Delayed microhyphaema with intraocular lenses: a retrospective study of eight patients

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SUMMARY Eight patients with delayed microhyphaema were identified from a computer data base of 1209 patients who had had cataract extraction with Binkhorst 4-loop intraocular lens insertion. Five cases were recurrent. The cases were examined to try and identify an underlying cause. No single cause was identified, but trauma, hypertension, and oral anticoagulants were found to be associated. Some episodes were asymptomatic. The wide variety of surgical technique and style of lens with which this complication has been reported implies multiple causative factors. The source of the bleeding and its management are discussed.

Delayed intraocular haemorrhage has been described in association with many types of intraocular lens since it was first reported by Ellingson1 in 1977 as part of the uveitis-glucoma-hyphaema (UGH) syndrome. Various suggestions have been made concerning aetiology and various approaches have been taken to management. No consensus has emerged.

We began this retrospective study after an initial impression that patients we saw were frequently on oral anticoagulants and moreover were well controlled. All the patients in this study are patients of one consultant (MJR-H). All with one exception, no. 8, have had cataract surgery by an identical technique. Following an intracapsular cataract extraction (ICCE) via a corneal section a Binkhorst 4-loop iris supported lens (BIOL) was inserted and secured with a single 10/0 polypropylene iris suture. Sodium hyaluronate was first used in 1983. A special BIOL follow-up form was filled in when patients attended either for routine follow-up or with acute problems. The results were transferred to a computer, and it is from those data, derived from some 1209 patients, that we identified additional patients. We have identified eight patients who have suffered one or more episodes of non-layering microhyphaema. There were no bilateral cases.

Case reports

CASE 1
Two years after left ICCE+IOL (at age 59 yr) she presented with mild painless blurring of the vision in her left eye. Her vision was 6/12 corrected. On examination there was a fine vertical spindle of red blood cells (RBCs) on the lower half of the corneal endothelium. No other ocular abnormalities were found. The operation notes record a shallow anterior chamber (AC) and some touch between the BIOL and the corneal endothelium at the time of lens insertion. In April 1982 she had had an uncomplicated myocardial infarction. There was no preceding history of trauma nor of drugs associated with coagulation defects. The episode resolved spontaneously and has not recurred. Follow-up time was 5-3 yr.

CASE 2
In December 1985 a previously fit 62-year-old man presented with a three-month history of right visual distortion. He had had a right ICCE+BIOL in 1984, when sodium hyaluronate had been used because of a shallow AC. His vision was still 6/9 but with distortion. There was a corneal RBC spindle but no RBCs or cells in the AC. The intraocular pressure (IOP) was elevated at 27 mmHg, and there was an iris sphincter tear temporally. A small macular haemorrhage was thought to be the cause of the visual distortion. He was found to be hypertensive. Topical treatment included pilocarpine drops 1% to immobilise the pupil. Subsequent difficulty in controlling his blood pressure was associated with a central retinal vein occlusion and vitreous haemorrhage. Although the vitreous cleared over the next 12 weeks, a corneal spindle could still be seen seven and 22 months later. Follow-up time was 3-9 yr.
CASE 3
In 1976 a fit 40-year-old woman had an uncomplicated right cataract extraction for a congenital cataract. In October 1980 she was hit on the right maxilla and became aware of blurred vision in the right eye 24 hours later. When she was seen four days later her vision was 6/6 in each eye and the only abnormality was an RBC spindle in the right eye. No treatment was given and she was lost to follow-up until May 1985, when she was again hit on the face. Again the only abnormality was an RBC spindle. There have been five or six spontaneous episodes since then, none requiring treatment. The pupil on the right is closely applied to the pillars of the BIOL, with very minimal sphincter atrophy. Follow-up time was 9-5 yr.

CASE 4
Twelve months after an uncomplicated left ICCE+IOL at age 57 years this patient was anticoagulated for rheumatic heart disease and myocardial ischaemia. She had an isolated microhyphaema 20 months later but developed a left traumatic hyphaema after hitting her eye with the handle of a carpet sweeper. This resolved spontaneously, but over the succeeding months she had multiple episodes of blurred vision (at least 26 between March 1979 and May 1981). When she was examined the episodes were characterised by an RBC spindle and occasionally RBCs in the AC. Pilocarpine drops were prescribed. An increase in the frequency of episodes occurred after difficulty in control necessitated an alteration in her warfarin dosage. Her prothrombin time remained within the therapeutic range throughout. There was some response to a decrease in warfarin, but when last seen in 1983 she was still subject to transient blurring in that eye. No areas of sphincter damage were seen, but the pupil was noted to be very mobile. She died in 1984. Follow-up time was 10-5 yr.

CASE 5
Nineteen months after an uncomplicated right ICCE+Biol at age 66 years she suffered an asymptomatic microhyphaema. A typical RBC spindle was seen. The only other feature was an IOP at 25 mmHg. Treatment with pilocarpine drops 1% was begun. There was no sphincter damage. A second asymptomatic episode occurred 14 months later. She is still being followed up. Follow-up time was 2-6 yr.

CASE 6
Seventy two months after an uncomplicated right ICCE+Biol at age 62 years this woman attended the casualty department with a spontaneous microhyphaema. She was stable on anticoagulants for rheumatic heart disease. The IOP on the right was slightly higher than on the left (20 to 15 mmHg). The BIOL was secure, with posterior synechiae to each pillar, but with extensive iris transillumination in adjacent areas. There was no history of trauma or of factors that might have altered her warfarin control. Her prothrombin time (PT) was within the therapeutic range (2-0-4-0), but her warfarin dose was temporarily reduced to achieve a ratio of under 2-0. Repeated examinations failed to reveal any site of bleeding. No specific treatment was given. Follow up time was 7 yr.

CASE 7
At the age of 44 years she had a right ICCE+Biol with vitreous loss. She achieved 6/5 vision. Eight years later she complained of occasional mistiness in her right eye. During these episodes an RBC spindle was the only abnormality. There was no history of trauma or drug ingestion. No treatment was given, and the episode resolved. She has since moved out of the area and has been lost to follow-up. Follow-up time was 11-5 yr.

CASE 8
At the age of 37, 24 years after blunt trauma (with hyphaema, sphincter damage, lens subluxation, and vitreous prolapse into the AC) this man required right cataract extraction. After delivery of the lens with a loop, an anterior vitrectomy and sphincter repair, a BIOL was inserted without complication. He achieved 6/9 vision. Postoperatively his pupil was pentagonal, and, perhaps significantly, no posterior synechiae formed to the BIOL pillars. In August 1984 he presented with pain and decreased vision in this eye. There was a diffuse hyphaema and blood in the anterior vitreous. The IOP was normal. The blood was reabsorbed on bed rest. Over the next 12 months he had recurrent hyphaemata of varying severity. In 1985 the BIOL was rotated through 45° in the coronal plane, and an additional iris suture inserted to prevent IOL rotation. For a while he continued to have microhyphaemata, but from March 1987 he had been symptom-free since having atropine drops 1% on alternate days. Repeated examination failed to reveal an obvious source of bleeding, but marked areas of iris transillumination existed adjacent to each pillar and round the peripheral iridotomies (PIs). Clotting studies gave normal results except for a bleeding time at the upper limit of normal (IVY method). This is not thought to be of clinical significance. Follow-up time was 6 yr.

Cases 1, 3, 5, and 7 have also had cataract surgery in the fellow eye.
Discussion

ANTICOAGULANT
In our study only two patients (nos. 4 and 6) proved to be on anticoagulants. They were both well controlled on warfarin for rheumatic heart disease. Case 6 has had a single episode at a time when her prothrombin time ratio (2-8) was well within the therapeutic range. We failed to identify anything that might have altered her response to the drug. It is difficult to be certain if the resolution of the episode that occurred when the dose was reduced was more than chance coincidence. Case 4 had at least one episode prior to the ocular trauma. Although she was under the supervision of a local anticoagulant clinic, control was variable and associated with an increase in the frequency of episodes. A third patient, no. 8, was found to have a bleeding time just outside the normal range, but this is of doubtful clinical significance. All three were among those most severely affected, either in amount of bleeding or in the number of episodes. Only one other patient, no. 3, has had multiple bleeds.

The increased risk of spontaneous hyphema in patients on oral anticoagulants has been discussed. Schiff reported five cases, all with iris supported lenses, who developed spontaneous hyphaemae after starting warfarin. However, no details of control were given, and four bled within the first few weeks of beginning the drug. It is possible that they were not yet stable.

TRAUMA
Postoperative trauma seems to have been a precipitating event in one, case 3, and implicated in the onset of recurrent episodes in one other, no. 4. Three other patients, nos. 1, 2, and 7, were recorded as having an intraoperative event at the time of BIOL insertion. We wonder whether this may have resulted in minor and overlooked areas of iris trauma and that such areas might be susceptible to bleeding under the influence of later events. Patient 8 suffered severe preoperative trauma, including iris sphincter damage. Gonioscopy failed to reveal abnormal angle vessels. Four patients in our series have had multiple bleeding episodes. Three, nos. 3, 4, and 8, had ocular trauma of a degree that warranted attendance for examination. One, case 4, was also on warfarin.

CARDIOVASCULAR DISEASE
The onset of haemorrhage in case 2 led to the diagnosis of hypertension. Hypertension can also rarely present with epistaxis. Subsequent difficulty in controlling his blood pressure is likely to have been a factor in his central retinal vein occlusion. The endothelial spindle persisted much longer than the vitreous haemorrhage and may indicate recurrent anterior segment bleeds. Patients with cataract, because of their age, are quite likely to have coexistent cardiovascular disease. Case 1 had an uncomplicated myocardial infarction prior to the onset of his visual symptoms. It is interesting to speculate whether arteriosclerosis has a direct role or whether it simply makes the patient more likely to develop hypertension or to need anticoagulation. A quarter of the patients reported on by Johnson et al. had iris transillumination defects and microhyphaemae after insertion of sulcus fixed posterior chamber IOLs, had had surgery for cardiovascular disease.

We could not identify any factors for patient 5.

We noted with interest that the average age of the patients in the series was considerably lower (53-37 yr) than the averages of the groups from which they came—68-35 (NHS patients) and 67-91 (private patients). The series does contain one patient aged 40 yr who required cataract surgery following trauma and one aged 44 yr with congenital cataracts, but, even if they are excluded, the average is only 58-4 yr. Since episodes may be asymptomatic, we may not have identified all affected patients, and thus the real average may be different.

SOURCE OF BLEEDING
The identification of the source of bleeding in such spontaneous microhyphaemae is important if a rational approach to prevention and management is to be adopted. In 1973 Swan reported three cases of sudden transient blurring of vision in aphakic eyes with gonioscopic evidence of vascularisation of the limbal wound and fresh haemorrhage. They were treated with focal laser coagulation or surgical excision of the vascularised area. From a survey of 58 aphakic eyes examined 5–10 years after surgery Watzke found 12% with episcleral vessels on the inner aspect of the wound and that almost half showed evidence of mild intraocular haemorrhage. He believed that, while these vessels were a common source of such haemorrhage, treatment was usually unnecessary. Defective wound healing, coarse silk and gut suture, ingrowth of episcleral vessels, and trauma have all been implicated as causes of wound vascularisation. All our patients had incisions in clear cornea, and while superficial vascularisation of these incisions is not uncommon we have not observed deeper vessels of the type that would be required. The section in our patients would also be a very visible source of even a minor bleed. Detailed gonioscopy was performed on all but patient 4 without evidence of abnormal vessels being found.

When an iris fixed or ciliary sulcus fixed lens is used, the posterior surface of the iris becomes
another possible source. In a detailed study by Nicholson6 of one patient with a Binkhorst 4-loop lens who suffered multiple anterior chamber bleeds angiography showed an abnormal iris vascular pattern on the anterior iris surface. Radial vessels were displaced adjacent to the superior pillars, and there was an area of leakage adjacent to one. He blamed these on recurrent iris chafing by the lens. Schiff also observed leakage on iris angiography adjacent to areas of sphincter erosion.7 Areas of iris transillumination over the loops of angulated sulcus fixated IOLs are well recognised but said to be uncommon. Estimates vary from 5 to 15%.5 6 Similar chafing defects have been observed corresponding to the edges of the optic in a uniplanar posterior chamber lens. Some of these patients also show transient microscopic hyphaemas characterised by an RBC spindle and clear aqueous.6 10 In at least one patient active streaming of RBCs from the posterior iris surface was seen.6 Small volumes of blood would be carried forward in the aqueous circulation currents and, by analogy with pigment in the pigment dispersion syndrome, be deposited as an endothelial spindle. Areas of sphincter damage were seen in four of our patients. Preoperative, operative, or postoperative trauma might produce small areas of iris damage vulnerable to secondary factors. These include repeated trauma (including a very mobile pupil) and hypertension. The very frequent bleeds seen in one patient on warfarin suggest that small breaches in the vessel walls may be occurring often. Only in the presence of defective coagulation are these made manifest.

COMPLICATIONS
The most common complaint in our series is of blurred vision, though the episodes can also be asymptomatic. In most patients there was no permanent decrease in visual acuity. A more prolonged decrease in vision occurs if the anterior hyaloid face is broken and blood enters the vitreous. If the bleeding is severe enough, a ghost cell glaucoma may be found.11 The IOP may also be elevated by the crowding of fresh RBCs in the angle. We found no evidence of the creeping angle closure noted by Swan.7

While the diagnosis may be obvious, in some cases a small spindle may be easily overlooked. More than one patient has been investigated for amaurosis fugax, and at least one has had carotid angiography—a procedure not without its own risks.4 6 10 12

MANAGEMENT
Various approaches have been tried. Miotics and mydriatics are used to immobilise the pupil and thus minimise lens-iris chafing.10 Pilocarpine drops were used in three of our patients. They have the additional benefit of being an ocular hypotensive agent. Atropine drops were also used to good effect in one. Additional McCannel iris sutures can also reduce IOL movement. Berger13 believes that nocturnal trauma is an important factor and therefore recommends the use of a plastic eye shield at night. The management of systemic factors such as hypertension, and anticoagulant control, are theoretically important. A logical approach for those who do require active intervention is laser ablation of areas of vascular leakage identified by iris angiography (on the assumption that these are responsible).

It is important to remember that not all patients will require treatment.

CONCLUSION
A spontaneous hyphaema, either on its own or as part of the UGH syndrome, is not now thought of as just a complication of poorly finished rigid AC lenses. It has also been seen in association with flexible AC lenses, iris supported lenses, and sulcus fixated posterior chamber lenses. The real incidence of this uncommon complication is difficult to establish. It is likely that patients who suffer an isolated, transient blurring of vision may not attend for examination. Some clinically detectable episodes seem to be asymptomatic. Even patients who do attend may be misdiagnosed if the only evidence is an RBC spindle which is overlooked. While we have looked at those patients known to us, it would seem unwise to extrapolate a true incidence from these figures. Moreover different surgeons using different techniques and lens styles are likely to find different levels of incidence.

The evidence of iris angiography and the clinical impression from the observed endothelial spindle formation is in favour of a posterior iris source for iris supported and sulcus fixated IOLs, the likely sites being areas of pseudophakos-iris chafing. The aetiology is likely to be multifactorial, comprising local, systemic, and temporal factors. This study provides three factors that need to be considered: trauma (preoperative, operative, and postoperative); cardiovascular disease, particularly poorly controlled hypertension; and oral anticoagulants. Trauma seems to be particularly associated with multiple episodes of bleeding. Not all patients will require active treatment. In those who do the most logical approach seems to be ablative laser applications to areas identified by iris angiography.

The pseudophakic eye is a system in delicate balance. Histopathological evidence emphasises the inflammatory response to all types of intraocular lenses.14 15 These responses seem to be less with lenses
implanted 'in the bag'. Delayed recurrent microhyphaema is another, probably under-recognised, reason for adopting this technique.

References


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