• Clinical Research •

Evaluation of the risk factors for rhegmatogenous retinal detachment associated with choroidal detachment from the viewpoint of treatment patterns: a retrospective study

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Abstract

● **AIM:** To compare the proportion of rhegmatogenous retinal detachment (RRD) associated with choroidal detachment (RRDCD) in the emergency surgery group with the routine inpatient surgery group and determine risk factors for RRDCD.

● **METHODS:** A total of 694 patients (694 eyes) diagnosed with RRD in the emergency surgery (the median duration of RRD was 5d) group were included from the Department of Ophthalmic Emergency, and 692 patients (eyes) in the routine inpatient surgery group (the median duration was 15d) were selected randomly from the Ocular Fundus Department. Demographics, refractive status, macular status, lens status, extent of retinal detachment, number of retinal breaks, duration of symptoms before surgery, and the incidence of RRDCD were compared. A logistic regression analysis was used to determine potential risk factors for RRDCD.

● **RESULTS:** Compared to the routine inpatient surgery group, the emergency surgery group had a significant less median time to surgery (P<0.001) and a decreased proportion of RRDCD (2.88% *vs* 10.84%, P<0.001). Logistic regression analysis revealed that a prolonged duration of RRD [OR 3.51, 95% confidence interval (CI) 1.98-6.23], pseudophakia/aphakia status [OR 2.74, 95%CI (1.50-4.98)], multiple retinal breaks [OR 1.67, 95%CI (1.03-2.70)], and a substantial extent of RRD [OR 11.58, 95%CI (7.12-18.84)] were independent risk factors for RRDCD.

● **CONCLUSION:** Emergency surgical pattern of RRD demonstrates a lower incidence of RRDCD. The adoption of an expedited surgical approach has the potential to reduce the duration of RRD, possibly correlating with a decreased risk of RRDCD development.

● **KEYWORDS:** rhegmatogenous retinal detachment with choroidal detachment; ophthalmic emergency; rhegmatogenous retinal detachment

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INTRODUCTION

Rhegmatogenous retinal detachment (RRD) associated with choroidal detachment (RRDCD) is a complicated form of RRD with poor prognosis[1-3]. Although the pathogenesis of RRDCD is unclear, most related studies suggest that inflammatory responses and low intraocular pressure after RRD stimulates the expansion and hyperpermeability of choroidal vessel, which contributes to RRDCD[2,4-5].

The prevalence of RRDCD among RRD varies from 2% to 18.79% in different studies[6-9]. Due to the high incidence of proliferative vitreoretinopathy (PVR) after surgery, the primary anatomic reattachment rate was reported to be less than 70% in RRDCD[8-9]. As the techniques of vitrectomy advanced and preoperative management (*e.g.*, preoperative administration of steroids) improved, the anatomic success rate of RRDCD has increased to 81.8%[3,10-11]. However, RRDCD remains a

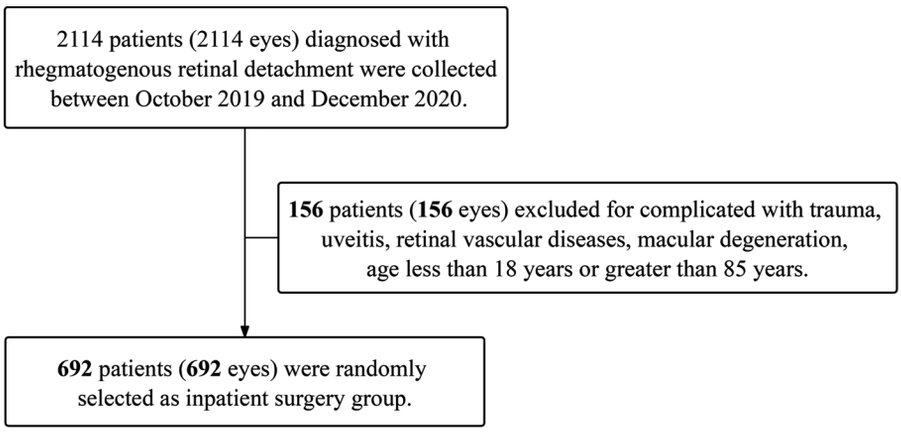

Figure 1 Flow chart showing the process for determining eligibility for inclusion in the inpatient surgery group between October 2019 and December 2020.

remarkable risk factor for primary surgical failures and poor prognosis of RRD[9,12]. Identifying the risk factor of RRDCD is of great significance for early intervention.

Our earlier study demonstrated that implementation of the emergency surgical protocol for RRD clearly reduced the treatment interval of RRD, resulting in improved prognoses for affected patients[13]. In the emergency surgical protocol of RRD, patients benefit from a prioritized "Emergency Green Channel". Ophthalmological specialists are on-call around the clock, ensuring prompt intervention. Typically, the interval from the onset of visual impairment to surgical admission does not exceed 48h for the majority of patients. However, it is still unclear whether the incidence of RRDCD changes after prompt emergency surgical intervention based on existing literature. This study aims to determine whether the implementation of the emergency surgical pattern contributes to a decreased incidence of RRDCD and to identify potential risk factors associated with occurrence of RRDCD.

PARTICIPANTS AND METHODS

Ethical Approval This retrospective study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Ethical Review Committee of Zhongshan Ophthalmic Center (Ethics Approval Number: 2022KYPJ054). The Institutional Review Board of the Zhongshan Ophthalmic Center granted a waiver of informed consent for this research due to its retrospective nature.

Study Design The medical records of patients who underwent RRD surgery at the Zhongshan Ophthalmic Center were reviewed retrospectively, and patients complicated with RRDCD were identified.

Patients with RRD who underwent routine inpatient surgery between October 2019 and December 2020 were enrolled as the routine inpatient surgery group. A systematic sampling was implemented on 1958 eligible patients (after excluding 156 cases from an initial cohort of 2114 based on predefined exclusion criteria), resulting in a final sample of 692 participants (Figure 1). We implemented an emergency protocol for RRD from January 2021 to provide urgent care for RRD patients. Those individuals who fulfilled the criteria for the emergency surgical protocol and underwent emergency surgery between January 2021 and March 2022 were categorized into the emergency surgery group (Figure 2). The indications for emergency surgery in cases of RRD are as follows: 1) RRD with macular-on; 2) RRD with macular-off lasting less than 3d. Macular status was verified by slit lamp examination, fundus color photography, and optical coherence tomography.

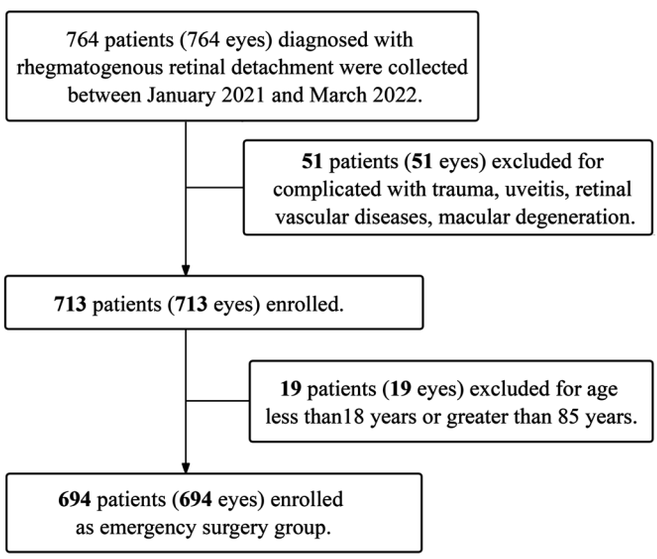

Figure 2 Flow chart showing the process for determining eligibility for inclusion in the emergency surgery group between January 2021 and March 2022.

RRDCD was diagnosed by ultrasound B-scan, ultrasound biomicroscope, slit lamp examination, or intraoperative findings. The number of retinal breaks and extent of RRD were verified by slit lamp examination, color fundus photography, or intraoperative condition.

Demographics, refractive status (high myopia was defined as a spherical equivalent refraction of −6.0 D or less), macular status, lens status, extent of RRD, number of retinal breaks, duration of RRD, and the incidence rate of RRDCD were recorded and compared. As total retinal detachment has been reported to be a risk factor for RRDCD[14-15], patients were stratified into two groups based on the extent of retinal detachment: those with a retinal detachment extent less than or equal to 3 quadrants and those with a retinal detachment extent equal to 4 quadrants.

Inclusion/Exclusion Criteria The inclusion criteria were as follows: 1) all participants aged from 18 to 85y; 2) a diagnosis of RRD was established based on slit lamp examination with a 90-diopter lens, ultrasound B-scan or color fundus photography; 3) we investigated whether choroidal detachment occurred with RRD by clinical examinations or intraoperative findings.

Exclusion criteria included: 1) a diagnosis of exudative RRD or tractional RRD; 2) history of age-related macular degeneration, diabetic retinopathy, retinal artery or vein occlusion; 3) history of intravitreal injection, retinal photocoagulation or other intraocular treatment (except for uneventful cataract surgery).

Statistical Analysis IBM SPSS 20.0 software (SPSS Inc, Chicago, IL, USA) was employed for statistical analysis. Quantitative data were expressed as mean±standard deviation or median (interquartile range, IQR), and analyzed by *t* test or Mann-Whitney *U* test. Categorical data were expressed as frequency and analyzed by Chi-squared test. The independent risk factors for RRDCD were analyzed by binary logistic regression analysis. $P<0.05$ was regarded as statistical significance.

RESULTS

Emergency Surgery Group *vs* Routine Inpatient Surgery Group Based on the eligibility criteria, 694 eyes from 694 patients underwent emergency surgery, while 692 eyes from 692 patients received routine inpatient surgery. The demographic and clinical characteristics of the emergency surgery and routine inpatient surgery groups are summarized in Table 1. Compared to the routine inpatient surgery group, patients in the emergency surgery group had a lower proportion of RRDCD (2.88% *vs* 10.84%; $P<0.001$). In the emergency surgery group, the median (IQR) duration of RRD was 5 (3–10)d. However, in the routine inpatient surgery group, the median (IQR) duration of RRD was 15 (10–30)d. There was no significant difference in age, gender, the status of refraction, the status of the macula, lens status, number of retinal tears and extent of RRD between the two groups ($P>0.05$).

RRD Group *vs* RRDCD Group A total of 1386 RRD patients (1386 eyes) in both emergency and routine inpatient surgery group were studied, 95 patients (95 eyes) diagnosed with RRDCD in RRDCD group and 1291 patients (1291 eyes) without choroidal detachment in RRD group. Clinical and demographics data of RRD group and RRDCD group were presented in Table 2. The RRDCD group had more patients with pseudophakic/aphakic eyes, multiple retinal tears, total retinal detachment, and longer duration than RRD group ($P<0.05$). The following variables were designated as categorical variables: lens status (phakia *vs* pseudophakia/aphakia), numbers of retinal tears (1 *vs* >1), extent of retinal detachment (≤3 quadrants *vs* 4 quadrants), and duration of RRD (≤7d *vs* >7d). Binary Logistic regression analysis revealed that pseudophakia/aphakia [odds ratio (OR) 2.74, 95% confidence interval (CI) 1.50-4.98], multiple retinal tears [OR 1.67, 95%CI (1.03-2.70)], total retinal detachment [OR 11.58, 95%CI (7.12-18.84)], and a prolonged duration (>7d) [OR 3.51, 95%CI (1.98-6.23)] were identified as independent risk factors for RRDCD (all $P<0.05$), as shown in Figure 3. When the duration of RRD was categorized into two groups (≤3d *vs* >3d), it remained an independent risk factor for RRDCD. However, the number of retinal breaks, when divided into two groups (≤2 *vs* >2), was not found to be an independent risk factor for RRDCD, as shown in Tables 3, 4, and 5.

Table 1 Clinical and demographics of the emergency surgery group and the routine inpatient surgery group mean±SD or *n* (%)

Characteristics	Emergency surgery group	Inpatient surgery group	*P*
Patients/No. of eyes	694/694	692/692	-
Age, y	46.74±13.21	47.22±14.70	0.313[a]
Gender			0.646[b]
Male	473 (68.15)	463 (66.91)	
Female	221 (31.85)	229 (33.09)	
Affected eye			0.385[b]
Right eye	390 (56.20)	405 (58.53)	
Left eye	304 (43.80)	287 (41.47)	
High myopia	170 (24.50)	148 (21.39)	0.180[b]
Macular hole	20 (2.88)	16 (2.31)	0.613[b]
Lens status			0.717[b]
Phakic	629 (90.63)	623 (90.03)	
Pseudophakic/aphakic	65 (9.37)	69 (9.97)	
No. of retinal tears			
1	496 (71.47)	488 (70.52)	0.723[b]
>1	198 (28.53)	204 (29.48)	
≤2	660 (95.10)	659 (96.23)	0.999[b]
>2	34 (4.90)	33 (4.77)	
Extent of retinal detachment			0.0753[b]
≤3 quadrants	641 (92.36)	620 (89.60)	
4 quadrants	53 (7.64)	72 (10.40)	
Duration of RRD			
≤7d	505 (72.77)	124 (17.92)	<0.001[b]
>7d	189 (27.23)	568 (82.08)	
≤3d	224 (32.28)	11 (1.59)	<0.001[b]
>3d	470 (67.72)	681 (98.41)	
With choroidal detachment	20 (2.88)	75 (10.84)	<0.001[b]

RRD: Rhegmatogenous retinal detachment. [a]Mann-Whitney *U* test; [b]Fisher's exact test.

Table 2 Clinical and demographics of the RRD eyes with and without choroidal detachment mean±SD or *n* (%)

Characteristics	RRD without CD	RRD with CD	*P*
Patients/No. of eyes	1291/1291	95/95	-
Age, y	46.86±13.93	48.57±14.52	0.196[a]
Gender			0.140[b]
Male	865 (67.00)	71 (74.74)	
Female	426 (33.00)	24 (25.26)	
Affected eye			0.830[b]
Right eye	739 (57.24)	56 (58.95)	
Left eye	552 (42.76)	39 (41.05)	
High myopia	299 (23.16)	19 (20.00)	0.529[b]
Macular hole	32 (2.48)	4 (4.21)	0.305[b]
Lens status			<0.001[b]
Phakic	1179 (91.32)	73 (76.84)	
Pseudophakic/aphakic	112 (8.68)	22 (23.16)	
No. of retinal tears			
1	929 (71.96)	55 (57.89)	0.005[b]
>1	362 (28.04)	40 (42.11)	
≤2	1243 (96.28)	76 (80.00)	<0.001[b]
>2	48 (3.72)	19 (20.00)	
Extent of retinal detachment			<0.001[b]
≤3 quadrants	1212 (93.88)	49 (51.58)	
4 quadrants	79 (6.12)	46 (48.42)	
Duration of RRD			
≤7d	612 (47.41)	17 (17.89)	<0.001[b]
>7d	679 (52.59)	78 (82.11)	
≤3d	233 (18.33)	2 (2.11)	<0.001[b]
>3d	1038 (81.67)	93 (97.89)	

RRD: Rhegmatogenous retinal detachment; CD: Choroidal detachment. [a]Mann-Whitney *U* test; [b]Fisher's exact test.

DISCUSSION

The increasing incidence of RRD and substantial populations in China present challenges to the routine inpatient surgical approach. Under this approach, patients experience extended waiting times of nearly two weeks or even one month before undergoing surgery. To address the urgent healthcare needs of patients, the Zhongshan Ophthalmic Center has built the first Department of Ophthalmic Emergency in China and instituted an "Emergency Green Channel" specifically designed for cases of RRD[13].

In this study, clinical characteristics of RRD and the prevalence of RRDCD were compared between the emergency surgery group and the routine inpatient surgery group. The results demonstrated that patients had a shorter duration of RRD and a lower incidence of RRDCD in the emergency surgery group. Logistic regression analysis showed that a prolonged duration (>7d), pseudophakia/aphakia, multiple retinal tears, and a substantial extent of retinal detachment are independent risk factors for RRDCD. Therefore, our study indicates that the emergency surgical pattern may decrease the incidence of RRDCD by reducing the median time to surgery for RRD.

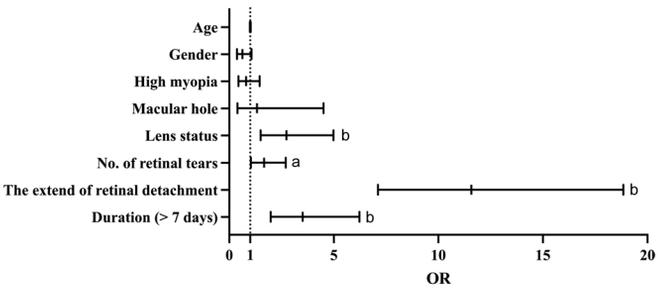

Figure 3 Binary logistic regression analysis of risk factors for RRDCD OR values greater than 1 indicating positive relationship, and OR values less than 1 indicating negative relationship; [a]*P*<0.05, [b]*P*<0.001. RRDCD: Rhegmatogenous retinal detachment associated with choroidal detachment; OR: Odds ratio.

Table 3 Binary logistic regression analysis of baseline characteristics, retinal tears (>2), duration of RRD (>3d) associated with RRDCD

Characteristics	OR	95%CI	*P*
Age	1.006	0.990-1.024	0.456
Gender	0.600	0.352-1.026	0.062
High myopia	0.828	0.457-1.501	0.535
Macular hole	1.243	0.359-4.300	0.731
Pseudophakic/aphakic	2.612	1.432-4.766	0.002
No. of retinal tears (>2)	0.439	0.099-1.938	0.277
Extent of retinal detachment	13.709	8.409-22.349	<0.001
Duration of RRD (>3d)	9.862	2.360-41.214	0.002

RRD: Rhegmatogenous retinal detachment; RRDCD: Rhegmatogenous retinal detachment associated with choroidal detachment; OR: Odds ratio; CI: Confidence interval.

Table 4 Binary logistic regression analysis of baseline characteristics, retinal tears (>2), duration of RRD (>7d) associated with RRDCD

Characteristics	OR	95%CI	*P*
Age	1.005	0.988-1.022	0.554
Gender	0.607	0.356-1.035	0.067
High myopia	0.830	0.458-1.505	0.540
Macular hole	1.573	0.475-5.203	0.458
Pseudophakic/aphakic	2.732	1.502-4.969	0.001
No. of retinal tears (>2)	0.449	0.102-1.976	0.289
Extent of retinal detachment	11.847	7.271-19.304	<0.001
Duration of RRD (>7d)	3.358	1.898-5.943	<0.001

RRD: Rhegmatogenous retinal detachment; RRDCD: Rhegmatogenous retinal detachment associated with choroidal detachment; OR: Odds ratio; CI: Confidence interval.

Table 5 Binary logistic regression analysis of baseline characteristics, retinal tears (>1), duration of RRD (>3d) associated with RRDCD

Characteristics	OR	95%CI	*P*
Age	1.006	0.989-1.024	0.458
Gender	0.623	0.356-1.035	0.081
High myopia	0.805	0.445-1.459	0.475
Macular hole	1.080	0.305-3.829	0.905
Pseudophakic/aphakic	2.629	1.437-4.808	0.002
No. of retinal tears (>1)	0.449	0.102-1.976	0.067
Extent of retinal detachment	13.432	8.239-21.896	<0.001
Duration of RRD (>3d)	10.035	2.399-41.969	0.002

RRD: Rhegmatogenous retinal detachment; RRDCD: Rhegmatogenous retinal detachment associated with choroidal detachment; OR: Odds ratio; CI: Confidence interval.

Consistent with prior research, our findings further support the idea of pseudophakia/aphakia status is a notable factor associated with RRDCD[4,16]. Compared with phakic RRD, pseudophakic RRD had greater RD extent and PVR[14]. Based on the findings of the above study, pseudophakia/aphakia may be associated with RRDCD by exerting an influence on the vitreous and PVR, subsequently impacting the extent of retinal detachment[14,17].

Most studies suggested that RRDCD was associated with multiple retinal tears[2,16]. Yu *et al*[15] found that total RRD might be the potential risk factor for the development of RRDCD in RRD patients. A larger extent of retinal detachment may lead to significant breakdown of the blood-retinal barrier, exposing the retinal pigment epithelium. This exposure could potentially induce hypotony, along with the development of edema and detachment of the ciliary body and choroid[5,16].

As the duration of RRD prolongs, breakdown of blood-retinal barrier can lead to persistent low intraocular pressure combined with severe immune reaction in the vitreous. This disruption may also induce the dilation and hyperpermeability of choroidal vessels and potentially leading to RRDCD. Therefore, for RRDCD, the duration of RRD might be an independent risk factor[18], which is consistent with our finding. In the studies of Yu *et al*[15] and Gu *et al*[16], no significant difference in the duration between RRDCD versus RRD was found. The durations explored in their studies extending beyond 14d, while most patients with RRD had a duration ≤7d (72.77%) in our emergency surgery group. Therefore, this disparity may obscure the potential impact of a shortened duration in reducing the incidence of RRDCD. Under our emergency surgical approach, patients with RRD can receive timely treatment, facilitated by the prompt availability of emergency triage services and efficient consultations with retinal surgeons.

Previous reports showed that macular hole and high myopia were the risk factors for RRDCD[15-16,19]. In our study, it appears that the contributions of macular hole and high myopia to predicting RRDCD are not statistically significant at the 0.05 level. Given that high myopia is frequently correlated with retinal degenerative changes, such as retinal breaks, necessitating retinal laser photocoagulation, our study excludes individuals who have undergone prior retinal laser treatment. This may explain the divergence in our results from previous study.

We acknowledge the limitations of our study. First, retrospective studies are susceptible to inherent biases, such as selection bias, where the non-random assignment of subjects may affect the generalizability of results. To address these biases, we employed strict inclusion criteria and reliable data verification methods, ensuring that our findings are dependable. Second, we only recorded the number of retinal tears without documenting the location or morphology of retinal breaks or the grades of PVR. Other studies have identified these details as potential risk factors for complex retinal and choroidal detachments. This limitation restricts our ability to fully compare the RRDCD and RRD groups.

Our study revealed that patients with RRD experienced a shorter duration and a lower incidence of RRDCD under the emergency surgical pattern compared to the routine inpatient surgical pattern. Our findings confirmed that pseudophakia/aphakia, multiple retinal tears, total retinal detachment, and a prolonged duration may contribute to the development of RRDCD. The accessibility of the emergency surgical pattern significantly reduced median time to surgery for RRD, consequently lowering the incidence of RRDCD.

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REFERENCES

1 Wu ZF, Ding NN, Yu MX, *et al*. Identification of potential biomarkers for rhegmatogenous retinal detachment associated with choroidal detachment by vitreous iTRAQ-based proteomic profiling. *Int J Mol Sci* 2016;17(12):2052.

2 Li ZH, Li YH, Huang XH, *et al*. Quantitative analysis of rhegmatogenous retinal detachment associated with choroidal detachment in Chinese using UBM. *Retina* 2012;32(10):2020-2025.

3 Li PP, Li L, Wu JH. The effect of steroid intervention before vitrectomy for rhegmatogenous retinal detachment associated with choroidal detachment: a meta-analysis and systematic review. *Curr Eye Res* 2024;49(10):1005-1011.

4 Seelenfreund MH, Kraushar MF, Schepens CL, *et al*. Choroidal detachment associated with primary retinal detachment. *Arch Ophthalmol* 1974;91(4):254-258.

5 Luo SS, Xu HY, Yang LF, *et al*. Quantitative proteomics analysis of human vitreous in rhegmatogenous retinal detachment associated with choroidal detachment by data-independent acquisition mass spectrometry. *Mol Cell Biochem* 2022;477(6):1849-1863.

6 Li JP, Xu J, Zhao M. Changes in axial length after vitrectomy for rhegmatogenous retinal detachment combined with choroidal detachment. *Int J Ophthalmol* 2022;15(8):1290-1295.

7 Kohli GM, Shenoy P, Halim D, *et al*. Safety and efficacy of suprachoroidal triamcinolone acetonide for the management of serous choroidal detachment prior to rhegmatogenous retinal detachment surgery: a Pilot study. *Indian J Ophthalmol* 2022;70(4): 1302-1306.

8 Zhang ZT, Fang D, Peng MJ, *et al*. Systemic approach to prevent inadvertent perfusion in eyes with extensive choroidal detachment, suprachoroidal fluid, and hypotony during pars Plana vitrectomy. *Adv Ther* 2019;36(1):257-264.

9 Wei Y, Zhou RL, Wang XB, *et al*. The effect of single periocular injection of methylprednisolone and drainage of suprachoroidal fluid in the treatment of rhegmatogenous retinal detachment combined with choroidal detachment. *Eye* (*Lond*) 2019;33(9):1387-1392.

10 Wei Y, Wang NL, Chen FH, *et al*. Vitrectomy combined with periocular/intravitreal injection of steroids for rhegmatogenous retinal detachment associated with choroidal detachment. *Retina* 2014;34(1):136-141.

11 Dave VP, Chou HD, Kiri H, *et al*. Presentations and factors affecting outcome of rhegmatogenous retinal detachment with choroidal detachment: an Indo-Taiwanese Study. *Retina* 2024;44(2):255-260.

12 Adelman RA, Parnes AJ, Michalewska Z, *et al*. Clinical variables associated with failure of retinal detachment repair: the European vitreo-retinal society retinal detachment study report number 4. *Ophthalmology* 2014;121(9):1715-1719.

13 Chen ZY, Gao K, Lai KB, *et al*. Effects of the implementation of an emergency surgical pattern in patients with rhegmatogenous retinal detachment: a retrospective observational study. *J Ophthalmol* 2022;2022:4240225.

14 Ferrara M, Mehta A, Qureshi H, *et al*. Phenotype and outcomes of phakic versus pseudophakic primary rhegmatogenous retinal detachments: cataract or cataract surgery related *Am J Ophthalmol* 2021;222:318-327.

15 Yu YJ, An M, Mo B, *et al*. Risk factors for choroidal detachment following rhegmatogenous retinal detachment in a Chinese population. *BMC Ophthalmol* 2016;16:140.

16 Gu YH, Ke GJ, Wang L, *et al*. Risk factors of rhegmatogenous retinal detachment associated with choroidal detachment in Chinese patients. *Int J Ophthalmol* 2016;9(7):989-993.

17 Mahroo OA, Dybowski R, Wong R, *et al*. Characteristics of rhegmatogenous retinal detachment in pseudophakic and phakic eyes. *Eye* (*Lond*) 2012;26(8):1114-1121.

18 Li JP, Zhao M, She HC, *et al*. The impact of the COVID-19 pandemic lockdown on rhegmatogenous retinal detachment services-Experiences from the Tongren eye center in Beijing. *PLoS One* 2021;16(8):e0254751.

19 Kang JH, Park KA, Shin WJ, *et al*. Macular hole as a risk factor of choroidal detachment in rhegmatogenous retinal detachment. *Korean J Ophthalmol* 2008;22(2):100-103.