology predisposed to the occurrence of a detachment, and cases of re-detachment were excluded from the analysis.

RESULTS: The mean age at presentation was 63.08 years old, with 58.8% males. The incidence peaked in January and during the summer. The mean axial length of the eyes was 24.7 mm and 62% were phakic. The most common symptom at presentation was loss of central VA. About two-thirds of the patients presented with a macula-off detachment. The average time from the onset of the first symptoms to diagnosis was 20.2 for macula-on detachments and 32.5 days for macula-off. Average time for surgery was 2.8 days in the macula-on group and 6.7 in the macula-off group.

CONCLUSION: A slight predominance of males was found and as expected, the disease was diagnosed across all age groups. Past cataract surgery was an important risk factor for the development of the disease. Most detachments were diagnosed as macula-off, and those patients took longer to seek medical observation after the onset of symptoms, which may negatively influence the visual outcome. The time between diagnosis and surgery was much shorter in macula-on cases. Patient's knowledge of the warning symptoms of this disease plays a key role in its timely diagnosis, which may allow a prompter treatment and better final visual results.

KEYWORDS: Age Distribution; Retinal Detachment/diagnosis; Retinal Detachment/epidemiology; Seasons; Sex Distribution.

RESUMO

INTRODUÇÃO: Os descolamentos da retina regmatogénicos consistem na separação da retina neurossensorial do epitélio pigmentado da retina devido à passagem de fluido através de um defeito retiniano. O objectivo deste estudo foi a realização de uma análise epidemiológica de todos os casos de descolamento regmatogénico primário da retina diagnosticados durante os últimos 11 anos.

MÉTODOS: Estudo retrospectivo que incluiu 306 olhos. Os casos de descolamento traumático, casos em que patologia ocular ou sistémica preexistente predispunha ao desenvolvimento de um descolamento, e casos de redescolamento foram excluídos.

RESULTADOS: A idade media à apresentação foi de 63,1 anos, com 58,8% doentes do sexo feminino. Os picos de incidência ocorreram em janeiro e durante os meses de verão. O comprimento axial médio dos olhos foi de 24,7 mm e 62% eram fáquicos. O sintoma mais comum à apresentação foi de perda visual central. Cerca de dois terços dos doentes apresentaram-se com a mácula descolada. O tempo médio ocorrido entre os primeiros sintomas e o diagnóstico foi de 20,2 dias para os casos mácula-*on* e 32,5 para os casos mácula-*off*. O tempo médio do diagnóstico até à cirurgia foi de 2,8 dias para o grupo mácula-*on* e 6,7 dias para o grupo mácula-*off*.

CONCLUSÃO: Foi encontrada uma ligeira predominância de doentes do sexo masculino e a doença foi diagnosticada em todas faixas etárias. A história de cirurgia de catarata constituiu um provável factor de risco importante para a doença. A maioria dos descolamentos foi diagnosticado com a mácula descolada e este grupo de doentes demorou mais tempo a recorrer aos cuidados de saúde. O tempo entre o diagnóstico e a cirurgia foi mais curto nos casos de descolamento mácula--*on*. O conhecimento por parte dos doentes dos sintomas de alarme para esta doença parece ter um papel chave no seu diagnóstico e tratamento atempados, o que poderá melhorar o prognóstico visual final.

PALAVRAS-CHAVE: Descolamento da Retina/diagnóstico; Descolamento da Retina/epidemiologia; Distribuição por Idade; Distribuição por Sexo; Estações.

INTRODUCTION

Retinal detachment (RD) is a potentially blinding disease, consisting of the separation of the neurosensory retina from the underlying retinal pigment epithelium (RPE). Rhegmatogenous retinal detachments (RRD) occur when a break in the retina allows the passage of fluid into the potential space between the neurosensory retina and the RPE.[1,2] The reported incidence rates of population-based studies vary according to the geographic area and the estimated annual incidence was estimated to be between 6.9 and 17.9 cases per 100 000.[1,3] Some publications claim an increase in cases during the last decades.[4,5]

Established risk factors for the occurrence of RRD include myopia, past crystalline lens surgery, age, and trauma.[1,2] Peripheral retinal degenerations, such as lattice degenerations are also associated with an increased risk, since they can progress into retinal tears or holes in the presence of vitreoretinal traction that occurs, for instance, during posterior vitreous detachment (PVD). Regarding patient age, studies demonstrate two age peaks associated with higher incidence: 60-69 years, probably related to the high incidence of PVD and cataract surgery,6 and 20-30 years, especially in highly myopic patients.[7,8] There seems to be a significant variation in the incidence of DR for different ethnic groups. Some studies have reported incidences up to 3 times higher in Caucasians than Asians, despite significantly higher rates of myopia in the latter group. The incidence also seems to be lower in individuals of African descent than in Caucasians. The cause of those ethnic variations is unknown and post-mortem studies have not demonstrated racial variation in the prevalence of predisposing ocular factors for RRD.[9–11] Epidemiological studies report a slightly increased incidence in male patients, probably related to a higher rate of trauma in men and anatomical differences between genders.[8,12] Myopia, especially high myopia is a well-known risk factor for RRD. An eye with a spherical equivalent refractive error of 1-3 diopters (D) has a 4-fold increased risk of RRD, which increases to 10-fold if the refractive error is higher than 3D. The reasons for this predisposition are the association of increased axial length of the myopic eye with greater vitreous liquefaction, earlier PVD, and higher rates of vitreoretinal degeneration.[13–15] Cataract surgery appears to increase the risk of developing RD by 4-9 times, even with the use of modern surgical techniques such as phacoemulsification.[16] Trauma may induce retinal breaks through compression, decompression, overfitting, and oscillation. The most common traumatic defects

in closed globe injury are retinal dialysis and peripheral tears, which have a higher risk of developing RD than non-traumatic retinal defects.[17]

The seasonal variation in the incidence of RRD is a highly controversial topic. Variations in light and temperature and their potential influence on the biomechanical properties and volume of the vitreous are some of the proposed mechanisms to explain seasonality. However, the available evidence is highly variable. Some studies report a summer peak and a winter trough, while others report the opposite. In some, no seasonal variation was found.[3,18–20]

This study aimed to conduct an epidemiological study of all cases of primary RRD diagnosed in Hospital Pedro Hispano – ULSM, during the last 11 years, and to identify and characterize the different patterns, variables and risk factors associated with the development of this disease.

METHODS

A retrospective study was conducted, including 306 eyes diagnosed with primary RRD in Hospital Pedro Hispano – Unidade Local de Saúde de Matosinhos, between October 2012 and September 2023.

Data included all patients diagnosed with RRD during the referred period, regardless of age, race, or sex. Cases of RD after trauma or in the context of congenital eye abnormalities or systemic diseases predisposing RD were excluded. Tractional and exudative retinal detachments were also excluded from the analysis. Cases of re-detachments in patients who had already had surgery for the treatment of RD were excluded, as well as cases arising from previous complicated ophthalmologic surgery, including those that occurred after complicated cataract surgery (Fig. 1).
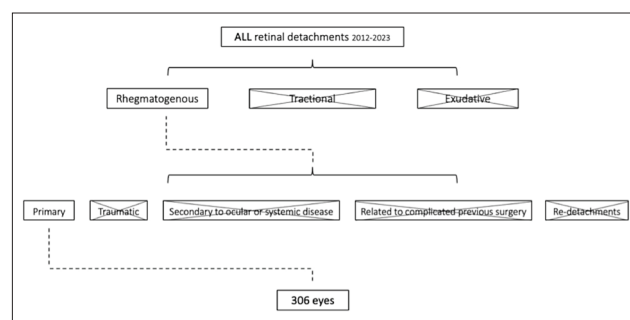

Figure 1. Exclusion criteria used for patient selection.

Patient data was collected from the clinical records, including gender, age at presentation, surgery date, predominant symptom at presentation, best corrected visual acuity (BCVA) at presentation, phakic status, including time since cataract surgery in pseudophakic patients, location of the detachment, axial length of the eye (through optic or ultrasound biometry), status of the macula at presentation, time passed since the first symptoms until the first observation, and time from presentation until surgery.

For statistical purposes, BCVA usually labeled as "counting fingers", "hand movement", and "light perception" was converted to a decimal scale as 0.01, 0.005, and 0.0005, respectively, following the conversion method developed by Lange.[21] Additionally, visual acuity represented using the decimal scale was converted to the equivalent logarithm of the minimum angle of resolution (logMAR).

This work was carried out with the agreement of the ethics committee of Hospital Pedro Hispano. Informed consent was obtained from the study participants, and the guidelines outlined in the Declaration of Helsinki 2013 were followed.

Statistical analysis was conducted using Microsoft Excel 16.77.1 for Macintosh.

RESULTS

A total of 306 eyes were included in this study. Table 1 shows the demographics and characteristics of the patients, with 58.8% being male and 41.6% being female. The mean age of the patients was 63.08 ± 12.69 years old (Fig. 2). Most patients were diagnosed in the emergency service (91.8%), but a small fraction was observed in planned consultations (8.2%).
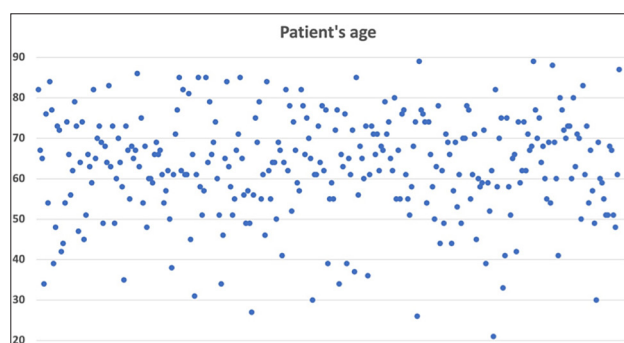

Figure 2. Scatter plot showing the age of patients at diagnosis.

The incidence of RRDs peaked in January, which had the highest mean number of cases, followed by the period between May and September (Fig. 3). The months corresponding to spring and autumn had a lower incidence, but overall, the differences throughout the year were minor, with the highest average number of 2.82 (January) and the lowest of 1.75 (December).
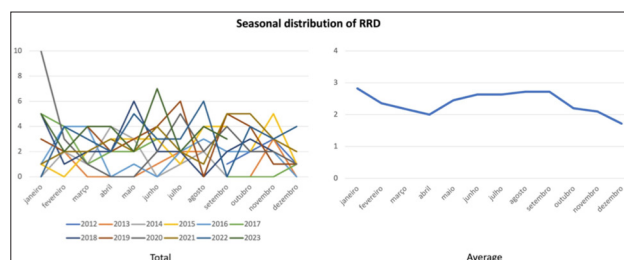

Figure 3. Seasonal distribution of cases.

Regarding the patient's phakic status, 62% were phakic, and 38% were pseudophakic, with an average time since

Table 1. Characteristics and demographics of the study sample.	
Gender	
Male	179 (58.4%)
Female	127 (41.6%)
Age	
Mean ± SD (years)	63.08 ± 12.69
Provenance	
Emergency service	91.8%
Scheduled appointment	8.2%
Phakic status	
Phakic	62%
Pseudophakic	38%
Average time since cataract surgery (months)	46.9 ± 46.6
Axial length	
Mean ± SD (mm)	24.7 ± 2.1
Main symptom at presentation	
Diminished VA	56.7%
Peripheral scotoma	17.1%
Photopsias	8%
Floaters	16%
Status of the macula at presentation	
On	36.6%
Off	63.4%
Primary location of the detachment	
Total	14%
Superior	35.1%
Inferior	25.7%
Temporal	18.1%
Nasal	6.4%
Visual acuity upon presentation (logMAR)	
Macula-on	0.44 ± 0.47
Macula-off	2.03 ± 0.86
Time since first symptoms until presentation (mean ± SD, days)	
Macula-on	20.2 ± 47.4
Macula-off	32.5 ± 95.5
Time from presentation to surgery (mean ± SD, days)	
Macula-on	2.8 ± 2.5
Macula-off	6.7 ± 11.2

the cataract surgery of 46.9 ± 46.6 months. The mean axial length was 24.7 ± 2.1 mm, with values ranging from 20.22 to 33.00 mm. The main symptom that led the patient to seek medical observation was a diminished visual acuity in more than half of the cases (56.7%), followed by a scotoma in the peripheral visual field (17.1%), often described as a black curtain in the peripheral vision. Floaters were the main complaint in 16% of cases, and photopsias in 8%.

The most frequent location of the detachment, at the time of the first observation was superior (35.1%), followed by inferior (25.7%), temporal (18.1%), and nasal (6.4%). A significant part of the patients presented with a total detachment (14%) upon the first observation. This group of patients took the longest to be observed after the onset of symptoms and naturally corresponded to the group with the lowest visual acuity at presentation. About two-thirds of the cases (63.4%) presented with a detached macula, and 36.6% had an attached macula upon presentation.

The average BCVAs at presentation were 0.44 ± 0.47 logMAR in the macula-on group and 2.03 ± 0.86 logMAR in the macula-off group (Fig. 4).
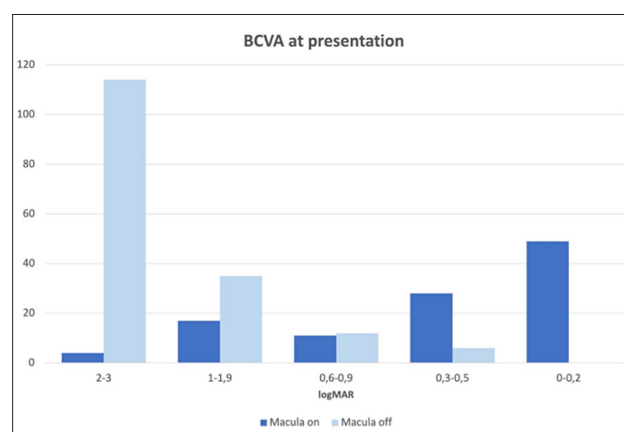

Figure 4. Best corrected visual acuity at presentation.

With regard to the time from the onset of the first symptoms until the first medical observation, patients with a macula-on RRD were observed on average 20.2 ± 47.4 days after the first complaints, while patients with macula-off RRD were observed 32.5 ± 95.5 days after symptoms onset. The average time between the first observation and the surgical treatment was 2.8 ± 2.5 days in the macula-on group and 6.7 ± 11.2 in the macula-off group.

DISCUSSION AND CONCLUSION

This study aimed to carry out an epidemiological analysis of all cases of primary RRD diagnosed and treated at our hospital over the last 11 years, which corresponds to the period in which the analysis of the patient's records is possible through the hospital's platform.

The exclusion criteria applied were chosen to standardize the patient's sample, in order to obtain more consistent data and conclusions. The exclusion of traumatic RRD was done because the natural history of those patients is different from that in spontaneous detachments, in which there is no known precipitating factor. Most cases of ocular trauma led to a visit to the emergency department and medical observation, which differs from primary detachments, where it is the onset of a symptom that leads the patient to seek medical advice. We therefore believe that this analysis would be more uniform and consistent with the exclusion

of those cases. Similarly, patients with pre-existing ocular or systemic pathologies that may increase the risk of RRD constitute a heterogeneous group, different from what this study intended to characterize, so they were not included in the analysis either.

Regarding the incidence of RRD according to gender, we found a slight predominance of cases in male patients. The literature describes a relatively higher incidence of detachments in males, but the main hypothesis for this disparity is that men have a higher rate of traumatic detachments, due to differences in their work occupations, which make them more susceptible to ocular trauma, and subsequently to detachments.[8,9,22] However, since our study excluded cases of traumatic detachments, this variable was not relevant. Other hypotheses suggest that these differences may be due to anatomical differences in the eye between genders. Our results suggest that there may be a slightly higher incidence of RRD in men.

The average age of the patients was 63.08 ± 12.69, although RRDs were diagnosed in all age groups, from 21 to 89 years old. This reinforces the fact that RRDs, unlike many other eye diseases, can occur in any age group. The majority of detachments that occur in young patients were related to the presence of myopia, especially high myopia, which is usually associated with an increased axial length of the eye, an important and well-known factor for the development of this pathology.[13–15] In older age groups, the incidence of posterior vitreous detachment, which increases exponentially from the 7th decade onwards, and the high rates of cataract surgeries performed in these patients constitute the main causal factor for the development of RRD.[16]

Although the vast majority of patients came from the emergency department, a not insignificant number (8.2%) were diagnosed in a consultation setting. Two distinct interpretations can be drawn from this data. Firstly, some cases of RD may remain asymptomatic for a relatively long time, especially if the initial symptoms do not involve the central vision, as in peripheral scotomas which do not affect the patient's life activities. This may happen in cases of inferior detachments, which generally evolve more slowly and may go unnoticed for a long time. On the other hand, it may mean that some patients are not aware of the severity of certain ocular symptoms, and the importance that early diagnosis has on the final prognosis. Some of those patients waited a long time for an appointment despite having symptoms compatible with a severe disease, rather than seeking immediate medical observation.

As previously mentioned, past cataract surgery may increase the risk of RD by 4-10 times, mainly due to the mobilization of the vitreous humor during the procedure, due to fluctuations in the volume and pressure inside the eye, and due to the anatomical changes resulting from the replacement of the crystalline lens with an intraocular lens16. A significant portion of the patients were pseudophakic (38%), but no conclusions can be drawn regarding this number, as we do not know the overall proportion of pseudophakic patients in our population. Complicated cataract surgery, especially in cases where the integrity of the posterior capsule is lost, is associated with an exponential increase in subsequent RDs.[16] However, these cases were excluded from the analysis, so the reported cases of pseudophakic RD only concern patients who have undergone uncomplicated cataract surgery. The average time from cataract surgery to RD was 46.9 ± 46.6 months, with some cases of detachment being diagnosed a few days after the cataract surgery, and others only decades later.

The average axial length of the adult eye varies slightly according to race and sex. Most mean values described in several studies carried out in different geographical regions are generally between 22.50 and 23.50 mm.[23] The average value found in our study was 24.7 ± 2.1, ranging from 20.22 to 33.00, which corroborates the widely described relationship between higher axial lengths and increased risk of RD.[2,9,13,24] Despite this, many eyes with a below-average axial length had RD, which shows that this disease is not at all exclusive to longer-than-average eyes.

The analysis of the symptoms that led the patient to seek medical observation showed that more than half of the patients (56.7%) were motivated by a sudden decrease in central visual acuity. A significant proportion went to the emergency service due to a peripheral scotoma, often described as a fixed black curtain blocking the vision, which is a classic complaint associated with this condition. Only a small portion of patients presenting with RD sought observation due to photopsia or floaters. This may have different interpretations. On one hand, floaters and photopsia are common causes of emergency room visits, but in the majority of those cases, the posterior vitreous detachment, vitreoretinal traction, or tearing that causes them may not yet be associated with the development of a RD. On the other hand, loss of peripheral or central vision probably dramatically increases the likelihood of the patient to seek medical help, since those symptoms are known to be often more associated with a severe disease.

About two-thirds of the patients had a detached macula when the RD was diagnosed, which is justified by the fact that the predominant symptom of central vision loss, the most common cause for seeking medical observation, occurs only when this part of the retina is affected. This is corroborated by the fact that the BCVA on admission was only 2.03 ± 0.86 logMAR for macula-off detachments, compared to 0.44 ± 0.47 logMAR in macula-on cases. This data shows that patients are much more likely to seek observation when the detachment is already at a more advanced stage, which is unfortunately associated with a worse long-term visual prognosis, proportional to the time of onset.

Another relevant factor is the time it took for patients to seek health services after the first symptoms onset. This interval was 20.2 ± 47.4 days for the macula-on RDs and 32.5 ± 95.5 for the macula-off RDs. This difference shows that the time it takes for the patient to seek medical observation may have an important impact on the long-term visual outcomes since a timely visit increases the likelihood of the detachment being diagnosed at an earlier stage of evolution, which may play a key role in the final prognosis.

Finally, we studied the average time from diagnosis to

surgical intervention, which was substantially lower for cases of macula-on RD. Timely treatment of macula-on RDs is essential so that the intervention is done before the macula detaches. This factor is especially important for superior macula-on RDs since their progression is exceptionally rapid. The factors that may lead to the existence of this interval are related to the logistics of the human resources and operating room, which may interfere with the scheduling of the surgeries. Whenever possible, patients underwent surgery as soon as possible, which meant that previously planned surgeries had to be postponed. In several cases, patients underwent surgery on days when posterior segment surgeries are not usually performed, bearing in mind the impact that this anticipation could have on the visual prognosis, especially in cases of macula-on RDs.

We believe that this report contributed to the further characterization of this disease, which continues to be one of the most feared ophthalmological pathologies, given the wide range of patients that it can affect, and the fact that many of them were previously healthy. Health education, by teaching the warning symptoms of this disease is fundamental for its timely diagnosis, which in turn will allow its prompt treatment. The limitations of our work were related to the limited size of the sample, its retrospective nature, and the fact that they included a limited geographical region, with scarce ethnic variability. Future contributions to the development of this work could include the study of surgical outcomes, including the type of surgery performed, type of tamponade agents used and the visual outcomes after surgery.

CONTRIBUTORSHIP STATEMENT / DECLARAÇÃO DE CONTRIBUIÇÃO:

RCB: Wrote the article.
RC, CT, ARV, AS, CF and PT: Contributed equally to data collection, analysis, and discussion of the results.
All authors approved the final version to be published.

RCB: Redigiu o artigo.
RC, CT, ARV, AS, CF e PT: Contribuíram igualmente para a recolha de dados, análise e discussão dos resultados.
Todos os autores aprovaram a versão final a ser publicada.

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que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pela Comissão de Ética responsável e de acordo com a Declaração de Helsínquia revista em 2013 e da Associação Médica Mundial.
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