

Retinal detachment and its relation to cataract surgery

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SUMMARY In Western Australia during the period 1 January 1976 to 31 December 1987 1089 eyes of 1044 patients in hospital were operated upon for primary rhegmatogenous retinal detachment due to causes other than penetrating trauma. Of these eyes 295 (27%) were aphakic or pseudophakic. During this period the annual number of cataract operations in the State increased by a factor of 245%, while aphakic and pseudophakic retinal detachment operations rose by only 55%. The declining risk of retinal detachment following cataract surgery is attributed to improvements in microsurgical techniques. In 1983 and 1984 the incidence of aphakic and pseudophakic retinal detachments dropped significantly ($p < 0.05$). At about this time extracapsular cataract surgery became widespread in the State, and this may explain the observed fall in retinal detachment operations. Since 1984 the incidence has risen owing to the rapidly increasing prevalence of pseudophakia in the resident population.

Recent studies have shown the incidence of retinal detachment (RD) to vary from 8 to 13 per 100 000 of the population.¹⁻³ Aphakic retinal detachment constitutes approximately one-quarter of these.⁵⁻⁸

With the advent of microsurgical techniques and the introduction of extracapsular surgery postoperative complications such as RD may have declined, though it is well recognised that surgical or YAG laser posterior capsulotomy increases the risk.⁹⁻¹¹ This study was undertaken to determine what effect the changing pattern of cataract surgery in Western Australia (WA) has had on the overall incidence of RD in this State.

The remote WA population provided a good model for this study because all rhegmatogenous RDs within the State were referred to a small number of surgeons (and hospitals) in Perth and Bunbury, and their records were traceable. By excluding out-of-State referrals we believe that the figures are accurate for the resident WA population over the period studied.

Material and methods

Available data on all patients undergoing surgery for primary RD in the period 1 January 1976 to 31 December 1987 were obtained from hospital records for all centres equipped to carry out this

operation in the State. RDs that followed penetrating trauma were excluded, as were patients not resident in WA at the time of surgery.

The following information was obtained on each patient: age, sex, side affected, date and type of previous cataract surgery, date of posterior capsulotomy, and date of primary RD surgery. Figures for the total number of cataract operations each year were obtained from the Health Department of WA and population figures were obtained from the Federal Bureau of Statistics. The data obtained were analysed by Student's *t* test.

Results

Between 1976 and 1987 the WA population rose steadily from 1.17 million to 1.50 million, an increase of 28%. During the same period the number of cataract operations per year increased from 1089 to 3755, a rise of 245%. Over the same 12 years 1089 eyes of 1044 patients underwent primary RD surgery as defined above (Table 1). Information could not be obtained on a further 13 eyes, which were excluded from the study. Two hundred and ninety-five eyes were aphakic or pseudophakic (27.7%) and 794 were phakic (72.3%). Intracapsular extractions (ICCE) had been performed on all eyes presenting in 1976, while by 1987 the proportion had fallen to 40%, the remaining eyes having undergone extracapsular surgery (ECCE) (Fig. 1).

Table 1 State population (State pop) in millions, total cataract operations, primary retinal detachment operations and calculated retinal detachment incidence (RD incidence) for aphakic and phakic patients, 1976-87.

Year	State Pop.	Cataract operations	Primary RDRD operations	RD Incidence	
				Phakic	Aphakic
1976	1.17	1089	74	4.35	1.79
1977	1.20	1127	76	5.25	0.91
1978	1.22	1209	77	4.10	1.96
1979	1.24	1310	79	4.35	1.85
1980	1.27	1361	95	5.59	1.73
1981	1.30	1597	83	3.84	2.38
1982	1.34	1968	114	5.82	2.60
1983	1.36	2419	55	3.28	0.66
1984	1.38	2708	71	3.69	1.30
1985	1.41	3015	107	5.24	2.26
1986	1.46	3221	127	6.09	2.60
1987	1.50	3755	131	6.30	2.80

Of the 1044 patients 438 were female (42%). RD operations were carried out on 577 right eyes (53%). Bilateral RD surgery was carried out on 45 patients (4.3%). Aphakic/pseudophakic patients presented most commonly between the ages of 61 and 80 years, while phakic patients were usually 51-70 years, though a small peak was observed in the 21-30-year group.

Of the 218 eyes with RD that had undergone ICCE data on cataract and RD surgery dates were obtained for 209. RD surgery took place within one year in 82 of these (38%) (Fig. 2). Of the 49 eyes that had undergone ECCE without subsequent capsulotomy 26 had RD surgery within one year (53%) (Fig. 3).

RD surgery was carried out on 28 eyes that had undergone ECCE and delayed Nd-YAG capsulotomy, and 19 (68%) of these were within one year of the capsulotomy (Fig. 4).

The average frequency of RD in the State was 6.7 per 100 000 population per year (4.82 for phakic patients and 1.88 for aphakic/pseudophakic patients). In 1983 the incidence of aphakic/pseudophakic RDs fell to 0.66, and in 1984 it was 1.3. In the following years the incidence rose again (Fig. 5). When 1983 and 1984 were compared with the years before and since, the observed fall was statistically significant ($p < 0.05$).

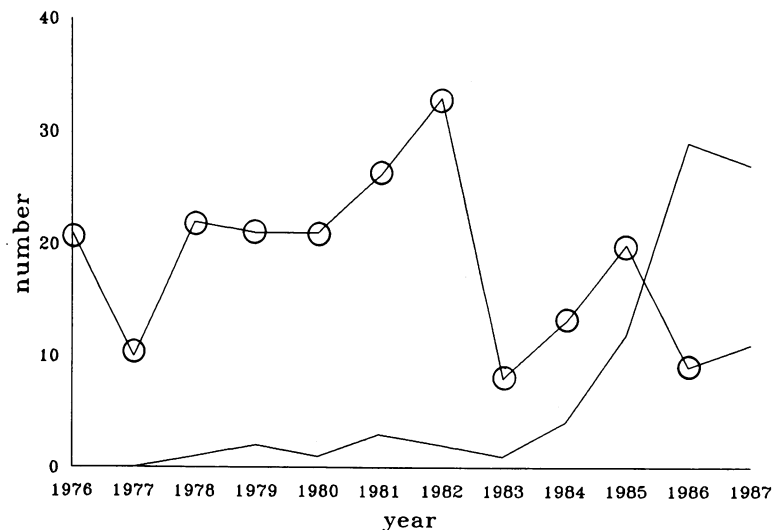
When the number of RD procedures performed on aphakic/pseudophakic eyes each year was compared with the number of cataract operations in the preceding year, the average risk of RD during 1976-82 was 1.75% (SD 0.4), while during 1983-7 it fell to 0.86% (SD 0.31) (Fig. 6).

Discussion

While the number of cataract operations per year has increased dramatically between 1976 and 1987 in this State, by a factor of 245%, the incidence of aphakic/pseudophakic RD has risen by only 55% (1.8 per 100 000 in 1976 rising to 2.8 in 1987).

The age distribution of our patients is similar to that of other studies,^{2,3,12} as is the slightly higher incidence of RD surgery on the right eyes of both phakic and aphakic/pseudophakic patients.^{2,5,8} The 4.1% incidence of bilaterally affected eyes is similar to that found in a previous study³ but lower than that in a larger study by Ashrafzadeh *et al*¹² who found the

Fig. 1 The yearly numbers of primary retinal detachment operations for 295 eyes that underwent intracapsular (⊖) or extracapsular surgery (—).



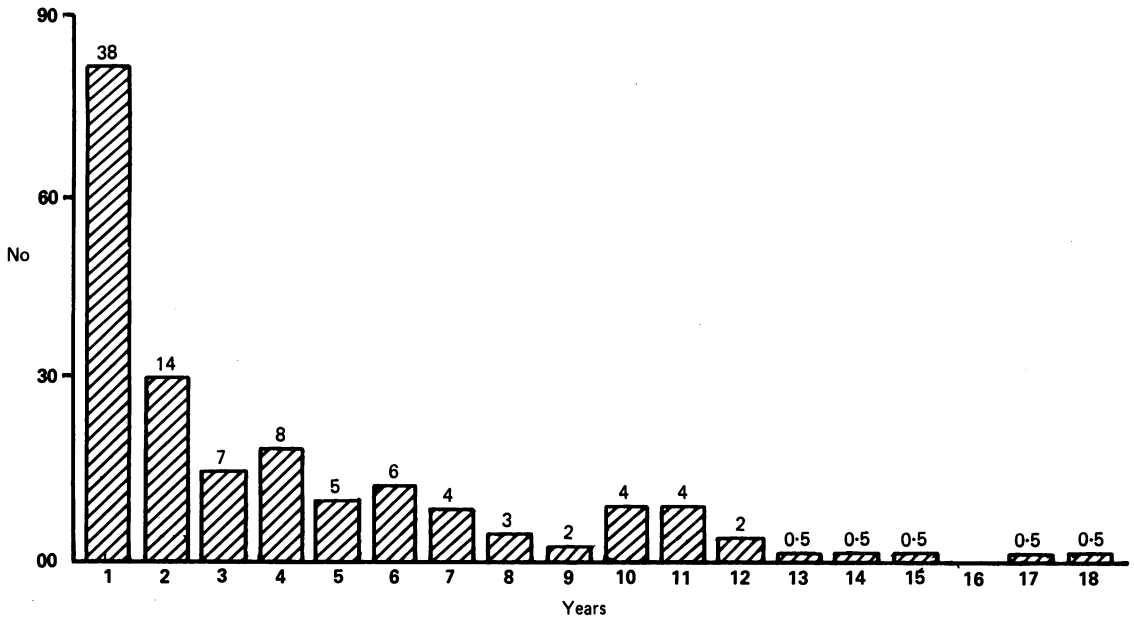


Fig. 2 Time interval to retinal detachment surgery for 209 eyes from the date of intracapsular cataract surgery (% of total above each bar).

incidence of bilaterally affected eyes to be 36.8% for aphakic and 31.2% for phakic eyes. This much higher figure may be partly explained by their inclusion of subclinical cases.

Our figures have shown that the risk of RD following cataract surgery is maximal in the first year, this being true for both ICCE and ECCE groups. This similarity has been reported elsewhere.¹³⁻¹⁵ In a post-mortem study of aphakic and pseudophakic

human eyes Osterlin found¹⁶ a significant deficit of hyaluronic acid only in those eyes operated upon by the intracapsular technique. The increased liquefaction of vitreous gel that this causes was thought by Binkhorst¹⁷ to be a significant factor in the causation of RD. But the striking similarity between ICCE and ECCE in terms of the interval to detachment, found in this and other studies, argues against the importance of this factor.

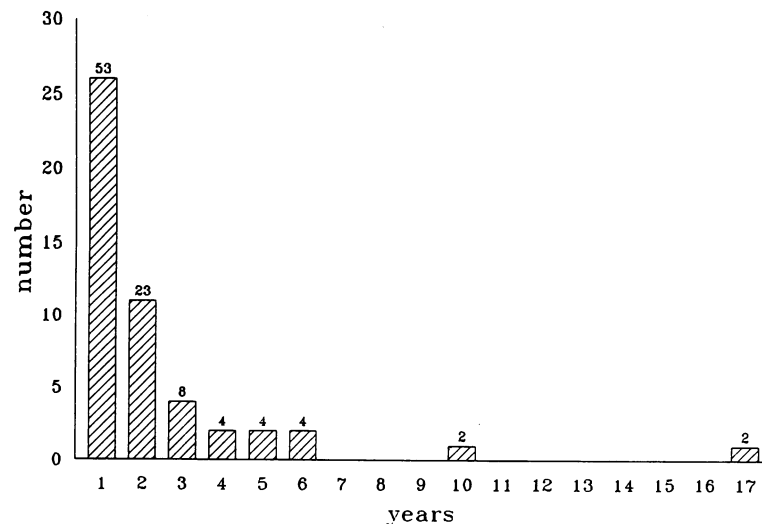
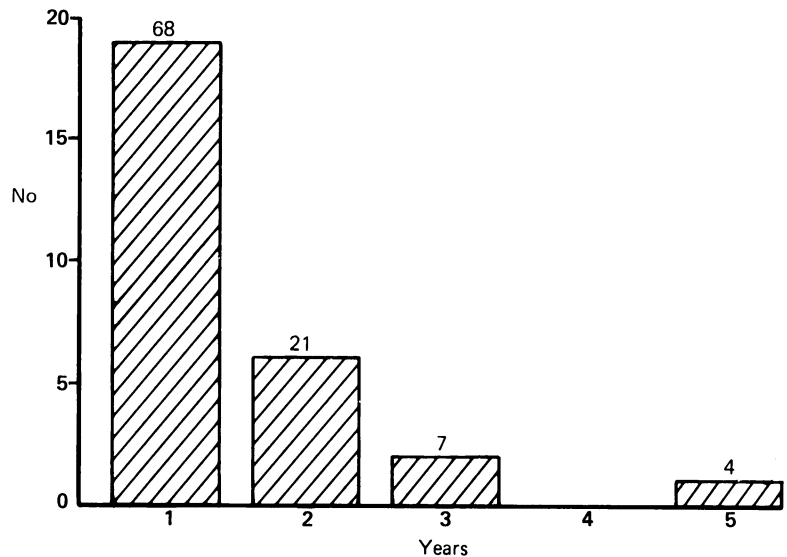


Fig. 3 Time interval to retinal detachment surgery from the date of cataract surgery for 49 eyes that underwent extracapsular extraction without subsequent posterior capsulotomy (% of total above each bar).

Fig. 4 Time interval to retinal detachment surgery from the date of Nd-YAG capsulotomy for 28 eyes following extracapsular cataract surgery (% of total above each bar).



Of the 79 eyes that had RD surgery following extracapsular surgery in our group 28 had a posterior capsulotomy present (36%). As expected, most RDs following this procedure occurred within one year, in agreement with a previous study.¹⁸ We have no accurate figures for the number of Nd-YAG laser procedures carried out during the study period and cannot therefore comment on the risk of RD from this procedure, but three large studies^{9,10,19} have found the incidence of RD following YAG capsulotomy to be 0.5%, 1%, and 2% respectively. The importance of posterior capsulotomy, whether

primary or delayed, surgical or laser, is further evident from the 3.6% RD risk reported by Wilkinson *et al* on 1500 eyes that underwent ECCE with phacoemulsification.²⁰ Posterior capsulotomies were carried out on 94.7% of these eyes, and the authors comment on the similarity of this group to cases of intracapsular aphakia. We attribute the slightly higher risk of aphakic/pseudophakic RD since 1983 in our study to increasing availability and use of the Nd-YAG laser.

The average frequency of RD during the study period was 6.7 per 100 000 population per year

Fig. 5 Incidence of retinal detachment, per 100 000 of population, for phakic patients (□) and aphakic/pseudophakic patients (■), 1976-87.

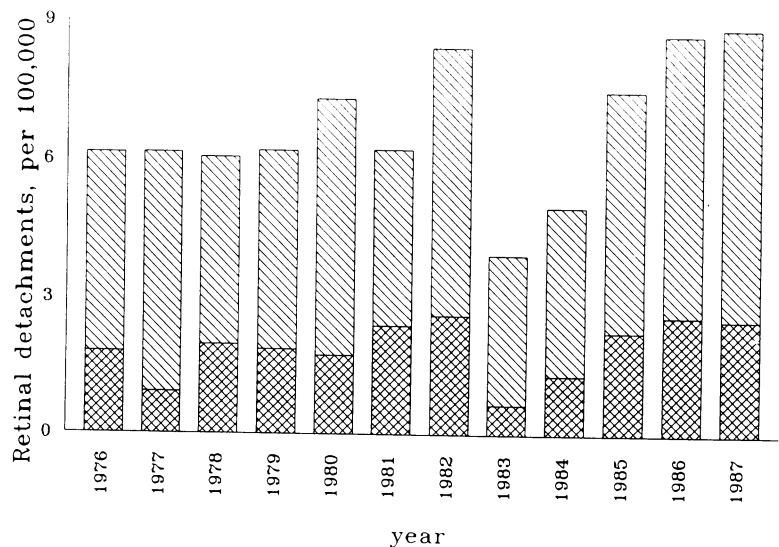




Fig. 6 Calculated risk of retinal detachment following cataract surgery, 1977-87.

This figure is broadly similar to those of other studies,^{2,3,5} and some of the differences may be attributable to the varying prevalence of aphakia, and possibly myopia, in the populations studied.

Between 1982 and 1983 almost all cataract surgeons in this State changed to extracapsular surgery, and a statistically significant fall in aphakic and pseudophakic RDs followed this change. We believe this provides good evidence that extracapsular surgery protects against RD when compared with ICCE. In a comparison of RD risk for 122 myopic eyes that underwent ICCE, with 151 eyes undergoing ECCE (both without vitreous loss) Jaffe *et al*²¹ found the risk in the former group to be 5.74% and in the latter only 0.66%. Minimum follow-up was one year. Coonan *et al* studied 842 consecutive ECCEs with a minimum follow-up of one year and found the overall risk of RD to be 1.4%.¹³ In uncomplicated cases in which the posterior capsule was left intact the risk was only 0.8%. In another study of 3065 cases of ECCE the risk was 1.7%, with a minimum follow-up of one year.¹⁴ Hurite *et al* studied 2095 patients who underwent ECCE by phacoemulsification, and the overall risk was 1.6%, with minimum follow-up of one year.²² The risk was only 1.2% for those cases in which the posterior capsule was left intact.

Accurate assessment of the risk of RD following cataract surgery is dependent on prolonged follow-up of a defined population. Such was not the case in this study. Nevertheless, bearing in mind that most RDs occur within the first two years, we believe our comparison of the number of aphakic/pseudophakic RDs per year with the total number of cataract operations for the previous year to be valid. The risk

of RD over the study period has fallen from a mean of 1.75% in the early part of the study to a mean of 0.86% in the years since 1982. At least some of this reduction is due to improved microsurgical techniques, and in particular the avoidance of vitreous loss. Though this retrospective study had not yielded reliable data on vitreous loss, other studies have confirmed its importance.^{13,20,22}

This study has documented the incidence of primary retinal detachment surgery during a period of major change in the surgical management of cataract. We have shown that the number of RD operations has risen much less than the number of cataract operations, and we attribute this to improvements in microsurgical techniques. The statistically significant fall in the number of aphakic/pseudophakic RD operations which began in 1983 may be attributable to the introduction of extracapsular cataract surgery a short time before.

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