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Vitreous haemorrhage after cataract extraction

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SUMMARY One hundred eyes undergoing intracapsular cataract extraction and 100 undergoing extracapsular extraction were examined prospectively within one week postoperatively and again at 6–10 weeks postoperatively. Indirect ophthalmoscopy showed vitreous haemorrhage in 36% of the intracapsular group and 13% of the extracapsular group. Vitreous haemorrhage was significantly related to the occurrence of operative hyphaema ($p<0.01$) but not to iridectomy ($p>0.5$). In the intracapsular group the use of chymotrypsin significantly reduced the incidence of vitreous haemorrhage ($p<0.01$). Three different types of vitreous haemorrhage were identified—streaks, diffuse haze, and beads in the vitreous base. Wound haemorrhage and operative hyphaema account for most cases, but it is suggested that zonular traction may be responsible for the bead haemorrhages and also for the retinal haemorrhages reported by other authors. Although no difference in visual result or incidence of cystoid macular oedema was observed in this study, a relationship to the vitreoretinal pathology of aphakia is suggested.

Vitreous haemorrhage after cataract extraction has been considered an uncommon complication resulting from primary or secondary wound haemorrhage or less commonly from the iridectomy.[1] Small amounts of blood are easily overlooked in the early postoperative period, though peripheral retinal haemorrhages in aphakic eyes are well documented.[2,3] Larsson and Osterlin[4] have suggested that zonular traction on peripheral retinal vessels may cause extravasation during lens extraction. We examined the incidence and significance of blood in the vitreous prospectively after cataract extraction in a group of 200 clinic patients, and attempted to correlate the morphological appearance of the haemorrhage with its possible origin.

Subjects and methods

Patients admitted for cataract extraction to any of three hospitals—Royal Perth Hospital, Sir Charles Gairdner Hospital, and Fremantle Hospital—were recruited in a random manner over a two-year period. The only selection criterion was availability for follow-up. Surgery was performed by one of 20 ophthalmologists or house staff using varied intracapsular or extracapsular techniques.

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The operative details and results of follow-up examination within the first week and again six to 10 weeks postoperatively were recorded prospectively. At each postoperative check slit-lamp examination and indirect ophthalmoscopy after maximal dilation were performed. The best corrected acuity was recorded and a three-mirror lens examination performed if cystoid macular oedema was suspected. Fluorescein angiography was not carried out as part of this study. Recruitment stopped after 100 cases of both intracapsular and extracapsular extractions. Fifty of those having extracapsular extractions also had a Sinsky style posterior chamber lens inserted as a primary procedure.

A separate group of six phakic eyes with hyphaema following routine trabeculectomy were examined to determine whether blood could pass through the intact zonule.

The data were analysed by the χ^2 test with Yates's modification.

Results

The mean age of the patients was 71 years with a range of 12 to 95 years.

36% of eyes undergoing intracapsular surgery and 13% undergoing extracapsular surgery were found to have some degree of vitreous haemorrhage (Table 1). This is a statistically significant difference

Table 1 *Incidence of vitreous haemorrhage after cataract extraction (expressed as a percentage)*

	Postoperative visual acuity 6/12 or better %	*Vitreous haemorrhage detected* %	*Surgical hyphaema* %	*Iridectomy* %
Intracapsular (n=100)	59	36	35	98
Extracapsular (n=100)	69	13	9	15
Extracapsular subgroup without IOL (n=50)	68	18	14	27
Extracapsular subgroup with IOL (n=50)	70	8	4	2

(χ^2=13; p<0·01). The blood was commonly seen in small streaks in the inferior vitreous anteriorly (type 1) and was often accompanied by a diffuse haze in the inferior vitreous (type 2) (Fig. 1). Small beads of blood, single or multiple, were seen in the vitreous base (type 3), usually associated with an otherwise clear vitreous. All three types occurred together in some eyes (Fig. 1).

The incidence of operative hyphaema was 60% with intracapsular extraction but only 9% with extracapsular extraction. Most surgeons performing intracapsular extraction also employed conjunctival flaps, large white limbus incisions, and peripheral iridectomies, while the majority of surgeons performing extracapsular extractions used clear corneal sections, with no iridectomy when an intraocular lens was inserted. Sixty-four operative hyphaemas were attributed to wound haemorrhage, and five to the iridectomy. In the intracapsular group vitreous haemorrhage was significantly more common (χ^2=9·1; p<0·01) after surgical hyphaema (55%) than without it (25%). In the extracapsular group vitreous haemorrhage occurred in 45% of the group with surgical hyphaema and 12% of those without it. This difference is also significant (χ^2=25; p<0·01).

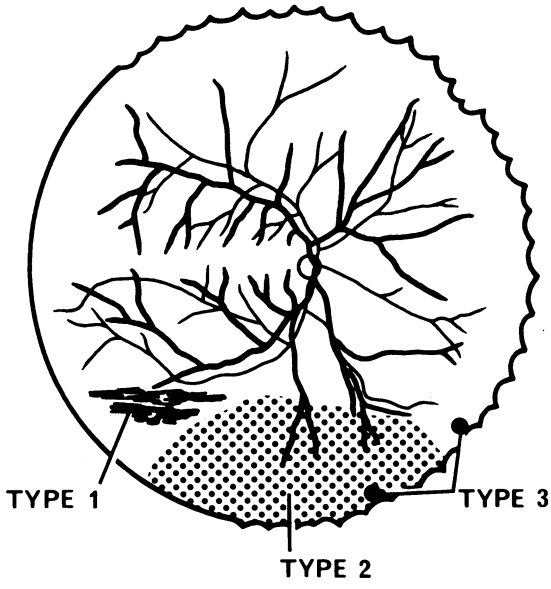

Fig. 1 *Diagram showing types of vitreous haemorrhage observed after cataract extraction.*

The finding of blood in the peripheral vitreous was also related to the quality of the fundus view obtained. In the intracapsular group the ora could be seen through 360° with a 28 D lens without scleral depression in 48% of cases. In 25% of cases the ora could be seen in only one quadrant by this method. The incidence of vitreous haemorrhage in the 25 cases with a poor quality view was only 4%, whereas in the other 75 it was 56%, which is a significant difference (χ^2= 8·0; p<0·01).

In the extracapsular group without an intraocular lens (IOL) a good 360° view of the ora was easily obtained in 32%, while of those with an IOL it was possible in only 26% in the early postoperative period. Blood was detected in nine cases without an IOL but only in four cases with an IOL.

In those intracapsular cases in which no surgical hyphaema occurred the use of chymotryspin was significantly associated with a decreased incidence of vitreous haemorrhage (χ^2=6·7; p<0·01). There was no significant relationship between vitreous haemorrhage and either cystoid macular oedema (χ^2=2·1; p>0·05) or worse than 6/12 best corrected vision (χ^2=2·7; p>0·05) in the intracapsular group at follow-up. The vitreous face was ruptured immediately postoperatively in 24% of the intracapsular group but in 32% at follow-up. Rupture of the vitreous face was not related to the use of chymotrypsin (χ^2=0·4; p>0·05) or the finding of cystoid macular oedema (χ^2=1·1; p>0·05). Of the intracapsular group 59% achieved 6/12 or better at follow-up, and 12% had cystoid macular oedema. Nineteen eyes had an unrelated cause of poor vision other than cataract diagnosed preoperatively.

In the extracapsular group 68% without an IOL had a best corrected acuity of 6/12 or better, and 70% of those with an IOL had 6/12 or better. 10% in each

group had cystoid macular oedema diagnosed biomicroscopically. Fifteen of the 100 extracapsular cases had a known cause of poor central vision other than cataract diagnosed preoperatively. Among those of the extracapsular group in whom no wound haemorrhage occurred the presence of a surgical iridectomy was not significantly related to the finding of vitreous haemorrhage ($\chi^2=4{\cdot}6$; $p>0{\cdot}05$).

Of note were two eyes that had previously undergone trabeculectomy and iridectomy. One had an intracapsular extraction and the other an extracapsular extraction, but both had small beads of haemorrhage over the ora postoperatively. These findings prompted an examination of a group of six phakic eyes in which trabeculectomy had been complicated by hyphaema. In two of these blood was seen in the inferior vitreous. During the study only one secondary wound haemorrhage was detected, and this was excluded from the study because further surgery was required.

In several eyes small intraretinal dot haemorrhages were seen near the ora with three-mirror examination, but because this examination was not possible in all cases this type of haemorrhage was excluded from the findings analysed.

Discussion

Small amounts of blood are common in the peripheral vitreous after recent cataract surgery and frequently occur with hyphaema. The finding that blood can be found in the inferior vitreous after surgical hyphaema in some phakic eyes supports the contention that blood may pass through the intact zonule. Furthermore vitreous haemorrhage can be found in 27% of traumatic hyphaemas when routinely assessed.[5] However, not all surgical hyphaemas lead to vitreous haemorrhage even after intracapsular extraction.

Blood was not seen behind the iridectomy, and there was no significant relationship between iridectomy and vitreous haemorrhage. This suggests that bleeding does not often occur from the iridectomy directly into the vitreous. The finding of only one secondary wound haemorrhage in the series suggests that this too is an uncommon cause of vitreous haemorrhage.

The observation of vitreous haemorrhage without operative hyphaema in 20 intracapsular and seven extracapsular cases requires further explanation. It is most unlikely that a secondary wound haemorrhage into a closed chamber would have been missed, since each patient underwent frequent slit-lamp examination. An alternative explanation is that bleeding occurred from the ciliary body or peripheral retinal vessels due to zonular traction. Larssen and Osterlin[4] have demonstrated that 10% of eyes have occasional retinal vessels closer to the ora than the normal arcade pattern, and that zonular traction during lens extraction produces traction on the peripheral retina. The finding that chymotrypsin used for intracapsular surgery is associated with a decreased incidence of vitreous haemorrhage supports the theory of Larssen and Osterlin that extravasation may occur from the anterior retinal vessels. Type 3 haemorrhages as shown in Fig. 1 may correspond to the expected morphological pattern resulting from localised extravasation into the vitreous base, while type 1 and type 2 haemorrhages correspond to the pattern expected as a result of blood traversing the hyaloid face or zonules from the anterior chamber. Extracapsular cataract extractions may well be accompanied by some zonular traction, especially during capsulotomy and perhaps also during expression of the nucleus. Saracco *et al.*[2] examined 150 aphakic eyes from one month to more than two years postoperatively with a three-mirror lens, and reported four types of retinal haemorrhage. 13·3% of cases had small haemorrhages observed near the ora, often in rows parallel to the limbus. Friedman *et al.*[3] reported a similar type of retinal haemorrhage in 10% of 200 aphakic eyes. Neither group reported vitreous haemorrhages.

We also observed retinal haemorrhages of this type, most common in the superior temporal quadrant; however, they were not included in the statistical analysis. Some of these retinal haemorrhages may also occur as a result of zonular traction.

The significance of vitreous haemorrhage in small amounts remains to be determined. Although we found no relationship with cystoid macular oedema or poor visual results in the short term, it may well be related to the vitreoretinal pathology of aphakia, and ultimately to the increased incidence of retinal detachment after intracapsular extraction.[6–10] Regnault[11] and others[12 13] have demonstrated that iron causes vitreous syneresis, with aggregation of vitreous fibrils and loss of hyaluronate. A threshold dose for significant syneresis is unknown, but the possible significance of subclinical haemorrhage is worth consideration. The consequences of extensive vitreous haemorrhage have been reviewed by Benson and Spalter.[12]

Extracapsular surgery is known to have a lower incidence of retinal detachment[6 7 9] than intracapsular surgery. Although the relative vitreous syneresis in the two groups remains uncertain, the presence of blood in the vitreous may be a contributory factor. Corneal section combined with routine extracapsular extraction is an effective method of minimising operative hyphaema and vitreous haemorrhage and according to the available data is the technique most likely to avoid vitreoretinal complications.

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