

Risk Factors for Retinal Detachment After Cataract Surgery in Southern Taiwan

Shwu-Jiuan Sheu^{1,2*}, Luo-Ping Ger³, Jane-Fang Chen²

¹National Yang-Ming University School of Medicine, Taipei, ²Department of Ophthalmology, and ³Department of Research and Education, Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan, R.O.C.

Background: This study was designed to investigate potential risk factors for retinal detachment (RD) after cataract surgery in southern Taiwan.

Methods: This was a prospective cohort study. Submitted charts and claimed records for insurance beneficiaries who underwent cataract extraction between August 1999 and December 2001 were collected from the Bureau of National Health Insurance. Data from these records were examined, including demographic characteristics, past history, refractive status, axial length, and type and complications of cataract extraction. At the end of 2002, any ophthalmologic diagnosis and related treatments, based on procedure and diagnosis codes listed in physician bills, were evaluated.

Results: A total of 9,398 patients were evaluated. The cumulative risk of RD in our study group was 0.4% at the end of follow-up. The mean follow-up time was 25.5 ± 7.7 months. Age had a significant influence on the risk of RD after cataract surgery ($p = 0.006$), whereas gender did not. Axial length also had a significant effect on the risk of RD after cataract extraction ($p < 0.001$), whereas systemic disease or the type of operation did not correlate significantly with RD. Intraoperative complications had a significant influence on RD risk only in patients aged more than 60 years ($p = 0.042$). Neodymium:yttrium-aluminum-garnet (Nd:YAG) laser posterior capsulotomy significantly reduced the risk of RD only in patients aged 50 years or younger ($p < 0.001$).

Conclusion: Our results show that young age and long axial length are both significantly associated with RD after cataract surgery. A more restrictive attitude towards early cataract extraction may therefore be appropriate, especially in highly myopic patients. [*J Chin Med Assoc* 2005;68(7):321–326]

Key Words: cataract, retinal detachment, risk factor

Introduction

Retinal detachment (RD) after cataract extraction is a serious and potentially sight-threatening complication that often necessitates further surgical intervention. Consequently, knowledge about the risk factors for RD and reliable estimates of risks associated with these factors are very important to ophthalmologists. Several risk factors have been reported in previous literature. These include preoperative factors unrelated to the surgical procedure (myopia, young age, lattice degeneration),

intraoperative complications (vitreous loss, rupture of posterior capsule with or without vitreous loss), and postoperative factors (posterior capsulotomy).^{1–11} Large-series reports from the literature have proven a statistically significant association between some of these risk factors and RD after cataract surgery. Until now, however, there has been no large-scale report on this topic in Taiwan; most studies were based on retrospective reviews of limited series of patients treated by an individual surgeon or at an academic center.^{12–14} Such small-series reports do not necessarily reflect complication rates in the overall health care

*Correspondence to: Dr. Shwu-Jiuan Sheu, Department of Ophthalmology, Kaohsiung Veterans General Hospital, 386, Ta-Chung 1st Road, Kaohsiung 813, Taiwan, R.O.C.
E-mail: sjsheu@isca.vghks.gov.tw • Received: September 6, 2004 • Accepted: March 17, 2005

system, and data cannot be extrapolated to larger populations.

Although the overall rate of RD after cataract extraction is low,¹⁵⁻²² the absolute numbers of this sight-threatening complication are substantial because of the high volume of cataract surgery. Thus, it is important to understand the potential risk factors for RD after cataract extraction in a geographically defined population.

Since 1995, the Bureau of National Health Insurance (BNHI) has collected the health records for nearly all patients who have received medical treatment in Taiwan. It was, therefore, feasible to investigate the association between potential risk factors and pseudophakic RD using claim-insurance data, as patient-specific information about laterality of procedure, events, and data about any postoperative procedures and diagnoses could be obtained from claim data or physician bills in the BNHI database.

The purpose of this study was to investigate potential risk factors for RD after cataract surgery based on a large, representative sample of insurance beneficiaries who underwent extracapsular cataract extraction (including phacoemulsification). The results of our evaluation were then compared with reports from other countries to facilitate understanding about domestic and potential race-related risk factors for RD after cataract surgery.

Methods

Study protocol

We performed a prospective cohort study based on submitted claim records and charts for BNHI insurance beneficiaries who underwent extracapsular cataract extraction (including phacoemulsification) in Taiwan between August 1999 and December 2001. Pediatric patients were excluded. Data from the charts, including demographic characteristics, past history, refractive status, axial length, type and complications (posterior capsule rupture) of cataract extraction, were recorded. Episodes of neodymium:yttrium-aluminum-garnet (Nd:YAG) laser posterior capsulotomy, and the diagnosis and procedures of retinal complications, and any other ocular diseases, were noted based on the procedure and diagnosis codes listed in physician bills at the end of 2002. If 2 cataract surgeries were identified for a single patient during the study period, the first occurrence was chosen as the index event. We excluded all cases of cataract surgery that were combined with other ocular procedures such as corneal graft, glaucoma, or other posterior segment procedures.

Patients were also excluded if they had a past history of RD or ocular trauma. Patients were followed-up until the detection of an RD episode, any other intraocular procedure unrelated to RD repair, death, or the end of the study period.

Statistical analysis

Kaplan-Meier analysis was used to calculate the cumulative risk of RD. Relevant subgroups were compared by the log-rank test. A 5% level of significance was used, and 95% confidence intervals were calculated when appropriate.

Results

Demographic and basic clinical characteristics of the study population are shown in Table 1. Information was collected for 9,398 patients: 5,249 females and 4,149 males. Mean patient age was 66.0 ± 9.3 years (range, 21-99 years), and mean follow-up time was 25.5 ± 7.7 months (Figure 1). Four-hundred and ninety-seven patients (5.3%) were 50 years old or younger, 1,936 (20.6%) were 50-60 years old, and 6,965 (74.1%) were over 60 years of age. Mean axial length of the eyeball was 23.2 ± 1.5 mm (range, 15.3-34.7 mm). An axial length of less than 23 mm was found in 4,449 eyes (47.3%), while 4,398 (46.8%) had an axial length of 23 mm to less than 26 mm; 551 eyes (5.9%) had an axial length of 26 mm or more. Cataract operations were performed by extracapsular lens extraction in 3,553 eyes (37.8%) and by phacoemulsification in 5,845 (62.2%). Intraoperative complications during surgery were documented for 82 eyes (0.9%).

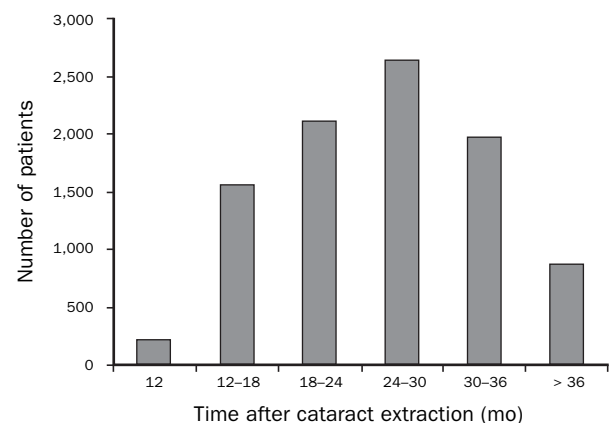


Figure 1. Follow-up time after cataract extraction: the mean was 25.5 ± 7.7 months. Patients were followed up until the detection of retinal detachment (RD), any other intraocular procedure unrelated to RD repair, death, or the end of the study period.

Table 1. Demographic and clinical characteristics of the study population

	Cataract patients, <i>n</i> (%)	3-year RD rate (%)	Log-rank value	<i>p</i>
Gender				
Male	4,149 (44.1)	0.51	2.04	0.153
Female	5,249 (55.9)	0.32		
Age, yr				
≤ 50	497 (5.3)	1.01	10.11	0.006
50–60	1,936 (20.6)	0.67		
> 60	6,965 (74.1)	0.29		
Diabetes mellitus				
Yes	1,256 (13.4)	0.24	0.94	0.333
No	8,142 (86.6)	0.43		
Hypertension				
Yes	1,330 (14.2)	0.30	0.37	0.544
No	8,068 (85.8)	0.42		
Axial length, mm				
< 23	4,449 (47.3)	0.25	23.29	< 0.001
23 to < 26	4,398 (46.8)	0.41		
≥ 26	551 (5.9)	1.63		
Type of surgery				
ECCE	3,553 (37.8)	0.42	0.01	0.917
PHAC	5,845 (62.2)	0.39		
Intraoperative complications				
Yes	82 (0.9)	1.22	1.33	0.249
No	9,316 (99.1)	0.4		
Capsulotomy				
Yes	157 (1.7)	1.27	3.01	0.083
No	9,241 (98.3)	0.39		

ECCE = extracapsular cataract extraction; PHAC = phacoemulsification; RD = retinal detachment.

The cumulative risk of RD in our study group was 0.4% (Figure 2). The mean interval between cataract extraction and RD was 9.7 ± 1.1 months (range, 1.0–25.2 months). Age significantly influenced RD risk after cataract surgery ($p = 0.006$), whereas gender did not. Younger patients had a significantly greater risk of RD than older patients (Figure 3). Axial length also had a significant effect on RD risk after cataract extraction ($p < 0.001$). The greater the axial length, the more likely a patient was to have RD after cataract surgery (Figure 4). For patients older than 60 years, the axial-length effect no longer existed (Table 2). Systemic diseases such as diabetes and hypertension did not correlate significantly with RD.

In our group, more cataract removal was done by phacoemulsification than by traditional extracapsular

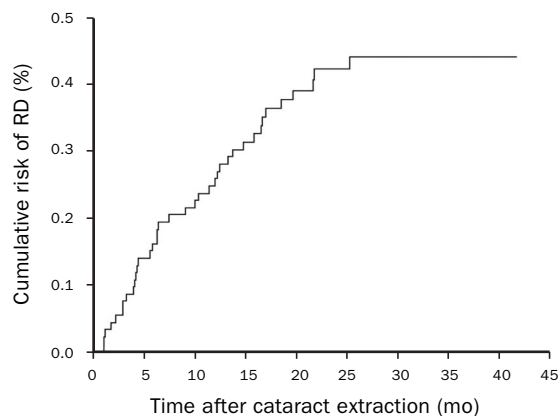


Figure 2. Cumulative risk of retinal detachment (RD) after cataract extraction: the risk was 0.4% in our study group. The annual additional risk of RD was highest during the first 2 years, and stabilized after the third year.

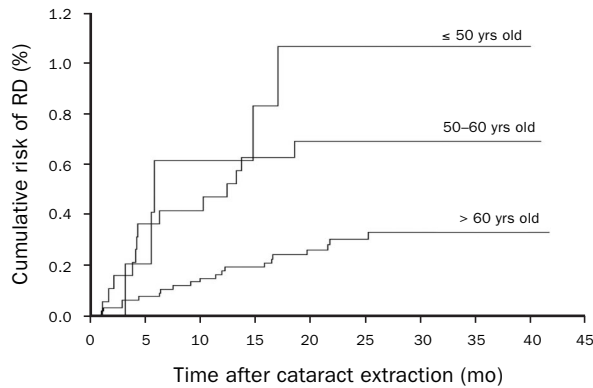


Figure 3. Effect of age on the risk of retinal detachment (RD) after cataract extraction: younger patients had a significantly higher risk of RD than older patients ($p = 0.006$).

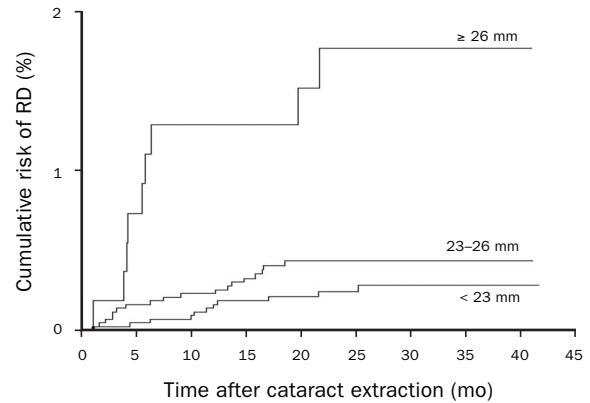


Figure 4. Effect of axial length on the risk of retinal detachment (RD) after cataract extraction: the greater the axial length, the more likely a patient was to have RD after cataract surgery ($p < 0.001$).

Table 2. Interaction of risk factors for retinal detachment (RD) with different age groups

	Age ≤ 50 yr ($n = 497$)			Age 50–60 yr ($n = 1,936$)			Age > 60 yr ($n = 6,965$)		
	Cataract patients, n (%)	3-year RD rate (%)	p	Cataract patients, n (%)	3-year RD rate (%)	p	Cataract patients, n (%)	3-year RD rate (%)	p
Axial length, mm									
< 23	214 (2.3)	0.47	0.291	883 (9.4)	0.34	0.109	3,352 (35.7)	0.21	0.265
23 to < 26	239 (2.5)	0.84	0.712	940 (10.0)	0.64	0.847	3,219 (34.3)	0.31	0.692
≥ 26	44 (0.5)	4.55	0.011	113 (1.2)	3.54	0.002	394 (4.2)	0.76	0.156
Gender									
Male	237 (2.5)	1.27	0.551	886 (9.4)	0.90	0.240	3,026 (32.1)	0.33	0.554
Female	240 (2.6)	0.77		1,050 (11.2)	0.48		3,939 (41.9)	0.25	
Diabetes mellitus									
Yes	73 (0.8)	< 0.01	0.360	270 (2.9)	0.74	0.880	913 (9.7)	0.11	0.270
No	424 (4.5)	1.18		1,666 (17.7)	0.66		6,052 (64.4)	0.31	
Hypertension									
Yes	55 (0.6)	< 0.01	0.436	210 (2.2)	0.48	0.723	1,065 (11.3)	0.28	0.987
No	442 (4.7)	1.13		1,726 (18.4)	0.70		5,900 (62.8)	0.29	
Type of surgery									
ECCE	201 (2.1)	1.49	0.371	781 (8.3)	0.38	0.156	2,571 (27.4)	0.35	0.974
PHAC	296 (3.1)	0.68		1,155 (12.3)	0.87		4,394 (46.8)	0.25	
Intraoperative complications									
Yes	4 (0.0)	< 0.01	0.831	11 (0.1)	< 0.01	0.792	67 (0.7)	1.49	0.042
No	493 (5.2)	1.01		1,925 (20.5)	0.68		6,898 (73.4)	0.28	
Capsulotomy									
Yes	5 (0.1)	20.00	< 0.001	44 (0.5)	< 0.01	0.589	108 (1.1)	0.93	0.235
No	492 (5.2)	0.81		1,892 (20.1)	0.69		6,857 (73.0)	0.28	

ECCE = extracapsular cataract extraction; PHAC = phacoemulsification.

extraction. However, no significant difference was found between these 2 types of operation. Intraoperative complications were documented for 82 eyes, and were associated with a significant effect on RD risk only in patients older than 60 years ($p = 0.042$). Since cataract extractions were paid for according to case-payment policies, surgeons received no extra payment for anterior vitrectomy (but did face possible legal problems). The intraoperative complication rate, then, may have been under-reported because of insurance policies or legal considerations. Nd:YAG laser posterior capsulotomy was performed on 157 eyes postoperatively (after an average of 9.0 months). The cumulative RD risk after cataract extraction was slightly higher in the capsulotomy than non-capsulotomy group; while this difference was not statistically significant in the entire study population ($p = 0.083$), it was significant in the subgroup of young patients (≤ 50 years; $p < 0.001$) (Table 2).

Discussion

The overall rate of RD after extracapsular cataract extraction is relatively low at 0.18–3.60%,^{15–22} depending on duration of follow-up and characteristics of the study group. However, large case numbers are needed to determine true statistical significance for any association between potential risk factors and RD after cataract surgery. Thus, our analysis of National Health Insurance beneficiaries provided a unique opportunity to examine risk factors for RD after cataract extraction. The methods in our study also allowed us to obtain patient-specific information about laterality of procedures, events, and potential RD risk factors previously reported in the literature.

The cumulative risk of RD in our study group was 0.4%, which was within the reported range in the literature. The annual additional risk of RD was greatest during the first 2 years and stabilized after the third year of follow-up; however, this pattern may alter with longer follow-up. Our results confirmed the recognized preoperative risk factors for RD such as young age and long axial length. However, after stratification by age, the significance of axial length as a risk factor for RD disappeared in the subgroup of individuals who were older than 60 years. For patients who are 60 years of age or younger, a high degree of myopia is a great concern for RD risk after cataract extraction. In our study, a high degree of myopia (axial length ≥ 26 mm) was more prevalent in patients aged 50 years or younger than in patients over 50 years of age (13.5% vs 3.4%). Thus, it seemed that highly myopic patients

tended to receive cataract surgery at a younger age than patients with less myopia.

Both young age and a high degree of myopia are reported risk factors for RD after cataract extraction. The combination of these 2 risk factors might predispose patients to rhegmatogenous RD. If the elevated risk of RD continues beyond the study observation period, the cumulative risk of RD experienced by young cataract patients with a high degree of myopia would be expected to increase to quite a high level in the later decades of life. As the prevalence of myopia in Taiwan is comparatively high, especially in the younger generation, our findings might suggest that a more restrictive attitude towards early cataract surgery should be adopted. Similarly, our findings have obvious implications for patients considering clear lens extraction as a refractive procedure. Such patients should be informed about the relatively high risk of pseudophakic RD before surgery.

Contrary to the published literature, gender was not significantly associated with the development of RD in our study. While intraoperative complications and Nd:YAG laser posterior capsulotomy have been reported to be significant risk factors for RD after cataract extraction, these associations have not been confirmed. Nonetheless, some previous studies showed that Nd:YAG laser posterior capsulotomy increased the risk of RD after cataract extraction by up to 4.9-fold.^{4–8,18,19} In our study, neither intraoperative complications nor Nd:YAG capsulotomy had a significant influence on the development of RD when the study group was considered as a whole. However, intraoperative complications had a significant influence on RD risk in the subgroup of patients aged more than 60 years old. As stated earlier, the complication rate may have been under-reported because of insurance policies or legal considerations, and this may have had a bearing on our evaluations of RD risk. Meanwhile, Nd:YAG laser posterior capsulotomy had a significant effect on RD risk in the young age group (≤ 50 years), but not in older patients (> 50 years); a more significant effect may manifest with long-term follow-up, and further study of this issue is underway.

Regarding the types of cataract extraction claimed in previous literature to have a significant influence on RD risk, intracapsular cataract extraction had a significantly greater RD risk than extracapsular cataract extraction and phacoemulsification. Further, phacoemulsification has been associated with an even lower RD risk than extracapsular cataract extraction, although this has not been consistently documented in all reports.^{23,24} In our study, there was no significant difference between extracapsular cataract extraction

and phacoemulsification regarding the risk of RD. Our data revealed a trend of moving away from the traditional procedure of extracapsular cataract extraction towards the newer intervention of phacoemulsification. However, if some surgeons were in their “learning curve” regarding the use of phacoemulsification, any potential difference in RD risk between extracapsular cataract extraction and phacoemulsification may have been masked in our study.

To the best of our knowledge, this is the first large-scale study of potential risk factors for RD after cataract extraction in Taiwan. We confirmed the recognized preoperative risk factors for RD, i.e. young age and long axial length. Although, in this respect, our study is not markedly different from other reports in the literature, it provides important epidemiologic data from a geographically defined population.

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