

# Posterior vitreous detachment after cataract extraction in non-myopic eyes and the resulting retinal lesions

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Cataract extraction, even when it is not complicated and takes place in a non-myopic eye, considerably increases the risk of retinal detachment. According to Böhringer (1956), the incidence of retinal detachment in phakic eyes of patients who are over the age of 50 years is less than 0.2 per cent. However, Scheie, Morse, and Aminlari (1973) reported an incidence of 2.2 per cent of retinal detachment in aphakia. According to various authors in a review of the literature on this subject the incidence of retinal detachment in aphakia varies between 0.4 and 3.52 per cent.

There is little doubt that detachment of the vitreous is a major factor in the development of retinal detachment and that most of the dangerous retinal tears are caused by this process. According to Hauer and Barkay (1964), Jaffe and Light (1966), and Duke-Elder (1969), posterior vitreous detachment is found in practically all aphakic eyes. If this is accepted, it becomes difficult to explain the high incidence of retinal detachment in aphakia. However, Heller, Irvine, Straatsma, and Foos (1971) reported an incidence of only 72 per cent of vitreous detachment in a series of 102 aphakic eyes examined *post mortem*. Similarly, in a clinical investigation, we reported an incidence of 66 per cent of vitreous detachment in 200 non-myopic aphakic eyes (Friedman, Neumann, and Hyams, 1973). It seemed, therefore, worthwhile to carry out a follow-up study of these aphakic eyes, with and without vitreous detachment, in an attempt to find out whether the process of late vitreous detachment is the major cause of new retinal tears. There is reason to believe that fresh retinal breaks are by far the most common cause of retinal detachment (Neumann and Hyams, 1972; Neumann, Hyams, Barkai, Feiler, Ivry, Jedwab, Krakowski, Maythar, Scharf, and Zinger, 1972).

## Material and methods

In the publication referred to above (Friedman and others, 1973), we reported on the state of the vitreous and peripheral retina in 200 non-myopic aphakic eyes. Altogether 68 eyes (34 per cent) were found with no sign of vitreous detachment, and 54 eyes of 47 patients were available for re-examination; these constitute Group I of the present report. Another 63 eyes of 60 patients, all at various stages of vitreous detachment when first examined after cataract extraction, were also re-examined and these constitute Group II of the present report. In all, 117 eyes of 107 patients were re-examined 6 months to 6 years after the original operation for cataract extraction.

During the present investigation each patient was asked about the presence of entopsies and photopsies. Maximal pupillary dilatation was achieved by the instillation of 0.5 per cent tropicamide and 10 per cent phenylephrine. Each eye was re-examined by the Haag-Streit 900 slit lamp and by the 3-mirror Goldmann contact lens. The state of the anterior and posterior vitreous surfaces as well as of the peripheral retina was noted and compared with that in the original investigation.

## Results

Table I gives the sex of each patient, and the age at the time of the cataract extraction.

**Table I** Age at time of cataract extraction and sex distribution of 47 patients (54 eyes) of Group I and 60 patients (63 eyes) of Group II

Age (yrs)	No. of eyes			
	Group I (54)		Group II (63)	
	Men	Women	Men	Women
45-55	5	1	—	7
56-65	8	5	8	9
66-75	14	11	12	17
> 75	3	7	5	5
Total eyes	30	24	25	38

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Table II shows the length of time between the cataract extraction and the first fundus examination, and the interval between the first and last fundus examination for both groups of eyes.

Table III summarizes the findings in the peripheral retina in both groups of eyes when first examined. Retinal tears had been found in two eyes of Group I (without vitreous detachment) and in seven eyes of Group II. None of these tears had ever been treated and no change has so far occurred in any of these eyes.

**Table II** *Time intervals between cataract extraction, first and last examinations in the two groups of eyes*

Time (mths)	No. of eyes			
	Time between cataract extraction and first examination		Time between first and last examination	
	Group I	Group II	Group I	Group II
2	35	33	—	—
3-6	4	5	—	—
7-12	1	3	9	5
13-24	5	8	7	10
25-36	5	5	11	3
37-48	4	9	19	16
> 48	—	—	8	29
Total eyes	54	63	54	63

**Table III** *Main findings related to retinal detachment in both groups of eyes on first examination after cataract extraction*

Group	No. of retinal tears	Areas of lattice degeneration	Areas of snail-track degeneration
I	2 (2 eyes)	1	1
II	10 (7 eyes)	1	1

Table IV shows the changes that occurred in the state of the vitreous in Group I during the follow-up period, as well as the more pertinent new retinal findings. In 28 of the 54 eyes, late vitreous detachment had been accompanied by the formation of five new retinal tears in three eyes of three patients. **A 76-year-old woman** was first examined 4 years after cataract extraction when no vitreous detachment could be seen, but 2 years later the vitreous was found to be detached above. A round equatorial retinal tear was found in the upper temporal quadrant, larger than 1 disc diameter and with a free operculum adherent to the posterior surface of the vitreous.

**Table IV** *State of vitreous on last examination and new findings in peripheral retina in 54 eyes of Group I*

State of vitreous	Complete posterior detachment	Detachment at posterior pole and above	Detachment above only	No detachment
No. of eyes	11	11	6	26
Retinal tears	3 (1 eye)	1	1	
Snail-track degeneration		1		1

**A 66-year-old man** was first examined 2 months after cataract extraction when no vitreous detachment could be detected, but complained of entopsies and photopsies 2½ years later. Examination revealed vitreous detachment above and at the posterior pole. A horseshoe equatorial tear, larger than 1 disc diameter, was seen at the upper temporal quadrant, with the vitreous still attached to the operculum. The operculum detached from the retina 10 days later and remained adherent to the posterior surface of the vitreous.

**A 63-year-old man** was first examined 7 months after cataract extraction when the vitreous was in place, but complained of entopsies 8 months later. Total vitreous detachment was seen and three horseshoe retinal tears were found at the ora serrata of the temporal periphery; one tear was larger than 1 disc diameter and the other two were about one-quarter disc diameter in size.

In two eyes new snail-track lesions were found. In one this was accompanied by recent detachment of the vitreous, in the other the vitreous was apparently still in place.

In 10 of the 28 eyes that developed vitreous detachment the patient gave a history of recent entopsies and in three cases of photopsies also. These symptoms were also found in six other eyes in which no posterior vitreous detachment could be detected.

Table V shows the changes in the state of the vitreous and the new retinal findings in the 63 eyes of Group II. In 11 of the 22 eyes with vitreous detachment extending from above to the posterior pole, the detachment became complete. Of the 19 eyes with partial vitreous detachment (above only), there was progression to include the posterior pole in five eyes, and in nine the detachment became complete. In one eye a partial vitreous detachment above was discovered 3½ years after cataract extraction; 4 years later the vitreous detached completely with the formation of six retinal tears below and the development of total retinal detachment. This is so far the only eye, out of the 200 non-myopic aphakic eyes which were the subject of the original study, that developed retinal detachment. The follow-up with regard to retinal detachment is complete since all such cases in Israel are reported to a central agency in Jerusalem.

**Table V** Changes in state of posterior vitreous surface in 63 eyes of Group II

Posterior vitreous detachment on last examination	Posterior vitreous detachment on first examination			Total
	Above	Above and posterior pole	Complete	
Above	5			5
Above and at posterior pole	5	11		16
Complete	9*	11	22	42
Total eyes	19	22	22	63

\* Completion of partial posterior vitreous detachment accompanied by formation of six retinal tears and retinal detachment in one eye

Table VI shows the state of the anterior vitreous face in the 117 eyes of both groups in relation to the state of the posterior vitreous when last examined. No significant differences could be found in the position of the anterior vitreous face between eyes with or without posterior vitreous detachment, except that relatively more eyes with complete posterior vitreous detachment showed marked bulging of the anterior vitreous face into the anterior chamber. In most of the eyes the anterior vitreous face was either behind the iris or extended up to half way into the anterior chamber (Grades 1 and 2), regardless of the state of the posterior vitreous surface.

**Table VI** State of anterior vitreous face on last examination in 117 eyes (both groups) in relation to state of posterior vitreous

State of posterior vitreous (no. of eyes)	State of anterior vitreous face		
	Grade 1*	Grade 2*	Grade 3*
Detachment			
None (26 eyes)	17	6	3
Above (11 eyes)	10	1	-
Above and at posterior pole (27 eyes)	18	4	5
Complete (53 eyes)	31	11	11
Total 117 eyes	76	22	19

\* Grade 1. Anterior vitreous face behind pupil or bulging slightly into anterior chamber

Grade 2. Anterior vitreous face bulging half way into anterior chamber

Grade 3. Anterior vitreous face close to cornea or touching cornea

**Discussion**

The present investigation shows that vitreous detachment may occur late in aphakia without myopia, with or without symptoms. Of the 54 eyes without vitreous detachment when first examined after cataract extraction, more than half (28 eyes) developed posterior vitreous detachment when re-examined 6 months to 6 years later, and in ten eyes this was accompanied by entopsies or photopsies. Moreover, it was found that even in aphakic eyes

posterior vitreous detachment can progress gradually. Although the numbers are small, the present study indicates that in aphakia, when posterior vitreous detachment is complete or is sufficiently advanced to include the posterior pole, the likelihood of new retinal tears occurring is small. On the other hand, the completion of a partial vitreous detachment, or even the gradual formation of an incipient vitreous detachment in an aphakic eye, can be associated with the development of retinal tears.

Theoretically, recent vitreous detachment and new retinal tears need not be the only cause of retinal detachment. One may imagine a retina with an old tear becoming detached by seepage of fluid from behind a detached vitreous, the cause of such an event being accidental or unknown. However, very few such cases have been reported (Knapp, 1943; Granström, 1944). Our own experience with 18 non-myopic aphakic eyes with old untreated retinal breaks indicates that over a period of 3-7 years none has developed a retinal detachment, irrespective of the size or location of the tear. In this respect, aphakic eyes do not seem to differ from phakic eyes where fresh, recently-established breaks seem to be dangerous (Neumann and Hyams, 1972; Neumann and others, 1972; Hyams, Meir, Ivry, Krakowski, Barkai, Jedwab, and Neumann, 1975).

The high incidence of retinal tears in aphakia is probably due to the greater freedom of movement of the vitreous because it is no longer attached to the lens. This increased movement results in a greater pull on certain areas of the peripheral retina if the vitreous is still attached. Since it has been shown that posterior vitreous detachment in non-myopic aphakic eyes may take place many years after cataract extraction, the occurrence of late retinal tears in such eyes can thus be explained.

**Summary**

A series of 54 non-myopic aphakic eyes with no signs of posterior vitreous detachment and 63 non-myopic aphakic eyes with various stages of posterior vitreous detachment was followed-up for a period of 6 months to 6 years. Over half of the eyes with no vitreous detachment when first examined developed various stages of posterior vitreous detachment during the follow-up period; in 10 eyes this was accompanied by entopsies with or without photopsies and three eyes developed five new retinal tears.

In over half of the eyes with partial vitreous detachment when first examined, the vitreous detachment continued to progress causing retinal detachment in one eye.

Late vitreous detachment in non-myopic aphakia or the completion of a partially-detached vitreous could account for the higher incidence of retinal tears in this group of eyes.

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