

Risk of Retinal Detachment in Patients with Lattice Degeneration

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Abstract: To determine the risk of retinal detachment in patients with lattice degeneration of the retina, we statistically analyzed the incidence of retinal detachment in these patients. The data of hospital patients with retinal detachment associated with lattice degeneration in Kumamoto Prefecture, Japan, in 1990 were collected. The prevalence of lattice degeneration in Kumamoto was reported to be 9.5% in 1980. Based on population data from the 1990 census, the cumulative incidence of retinal detachment associated with lattice degeneration was calculated in this study. Among 1,840,000 residents in Kumamoto, there were 110 patients with retinal detachment associated with lattice degeneration; 72 with detachment resulting from tractional tears (tears), and 38 with detachment from atrophic holes. The cumulative incidence of retinal detachment from atrophic holes was 1.5% at the age of 40 years; from tears it was 3.6% at the age of 80 years. The cumulative incidence of detachment from both atrophic holes and tears was 5.3% at the age of 80 years. The results of this study are useful for clarifying the natural course of lattice degeneration. **Jpn J Ophthalmol 1998;42:308–313** © 1998 Japanese Ophthalmological Society

Key Words: Atrophic hole, cumulative incidence, lattice degeneration, retinal detachment, risk, tear.

Introduction

Retinal detachment associated with lattice degeneration of the retina occurs by two mechanisms, atrophic holes or tractional tears (tears).¹ Lattice degeneration is the most frequent lesion causing breaks in nontraumatic phakic retinal detachment.² On the other hand, the incidence of lattice degeneration in the general population is relatively high, ranging

from 8.0 to 10.7% according to previous studies.^{1,3,4,5} Because the incidence of retinal detachment is as low as 1 in 10,000 per year,^{2,6,7,8} it is apparent that not all lattice degeneration causes detachment. To manage lattice degeneration properly, it is important to know the risk it carries for retinal detachment. Risk of retinal detachment associated with lattice degeneration is present for virtually a lifetime, making it difficult to evaluate that risk by follow-up of patients with lattice degeneration. Accordingly, there have been few follow-up studies on lattice degeneration to date.⁹

In 1990, we conducted a survey of rhegmatogenous retinal detachment in Kumamoto, Japan.² Based on that survey, we statistically analyzed the risk for retinal detachment in patients with lattice degeneration.

Presented at the 96th AAO meeting in Dallas, Texas, 1992.

Received: July 14, 1997

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Subjects and Methods

We collected data on hospital patients treated for primary rhegmatogenous retinal detachment in Kumamoto Prefecture in 1990.² The study was based on a retrospective review of records from the eight hospitals that perform retinal detachment surgery in Kumamoto. Patients with perforative eye trauma, uveitis, diabetic retinopathy, or subclinical detachment were excluded. Of the patients, 70% were diagnosed by six ophthalmologists at the Ideta Eye Hospital, and the remaining 30% by at least two ophthalmologists at each of the other seven hospitals. At each hospital, diagnosis was made using a binocular indirect ophthalmoscope and a scleral depressor.

Retinal detachment was classified according to the predisposing lesion of the breaks. Only those patients in whom lattice degeneration was the predisposing lesion were included in this study. Breaks associated with lattice degeneration were classified as atrophic hole or tear. Because cumulative incidence was not calculated per eye but per person, patients treated for retinal detachment in the fellow eye be-

fore 1989 were excluded. These patients were included in the cumulative incidence when they developed detachment in the first eye. Patients with detachment in both eyes with onset occurring in 1990 were included. Patients with aphakic detachment were also included when lattice degeneration was the predisposing lesion.

As the reference for refractive error in patients whose detachment involved the macula, we used the value of glasses or contact lenses and the refractive error in the fellow eye.

The age-specific incidence of retinal detachment (I), from atrophic holes, tears, and the combination of both, in patients with lattice degeneration in 1990, was calculated in 5-year age groups.

$$I_i = a_i / 0.095 \cdot N_i$$

i: age group

a: number of patients with retinal detachment from lattice degeneration

N: population

Next, the cumulative incidence (C) was calculated.

Table 1. Population, Number of Retinal Detachments, and Age-Specific Incidence in Kumamoto in 1990

Age (y)	Population (N) (in thousands)	Lattice Population ^a	Number of RD ^b (a)		Age-Specific Incidence ^c		(I) (%·10 ⁻²) Hole/Tear ^f
			Hole ^c	Tear ^d	Hole	Tear	
0-9	224.5	21.3					
10-14	131.2	12.5	2		1.6		1.6
15-19	129.1	12.3	8		6.5		6.5
20-24	99.2	9.4	8		8.5		8.5
25-29	105.3	10.0	7		7.0		7.0
30-34	117.8	11.2	2	1	1.8	0.9	2.7
35-39	136.9	13.0	6	2	4.6	1.6	6.2
40-44	142.5	13.5	2	7	1.5	5.2	6.7
45-49	112.4	10.7		6		5.6	5.6
50-54	113.4	10.8	2	8	1.9	7.4	9.3
55-59	123.7	11.8		14		11.9	11.9
60-64	117.9	11.2		8		7.1	7.1
65-69	93.8	8.9	1	14	1.1	15.7	16.8
70-74	71.3	6.8		8		11.8	11.8
75-79	55.7	5.3		3		5.7	5.7
80-84	37.8	3.6		1		2.8	2.8
85<	28.3	2.7					
Total	1840.3	175.0	38	72			

RD: retinal detachment.

^aPopulation with lattice degeneration: Population (N) × 0.095.

^bRetinal detachment from lattice degeneration.

^cRetinal detachment from atrophic hole.

^dRetinal detachment from tractional tear.

^eI = number of RD (a)/lattice population.

^fRetinal detachment from both atrophic hole and tractional tear.

$$C_x = 1 - (1 - I_0)(1 - I_1) \cdot \dots \cdot (1 - I_{x-1})$$

x: age

According to another survey carried out in 1980 on 1,000 adult residents (2,000 eyes) in Kumamoto, the prevalence of lattice degeneration was 9.5%.⁴ Population data in this study were based on the 1990 population census of Japan (Table 1).

Results

In 1990, there were 192 patients with retinal detachment; 180 were nontraumatic phakic, 9 were aphakic, and 3 were detachments caused by blunt trauma.² In 109 of the 180 patients with nontraumatic phakic detachment, the predisposing lesion of retinal break was lattice degeneration. We did not include patients with lattice degeneration in whom no break was observed in the areas associated with lattice degeneration, and in whom breaks occurring in another lesion had caused retinal detachment (one from branch retinal occlusion, and one from retinal tuft). Of these 109 patients, 2 who were treated for detachment in the fellow eye before 1989 were excluded from this study. In 3 (3 eyes) of 9 patients with aphakic detachment, the predisposing lesion of the break was lattice degeneration (1 atrophic hole, 2 tears). Thus a total of 110 patients (114 eyes) with nontraumatic phakic or aphakic detachment associated with lattice degeneration were the subjects of this study. Four of these patients developed retinal detachment in both eyes in 1990; 3 (6 eyes) were from atrophic holes, and 1 (2 eyes) was from tears.

Retinal detachment was classified into detachment from atrophic holes and detachment from tears (Table 1). There were 38 patient with atrophic holes (17 men and 21 women). Their mean age was 28±12 years. Of the 38 patients, 33 (86.8%) were less than 40 years old. There were 72 patients with tears (37 men and 35 women). Their men age was 58±11

Table 2. Refractive Error in Retinal Detachment from Atrophic Hole

Age (y)	Refractive Error (Diopter)	Number of Eyes
10-19	-5.2 ± 2.1	12
20-29	-7.8 ± 3.4	15
30-39	-7.2 ± 3.6	9
40<	-6.8 ± 4.5	4

Table 3. Refractive Error in Retinal Detachment from Tractional Tear

Age (y)	Refractive Error (Diopter)	Number of Eyes
30-39	-9.7 ± 3.4	3
40-49	-6.4 ± 5.5	13
50-59	-2.2 ± 3.2	21
60-69	-0.3 ± 3.0	22
70<	+0.8 ± 2.0	12

years. Of these 72 patients, 69 (95.8%) were at least 40 years old. The mean refractive error of the phakic detachment according to age group is shown in Tables 2 and 3.

Table 1 and Figures 1 and 2 show the yearly age-specific incidence of retinal detachment in persons with lattice degeneration. The incidence from atrophic holes peaked at 15-29 years of age, and that from tears peaked at 55-74 years of age.

The cumulative incidence of detachment from atrophic holes increased from the age of 10-19 years, reaching 1.5% at the age of 40 years. After this age it increased only slightly (Figure 3). The cumulative incidence of detachment from tears increased from the age of 30-39 years, reaching 3.6% at the age of 80 years (Figure 4). The incidence of detachment from both atrophic holes and tears reached 5.3% at the age of 80 years (Figure 5). Table 4 summarizes these data. The cumulative incidences in men and women were 5.2% and 5.4%, respectively, at the age of 80 years, showing no significant differences.

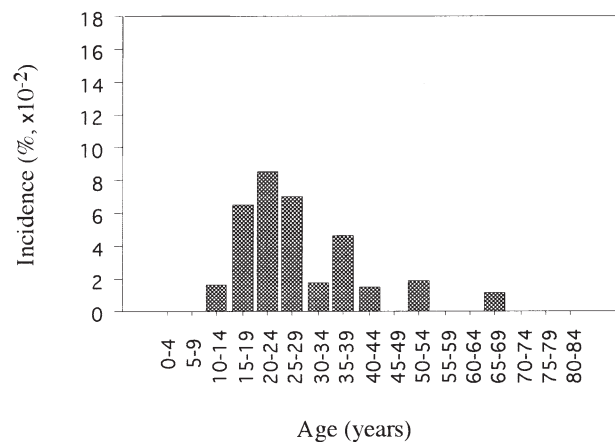


Figure 1. Age-specific incidence of retinal detachment from atrophic holes in Kumamoto patients with lattice degeneration in 1990.

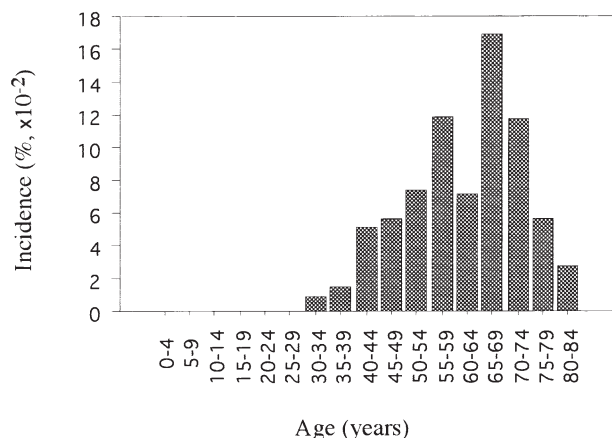


Figure 2. Age-specific incidence of retinal detachment from tractional tears in Kumamoto patients with lattice degeneration in 1990.

Discussion

Kumamoto Prefecture is located in southwestern Japan. Patients with retinal detachment in Kumamoto can be treated at eight hospitals, all of which participated in this study. The incidence of retinal detachment in Kumamoto in 1990 was 10.3 per 100,000 population.² This incidence was similar to that of nontraumatic detachment in Iowa investigated by Haimann and colleagues⁶ in 1976 (11.4), in Israel investigated by Michaelson and colleagues⁷ in 1968 (10.8), and in Rochester, Minnesota, investigated by Wilkes and colleagues⁸ between 1970 and 1978 (10.1). However, aphakic detachment accounted for only 4.7% of nontraumatic detachment in our study, lower than was previously reported (18.6%),¹⁰ (42.7%).⁶ Retinal detachment caused by

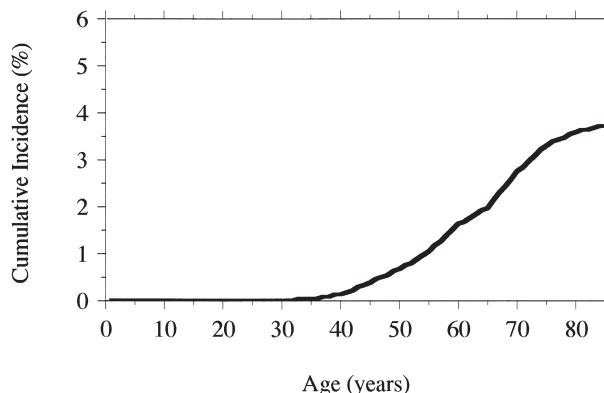


Figure 4. Cumulative incidence of retinal detachment from tractional tears in Kumamoto patients with lattice degeneration.

blunt trauma also accounted for only 1.9%. This discrepancy may be attributable to living habits and race.²

The prevalence of lattice degeneration in Kumamoto residents was 9.5%,⁴ similar to that in the United States (US) (8.0%),¹ (10.7%).⁵ However, the percentage of lattice degeneration in predisposing lesions of the break for retinal detachment differs among countries: about 30% in Europe,^{10,11} 47.1% in the US,¹² 60.6% in our study,² and 46.8% in other surveys in Japan.¹³ In this study, atrophic holes accounted for 20% of all predisposing lesions, which was high compared with 14%¹⁴ reported in the US. Retinal detachment from atrophic holes was observed especially frequently in young people with myopia. Because the incidence of myopia is higher in Japan than in the US, the incidence of retinal de-

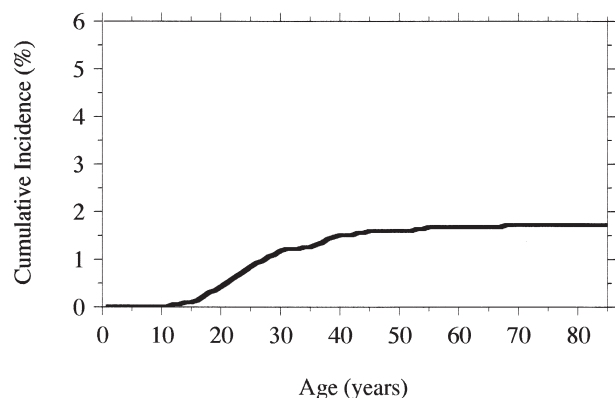


Figure 3. Cumulative incidence of retinal detachment from atrophic holes in Kumamoto patients with lattice degeneration.

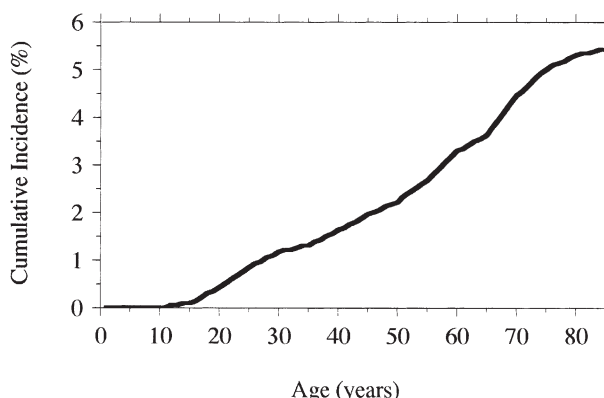


Figure 5. Cumulative incidence of retinal detachment from both atrophic holes and tractional tears in Kumamoto patients with lattice degeneration.

Table 4. Cumulative Incidence (%) of Retinal Detachment From Lattice Degeneration by Decade

Age (y)	Hole ^a	Tear ^b	Hole/Tear ^c
20	0.4		0.4
30	1.2		1.2
40	1.5	0.1	1.6
50	1.6	0.7	2.3
60	1.7	1.6	3.3
70	1.7	2.7	4.4
80	1.7	3.6	5.3

^aRetinal detachment from atrophic hole.^bRetinal detachment from tractional tear.^cRetinal detachment from both atrophic hole and tractional tear.

tachment from atrophic holes may also be high.² Differences among races may be another factor.

In our study, the cumulative incidence of retinal detachment from atrophic holes in patients with lattice degeneration reached 1.5% at the age of 40 years. After this age, the number of these patients decreased. The reason for this is not apparent. Retinal detachment from atrophic holes developed mostly in myopic patients aged 10–39 years. There is no doubt that myopia is a risk factor for detachment from atrophic holes. Therefore, in patients with lattice degeneration not accompanied by myopia, the development of retinal detachment from atrophic holes is rare. As the degree of myopia increased, the incidence of lattice degeneration was found to increase.^{15,16} Because there have been no epidemiological surveys of myopia in Japan, differences in the incidence of detachment according to refractive error could not be evaluated.

Tears occur in association with posterior vitreous detachment and, therefore, are often observed in patients older than 40 years of age. In this study, the peak of age-specific incidence was observed between the ages of 55 and 74 years. However, retinal detachment from tears was very rare after the age of 80 years. Posterior vitreous detachment occurs at a lower age with more marked myopia.¹⁷ It is reasonable that the refractive error in patients aged 30–49 years with detachment from tears was myopia.

There have been some follow-up studies of lattice degeneration in the fellow eyes of patients who already had retinal detachment in one eye; these cases are considered to be at high risk.^{18,19,20} However, there have been few follow-up studies of lattice degeneration in patients who have not had retinal detachment.⁹ Byer⁹ studied the natural course of lattice degeneration in 276 untreated patients with a follow-

up of 1–25 years (average, 10.8 years). During this period, 3 patients (1.08%) developed clinical retinal detachment. In our study, the mean cumulative incidence for 10 years during the 70-year period between the ages of 11 and 80 years was 0.7%. The highest incidence was 1.4% between the ages of 65 and 74 years. The result of the 10.8-year follow-up by Byer was consistent with the cumulative incidence in this study. The cumulative incidence during a life time in this study (5.3%) was relatively high because a long period of 80 years was evaluated. This figure is convincing when compared with the follow-up study by Byer. Byer's study however, did not reveal the incidence of retinal detachment from atrophic hole or tear, or the relation between age and retinal detachment associated with lattice degeneration. To clarify these problems, a population-based study like ours is necessary. For the management of lattice degeneration, further studies are needed on the degree of risk for each type of the disease, including refractive error.

(List of participating hospitals, showing number of patients enrolled in this study from each hospital.)

Ideta Eye Hospital, Kumamoto City, Kumamoto (131 patients): K. Sasaki, MD; H. Ideta, MD; J. Yonemoto, MD; S. Tanaka, MD; A. Hirose, MD; C. Oka, MD.

Kumamoto City Hospital, Kumamoto City, Kumamoto (11 patients): Y. Nomura, MD.

Kumamoto Red Cross Hospital, Kumamoto City, Kumamoto (7 patients): T. Shimizu, MD.

Kumamoto University, Kumamoto City, Kumamoto (34 patients): Y. Kojima, MD.

Kurume University, Kurume City, Fukuoka (1 patient): H. Nagasaki, MD.

Yamaga City Hospital, Yamaga City, Kumamoto (1 patient): R. Kamata, MD.

Yatsushiro Insurance General Hospital, Yatsushiro City, Kumamoto (2 patients): A. Matsumura, MD.

Yatsushiro Rosai Hospital, Yatsushiro City, Kumamoto (5 patients): T. Taura, MD.

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