# Frequency of retinal detachment after cataract surgery in highly myopic patients

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## ABSTRACT

**الأهداف:** تحديد العوامل المؤثرة على تمزق الشبكية بعد جراحة الماء الأبيض.

**الطريقة:** أجريت دراسة استرجاعية على سجلات المرضى خلال الفترة من 2000م حتى 2010م في قسم العيون، مستشفى الملك عبدالعزيز، الرياض، المملكة العربية السعودية لكل من البيانات الاكلينيكية والديموغرافية. وتم التعرف على الحالات التي طول المحور العيني 25مم أو أكثر، بينما شملت مجموعة التحكم 500 عين معدل طول المحور العيني 24-22 مم. تم تحليل البيانات لمقارنة المجموعتان وتقييم العوامل المؤثرة على تمزق الشبكية بعد جراحة الماء الأبيض.

**النتائج:** قمنا بمراجعة 852 عين من أصل 721 مريض ( 352 عين مصابة بقصر نظر شديد ومقارنتها مع 500 عين ( مجموعة الشاهد ). بعد حساب معدل المراجعة الدورية 45.1±27.9 شهر، ومعدل لوقمار لحدة البصر اختلف بشكل احصائي 0.51 ± 0.48لمجموعة الحالة و 0.38 ± 0.41 لمجموعة الشاهد بشكل إحصائي ($p$<0.0001). أصيبت 12 عيناً (1.4%) بتمزق الشبكية بعد العملية وكان معدل تمزق الشبكية مرتفعاً لدى مجموعة الحالة (10 [2.8%]) أكثر من مجموعة التحكم (2 [0.4%]) بشكل إحصائي ($p$=0.007). كما كان طول المحور العامل المؤثر الإحصائي الوحيد لتمزق الشبكية ($p$=0.005) بعد تسوية المتغيرات ($p$=0.019).

**خاتمة:** أن ارتفاع الطول المحوري بين المرضى المصابين يزيد من تمزق الشبكية.

**Objectives:** To determine the potential risk factors for retinal detachment after cataract surgery.

**Methods:** In this retrospective cohort study, medical records of patients operated on between 2000 and 2010 at the Department of Ophthalmology, King Abdulaziz University Hospital, Riyadh, Kingdom of Saudi Arabia were retrospectively reviewed for both demographic and clinical data. Cases were identified as having an ocular axial length ≥25 mm, while a control group of 500 eyes (axial length range; 22-24 mm) was sampled. Data were analyzed to compare both groups, and to assess potential risk factors for post-cataract retinal detachment.

**Results:** We reviewed 852 eyes of 721 patients; 352 eyes with documented high myopia were compared with 500 control eyes. After a mean follow up of 45.1 ± 27.9 months, the postoperative mean LogMAR visual acuity significantly differed; 0.51 ± 0.48 for cases and 0.38 ± 0.41 for controls ($p$<0.0001). Controls showed significantly better postoperative vision as measured by LogMAR (0.92 ± 0.7) than cases (0.71 ± 0.61) ($p$<0.0001). Twelve eyes (1.4%) had retinal detachments postoperatively. The RD prevalence was significantly higher among cases (10 [2.8%]) than controls (2 [0.4%]) ($p$=0.007). High axial length was the only significant risk factor for retinal detachment ($p$=0.005) even after multivariate adjustment ($p$=0.019).

**Conclusion:** High axial length among myopic cataract patients may increase the risk of postoperative retinal detachment.

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Cataract surgery is considered as one of the most common surgical procedures to be performed worldwide. It went through major advancements in terms of surgical techniques and utilized equipment over the last 5 decades, in order to minimize the complication rate and to enhance the visual outcome within a shorter recovery period. Although cataract surgery today has excellent outcomes, retinal detachment (RD) is still a serious and well-known complication after cataract extraction, which may lead to visual loss and blindness.[1] The incidence of RD either after extracapsular cataract extraction by nuclear expression (ECCE) or phacoemulsification has been estimated to be within the range of (0.6-2.7%).[1-3] Potential risk factors for RD after cataract extraction include; male gender, younger age, intra-operative rupture of the posterior capsule/ vitreous loss, presence of atrophic retinal lesions, neodymium:yttrium-aluminum-garnet (Nd;YAG) laser capsulotomy, and high axial myopia.[1,3-7] The relationship between high axial myopia and RD after cataract surgery either by (ECCE or phacoemulsification has been assessed and reported in many retrospective studies. A considerable number of studies reported that high axial myopia increases the risk of RD after ECCE,[7-10] while on the other hand, other studies have not found such an increase.[11-13] Similarly, after the introduction of the phacoemulsification technique, there was increasing evidence that high myopia is a risk factor for RD. Thus, there is still an uncertainty regarding the association between the increase in axial length and the event of RD after cataract surgery. The aim of this study is to determine whether high axial myopia is a potential risk factor for RD after cataract surgery and the identification of other potential risk factors, if any.

**Methods.** This is a retrospective cohort study, based on comparing the frequency of RD in myopic patients with high axial length to those with lower axial length after cataract surgery, and to analyze the role of other possible preoperative, intra-operative, and post-operative risk factors. In this retrospective cohort study, medical records of patients operated on between 2000 and 2010 at the Department of Ophthalmology, King Abdulaziz University Hospital (KAUH), Riyadh, Kingdom of Saudi Arabia (KSA) were retrospectively reviewed for both demographic and clinical data. Ethical approval was sought through the Institutional Research and Ethics Review Board (IRERB) of the College of Medicine, King Saud University, KSA, and follows the Declaration of Helsinki for ethics of research involving human beings. A meticulous review of literature was conducted using PubMed, Google Scholar, and King Saud University Digital Library databases. The reviewed literature was then narrowed down and filtered per quality and relevance. A sample size of 866 eyes (cases and controls) was estimated using the literature: (considering 2-sided confidence intervals of 95%; $\alpha$ error of 0.05; power of 80%, case to control ratio of 1:1, and incidence of disease among cases (3%) and among controls (0.5%). Coverage rate among cases was 85.7% while we randomly selected 500 controls. A stratified systematic sample of cataract patients who underwent cataract surgery between 2000 and 2010 was withdrawn from the electronic registration system at KAUH. We stratified the data per annual strata, from which our sample was systematically withdrawn. This stratification was based on time factor, to avoid selection bias and to enable equal probability for each cataract surgery case to appear in our sample. Medical files of selected file numbers were retrieved and reviewed, where a specially designed form was formulated to collect the required data. Data were collected in a retrospective fashion from these patient's medical records. The data sheet included age, gender, past ocular history, past medical history, medications, previous ocular surgeries, preoperative non-corrected and best-corrected visual acuity, intraocular pressure (IOP), clarity of cornea, type of cataract recorded based on the slit lamp, retina and optic nerve status, and axial length as measured by either ultrasound or optical measurements. Intraoperative data included: type of anesthesia, surgical technique, level of surgeon, occurrence of posterior capsular rupture, vitreous loss, suprachoroidal hemorrhage, intraocular lens implantation, and position of intraocular lens implantation. Postoperative data included: non-corrected and best-corrected visual acuity at the last visit, presence of posterior capsular opacification (PCO), Nd:YAG capsulotomy, RD, and mean time to RD. Exclusion criteria were: age less than 20 years, previous ocular surgery, ocular open injury trauma, history of preoperative RD, presence of retinal diseases (which is predispose to RD, such as Stickler syndrome or Marfan syndrome), cataract surgery combined with other ocular procedures, and development of endophthalmitis. Patients included in the data analysis must have completed at least 12 months of follow-up. The primary outcome of interest was RD. Additionally, we investigated the potentially associated risk factors including; age, gender, type of cataract, axial length, surgical technique, level of surgeon, posterior capsule tear, vitreous loss, and Nd;YAG capsulotomy.

*Statistical analysis.* The collected data were reviewed by the research team where all data were entered and stored into a specifically designed Microsoft Access

2007® database. A study group of high myopic cases were identified by having an ocular axial length ≥25 mm, and a randomly selected control group of 500 eyes that were almost similar the study group in necessary clinical characteristics such as, uveitis and trauma, type of cataract, and type of surgery and surgeon's level, was allocated to be within the average lower normal range. The selection process was carried out using the automatic random sampling option of the Statistical Package for Social Sciences (SPSS) version 19.0 Data analysis was conducted using SPSS version 19.0 (IBM Inc, Chicago, IL, USA), MedCalc® 11.6 (MedCalc Software bvba, Mariakerke, Belgium), and StatsDirect statistical software version 2.7.2 (StatsDirect Ltd, Cheshire, UK). Chi-square was calculated to investigate the association between cases and different factors (Fisher exact whenever indicated), Student's t test was carried out to compare the means of visual acuity and intraocular pressure, while regression model coefficient (R2) was used to evaluate the slope, and detect the correlation between pre- and post- intervention visual acuities and axial length, in addition to detecting the relationship between axial length and age. Binary logistic regression was conducted to adjust for potential confounders and achieve exact effect size.

**Results.** The total withdrawn sample size was 2720 eyes where the number of eyes with high myopia (axial length ≥25mm) was 371 eyes, while 1509 eyes were identified as control (axial length ranging from 22-24 mm). According to our inclusion criteria, we excluded 19 eyes from the cases. Consequently, 81 eyes were excluded from the control group. Out of the remaining 1428 control cases, we randomly sampled 500 control eyes to serve as controls, and compared them with the remaining 352 eyes with high myopia. The final selected sample for analysis was 852 eyes of 721 patients, where cases with high myopia were 352 eyes of 283 patients with 156 (55.1%) males and 127 (44.9%) females. Alternatively, the control eyes were 500 of 438 patients (case/control ratio: 1:1.42, 216 [49.3%] males and 222 [50.7%] females). The mean ± standard deviation (SD) follow-up duration was 47.8 ± 31.2 (range: 12-118) for cases, while it was 38.7 ± 18.2 (range: 12-97) for controls. The relationship between the axial length and age was found to be inversely correlated as the increased axial length is usually found among cases with younger age. At baseline, the mean ± SD LogMAR visual acuity did not differ much between cases (1.23 ± 0.62) and controls (1.3 ± 0.66), ($p$=0.144), while it was significantly different in the postoperative assessment (0.51 ± 0.48 for cases, and 0.38 ± 0.41 for controls) ($p$<0.0001), as controls showed more postoperative improvement (0.92 ± 0.7) than cases (0.71 ± 0.61), which was highly statistically significant ($p$<0.0001). Similarly, we have excluded cases with confirmed glaucoma diagnosis, and after the exclusion we compared the pre- and post- intervention mean IOP. The mean ± SD IOP as measured in mm Hg did not significantly differ between groups at baseline, and neither in the post assessment nor in terms of pre- to post- intervention reduction differed in terms of value ($p$=0.294) nor in the amount of decrease ($p$=0.920). Out of the 852 eyes recruited in this study, 12 eyes of 12 patients (1.4%) had RDs postoperatively, in which 10 eyes of 10 patients were of the high myopia group (2.8%) while only 2 (0.4%) were from the control group. The prevalence of post-operative RD among cases was significantly exceeding controls (2.8% versus 0.4%, $p$=0.007). Comparing cases to controls in terms of age showed that the mean age was 59.5 ± 11.3 (range: 20-85), and 62.3 years ± 10.7 (range: 20-90), and $p$<0.0001 for both cases and controls. However, such a significant difference in age was not found in the multivariate analysis. Additionally, age was highly inversely correlated with axial length (r=-0.148, $p$<0.0001) among the whole group (cases and controls). Although the inverse correlation persisted to show after disaggregation into cases (r=-0.098, $p$=0.072) and controls (r=-0.084, $p$=0.065), it did not reach a statistical significance. Meanwhile, there was no statistically significant difference between male and female ratios across groups. Among the eyes that developed RD postoperatively, males were more likely to develop RD than females, however, insignificantly (OR: 1.6; $p$=0.552). Among the cases, more surgeries were carried out with phacoemulsification (48.2%) than ECCE or lens aspiration. Conversely, among the controls the ECCE was the predominant technique (58.8%). This difference was statistically significant ($p$=0.034). The phaco technique tended to have RD more than the ECCE by 2 folds, however, insignificantly ($p$=0.636). Moreover, such increase was not found in the multivariate analysis (**Table 1**). Among both cases and controls, more surgeries were carried out by consultants than residents (70.7% and 62.4% versus 29.3% and 37.6%) where such difference was statistically significant ($p$=0.012). Meanwhile, among eyes that developed RD postoperatively, surgeon level was not found to have any effect on the incidence of RD. Intra-operative posterior capsule ruptures with- and without vitreous loss occurred more among cases 4.3% (15 of 352 eyes) compared to 1% (5 of 500 eyes) in controls, however this difference was not statistically significant ($p$=0.701). Among eyes that developed RD

**Table 1 -** Comparing cases to controls in terms of demographic and co-morbidity data at presentation of patients included in a study at the Department of Ophthalmology, King Abdulaziz University Hospital, Riyadh, Kingdom of Saudi Arabia.

| Variable | Cases n (%) | | Controls n (%) | | *P*-value |
|---|---|---|---|---|---|
| ***Age*** | | | | | <0.001 |
| Mean ± SD | 59.5 ± 11.3 | | 62.3 ± 10.7 | | |
| Range | (20-85) | | (20-90) | | |
| ***Gender*** | | | | | 0.128 |
| Male | 156 | (55.1) | 216 | (49.3) | |
| Female | 127 | (44.9) | 222 | (50.7) | |
| ***Eye*** | | | | | 0.683 |
| Right | 171 | (48.6) | 250 | (50.0) | |
| Left | 181 | (51.4) | 250 | (50.0) | |
| ***Unilaterality*** | | | | | <0.001 |
| Unilateral | 214 | (75.6) | 376 | (85.8) | |
| Bilateral | 69 | (24.4) | 62 | (14.2) | |
| Diabetes | 133 | (37.8) | 246 | (49.2) | 0.001 |
| Hypertension | 117 | (33.2) | 183 | (36.6) | 0.312 |
| Bronchial asthma | 27 | (7.7) | 26 | (5.2) | 0.142 |
| Other | 44 | (12.5) | 54 | (10.8) | 0.444 |
| Glaucoma | 38 | (10.8) | 62 | (12.4) | 0.474 |
| Corneal Scar | 55 | (15.6) | 44 | (8.8) | 0.002 |
| Uveitis | 1 | (0.3) | 1 | (0.2) | 0.990 |
| Retinal Disorder | 40 | (11.4) | 84 | (16.8) | 0.027 |
| Trauma | 7 | (2.0) | 4 | (0.8) | 0.216 |
| Congenital | 1 | (0.3) | 5 | (1.0) | 0.410 |

**Table 3 -** Risk for retinal detachment (RD) with increase in axial length of patients included in a study at the Department of Ophthalmology, King Abdulaziz University Hospital, Riyadh, Kingdom of Saudi Arabia (N=12).

| Axial length | RD incidence n (%) | | *P*-value |
|---|---|---|---|
| 22-24 | 2/500 | (0.4) | - |
| 25-27 | 4/244 | (1.6) | 0.196 |
| >27-30 | 3/80 | (3.8) | 0.017 |
| >30 | 3/28 | (10.7) | <0.0001 |

Chi² for linear trend, $p<0.001$

postoperatively, the presence of ruptured posterior capsule with- or without vitreous loss were more frequent, nonetheless, in univariate analysis, however, insignificantly ($p$=0.200). Moreover, this increase was not found when conducting multivariate analysis. Additionally, Nd:YAG capsulotomy after PCO was performed in 6.5% (13 out of 352 eyes) of cases and 2.8% (14 out of 500 eyes) of controls, and the difference was statistically significant ($p$=0.009). Performing Nd:YAG capsulotomy was found to be more frequent in cases than controls by 2-folds, however, insignificantly ($p$=0.436) in univariate analysis. This increase was not

**Table 2 -** Risk factors for retinal detachment after cataract surgery of patients included in a study at the Department of Ophthalmology, King Abdulaziz University Hospital, Riyadh, Kingdom of Saudi Arabia.

| Risk factor | Incidence of RD n | (%) | Total | Unadjusted OR | *P*-value | Adjusted OR | *P*-value |
|---|---|---|---|---|---|---|---|
| ***Age*** | | | 114 | 1.30 | 0.669 | 0.9 | 0.913 |
| <50 | 2 | (1.8) | | | | | |
| ≥50* | 10 | (1.4) | 738 | | | | |
| ***Gender*** | | | 372 | 1.31 | 0.774 | 1.4 | 0.655 |
| Male | 7 | (1.9) | 349 | | | | |
| Female* | 5 | (1.4) | | | | | |
| ***Axial length*** | | | 500 | 7.10 | 0.005 | 6.6 | 0.019 |
| <25* | 2 | (0.4) | | | | | |
| ≥25 | 10 | (2.8) | 352 | | | | |
| ***Retinal disorders*** | | | 123 | 1.97 | 0.398 | 0.6 | 0.514 |
| Present | 3 | (2.4) | | | | | |
| Absent* | 9 | (1.2) | 729 | | | | |
| ***Type of surgery*** | | | 430 | 2.23 | 0.246 | 0.6 | 0.599 |
| ECCE* | 4 | (0.9) | | | | | |
| Phaco | 8 | (2.1) | 385 | | | | |
| ***Level of surgeon*** | | | 289 | 0.97 | 0.998 | 0.7 | 0.524 |
| Resident | 4 | (1.4) | | | | | |
| Consultant* | 8 | (1.4) | 563 | | | | |
| ***Intra-operative complications*** | | | 62 | 2.54 | 0.221 | 0.4 | 0.216 |
| Present | 2 | (3.2) | | | | | |
| Absent* | 10 | (1.3) | 790 | | | | |
| ***Yag capsulotomy*** | | | 39 | 1.90 | 0.436 | 0.8 | 0.835 |
| Yes | 1 | (2.6) | | | | | |
| No* | 11 | (1.4) | 813 | | | | |

37 surgery types were either missing or using other techniques. *assigned reference group. RD - retinal detachment, ECCE - Extra Capsular Cataract Extraction, Phaco - Phaco Emulsification, OR - odds ratio

found in the adjusted multivariate analysis (**Table 2**). Moreover, the rate of RD after cataract surgery was found to have a positively increasing trend with the increase in axial length, which was confirmed through conduct of Chi-square for linear trend, which was highly significant ($p<0.001$) (**Table 3**).

**Discussion.** Myopia can be defined by refraction and/or axial length. Many studies have used refractive myopia as a definition for myopia.[6,14-16] The problem with using refraction as a definition is that - nuclear cataract can induce myopia, which will make it difficult to judge which happens first; myopia, or cataract. We used axial myopia as a definition for myopia where we considered eyes with axial length ≥25mm as having high myopia in agreement with several published studies.[8,9,12,13] One of the strengths of our study is the long follow-up when compared to previously published reports with a follow-up range from 12-118 months (mean 45.1 ± 27.9 months). Long follow-up will better estimate the incidence of RD following cataract extraction, but will not rule out the possibility of RD related to the natural history of myopia.

In our report, we estimated the overall prevalence of high myopia at 371/2720 (13.6%) among our reviewed medical charts. In the Arab region, the nearest report from Qatar,[17] estimated the prevalence of myopia among school children at 5%, while a similar study from Morocco reports myopia as 6.1%.[18] From Saudi Arabia,[19,20] 2 consecutive reports in children and adults have reported myopia to be 13.7% for children, and 4.5% for adults. Despite the difference in age groups, our findings go parallel with Al-Wadaani study.[20] However, it should be considered that our data are mainly hospital based data, which may be affected with selection bias, and that a community based assessment is needed for more accuracy of the prevalence of high myopia in the Saudi population.

The association between cataract type and high myopia was hard to judge given the retrospective nature of the current study, different observers, and different classifications. However, our records show that nuclear sclerosis was more common among the high myopic group, which goes in agreement with other studies,[21-23] while posterior subcapsular cataract (PSC) was far more common among controls where the literature shows conflicting results. Jeon et al[21] and The Blue Mountains study[22] found PSC to be more common in high myopic eyes. We noted that mature cataract was far more common among controls, which might be explained by the possibility that high myopic patients are less tolerant to cataract, and seek medical advice earlier before they reach to a mature cataract.

In our series, 2.8% of high myopic eyes developed RD following cataract extraction, while 0.4% of emmetropic eyes developed RD, which suggests that high axial length does significantly increase the risk of RD following cataract extraction. Our results which showed that high axial myopia is a significant risk factor for RD following cataract extraction come in agreement with previously reported studies, which showed that the incidence of RD following cataract extraction in myopic eyes range between 1.2-8%.[1,6,11,21-27] Jacobi et al[11] summarized the results of 8 studies published from 1984-1993 on pseudophakic RD in high axial myopia, and in these studies, the incidence of RD varied from 1.7-7.5% while most of these studies used ≥25 mm as a definition of high axial myopia with a follow-up range of 22-48 months. Williams et al[27] in 2009 summarized the results of 16 studies published from 1994-2007, in these studies the incidence of RD following phacoemulsification varied from 0-8% (mean: 4.4%), and following ECCE varied from 0-3.7% (mean: 1.5%). Most of these studies used ≥26 mm as a definition of high axial myopia with a follow-up range of 2-147 months.

The incidence of RD after cataract extraction among cases and controls was found to be 2.1%, which lies within the range reported in the literature.[23] Our study found that the incidence of RD was higher among high myopic patients when compared to emmetrope patients, which is in agreement with previously reported positive reports.[7-10] In high myopic patients, we found that the lesser the axial length the higher the prevalence of RD. Although the difference in the incidence of PCO was insignificant between cases and controls, the rate of Nd:YAG capsulotomy was significantly higher among cases, which reflects the low tolerance to PCO among cases or tendency of cases to have denser PCO. The Nd:YAG laser capsulotomy was reported to increase the risk of RD up to 4 folds.[3,27,28] Our data showed that in eyes that underwent Nd:YAG capsulotomy, they were 1.4 times more likely to develop RD, which is in agreement with more recently published studies that do not confirm an increased risk of RD after Nd:YAG capsulotomy.[29] However, it is difficult to conclude from different studies regarding the risk of RD following Nd:YAG capsulotomy, as using different energies might influence the changes occurring in the vitreous that may predispose to RD.

In our study, we found that the ages of the cases were less than those of the control group, which agrees with

previously reported studies, which showed that high myopic eyes tend to develop cataract and are operated upon at a younger age than emmetropic eyes.[6,21,24,30] Young age was reported to be a risk factor for RD after cataract extraction.[5,7,31] Our analysis showed that patients <50 years of age were 2.2 times more likely to develop RD than patients >50 years old, however, the difference was not statistically significant, which is in agreement with what Alio et al[24] and Neuhann et al[1] have observed, and they stated the need for a larger study group in order to obtain a significant difference. Phacoemulsification was reported to carry either similar, or even lower risk than ECCE.[5,28,32,33] However, Javitt et al[34] found pseudophakic RD to be higher after phacoemulsification in the few years following its introduction. In our study, the incidence of RD following phacoemulsification was higher than RD following ECCE, which is in agreement with the study reported by Javitt et al,[34] and this can be explained by the fact that phacoemulsification was introduced to our practice at KAUH between 2000 and 2003, at a time when most of our cases were operated on. Among our series, visual acuity did not significantly differ at presentation. As expected in cataract surgeries, vision has much improved among both groups. Although we realized much improvement in controls than cases, it should be noted that final visual acuity (assessed at the last follow up visit) is quite dependent on the initial visual acuity, which is expected to be less among the group with axial myopia.

Ruptured posterior capsule +/- vitreous loss occurred more among cases than controls. The incidence of intraoperative complications was higher than the previously reported studies, which may be explained by the learning curve, and the fact that more than 30% of our cases were carried out by residents who are usually in their second or third year of the Saudi residency Program. However, the incidence of ruptured posterior capsule and vitreous loss were relatively low among controls and comparable to previously published studies. We strongly believe that eyes with high axial myopia are more likely to have intraoperative complications when operated on by residents or surgeons in their early learning years. The risk of RD among cases with ruptured posterior capsule did increase but did not reach the statistical significance threshold, which is in agreement with previously published studies.[31] Male gender was found by several studies to be a high risk for RD following cataract extraction.[5,7,8,29] Our results are in agreement with previously published papers and showed that males are 2.56 times more likely to develop RD.

The current study faced a number of limitations of which, being a retrospective study with all the known drawbacks of such study design, monitoring a relatively rare event, which needed increasing the sample size. Additionally, the selected study period has implied the transition period from ECCE to phaco emulsification, which included a learning curve within our facility. Finally, being a university teaching hospital may have relatively affected our surgical outcomes. Due to such limitations, future wise, a prospective study design with a larger sample size and meticulous follow up that would include more critical variables and control for potential confounding and other potential biases may be needed.

Findings from this study may strongly suggest that cataract patients with high axial myopia are at potential risk for postoperative RD. Increasing awareness among those with myopia is required, as well as, empowering primary eye care for early detection and referral of such cases for surgery.

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