

## BLUNT OCULAR TRAUMA AND HYPHAEMA

K. R. LITTLEWOOD

University Department of Ophthalmology, Royal Perth Hospital

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### Abstract

138 consecutive cases of traumatic hyphaema treated at Royal Perth Hospital were studied retrospectively. 47% of cases were caused by sporting injuries; 21% by squash alone. 105 cases were available for follow-up examination at 6 weeks. Using  $\chi^2$  distribution the finding of worse than 6/12 vision at follow-up was significantly related to the occurrence of major associated ocular injury, and also to the occurrence of secondary haemorrhage. The benefit of hospital admission is doubtful when compared to the cost. Modern therapeutic modalities including anti-fibrinolytics have improved the prognosis of secondary haemorrhage.

Key words: Traumatic hyphaema, sporting accidents, secondary haemorrhage, anti-fibrinolytic therapy.

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### INTRODUCTION

Rapid compression of the globe generates a shock wave which exerts an internally directed force on the ciliary body via the lens zonules and iris root, and is then deflected into the anterior chamber angle causing ciliary body tears and other sequelae.

Kilgore<sup>1</sup> produced these tears after experimental hyphaema in primates, and Wolff and Zimmerman<sup>2</sup> and others have described tears between the circular and longitudinal ciliary muscle in enucleated human eyes after trauma. Angle recession is observed in 70% of eyes following hyphaema,<sup>3-5</sup> whilst iridodialysis and stromal iris lacerations each occur in up to 26%.<sup>5</sup> A hyphaema signifies structural anterior segment damage which may be complicated by glaucoma months to years later, and is an indication for careful gonioscopy and examination of the retinal periphery. Whilst the occurrence of ocular sequelae such as lens or macular damage affords an obvious explanation of poor visual outcome,

it is not clear whether the size or duration of hyphaema influences the visual result in the absence of corneal blood staining or glaucoma.

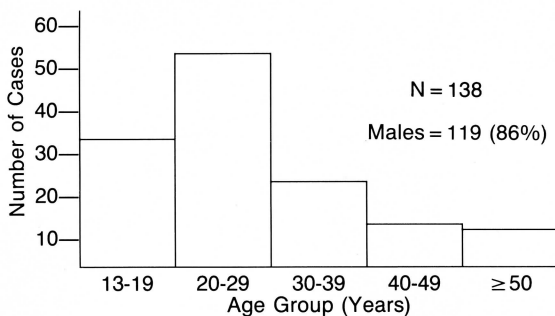
In this community routine management includes hospital admission for an average of 5.8 days. The ever increasing cost of in-patient care, and the recently reported effectiveness of anti-fibrinolytic therapy in ambulant patients<sup>6</sup> indicates the need for closer scrutiny of the cost effectiveness of current management.

### ANALYSIS OF CASES

A retrospective analysis was made of 138 consecutive hyphaemas admitted to Royal Perth Hospital between January 1979 and June 1981 inclusive, and treated with strict bed rest, double pads, sedation and analgesia if required. The ages ranged from 13-92 years. All cases below 13 years of age were treated at another hospital and were not included in this study. 119 were male (86%), 19 were female (Table 1).

TABLE 1

Disbribution of Hyphaema Population



105 cases were available for follow-up examination at six weeks. Routine ophthalmic examinations included refraction if visual loss was suspected. A major ocular injury was defined as any significant structural damage likely to result in either short or long-term loss of vision. This excluded iris tears and traumatic mydriasis, but included several cases of angle recession, retinal haemorrhage and detachment, lens dislocation, vitreous haemorrhage and orbital fractures.

## RESULTS

Two cases were excluded from the study because they presented more than 24 hours after the injury with a secondary hyphaema. 47% were caused by sporting accident, and 21% of the total, or 57% of the sporting cases, were due to squash alone (Tables 2 and 3).

One case presented with a total hyphaema which did not become "black", and resolved without complication. There were 20 episodes of re-bleeding in 13 eyes, with one eye re-bleeding

TABLE 2  
Causes of Hyphaema in 138 Consecutive Cases

Cause of Injury	No. of Cases
Sport	65 (47%)
Industrial	19 (14%)
Home accident	32 (23%)
Assault	17 (12%)
MVA	5 (4%)
<b>Total</b>	<b>138</b>

TABLE 3

Causes of Hyphaema

65 Sporting Injuries	
Squash	29 (21%)
Cricket	9 (7%)
Shuttlecocks	5 (4%)
Football	4 (3%)
Golf balls	4 (3%)
Others	14 (10%)
32 Home Accident Cases	
Stones	5 (4%)
Wood chopping	5 (4%)
Lawn mowers	2 (1%)
Champagne corks and bottle tops	3 (2%)
Others	17 (12%)

six times and requiring cyclocryotherapy for black ball hyphaema (Table 4). He attained 6/12 vision despite previous amblyopia. Only 2 of the other 14 episodes of rebleeding resulted in more than half of the anterior chamber filling with blood.

To assess the effect of associated major injury on visual outcome, the group who had no secondary haemorrhage were subdivided into those with and those without associated major ocular injury. The proportion with worse than 6/12 vision in each sub-group were compared using the  $\chi^2$  distribution test. Eleven of 18 with an associated major injury had worse than 6/12 vision at follow-up, while 2 of 74 with no

TABLE 4  
Time of Secondary Haemorrhage

20 episodes in 13 eyes; 6 episodes in one eye

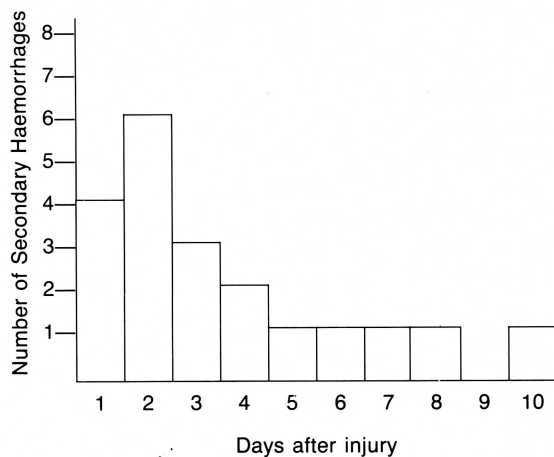


TABLE 5  
Proportion in Each Subgroup with Worse than 6/12 Vision  
at Six Weeks Follow-up

	Associated secondary haemorrhage		
	Yes		No
	Yes	0	11/18
Associated major ocular injury	No	4/13	2/74

associated major injury had worse than 6/12. This difference is significant ( $\chi^2 = 32.5$ ,  $P < 0.01$ ). The effect of re-bleeding was tested by subdividing the group in whom no major injury was found. Four of 13 in whom re-bleeding occurred had worse than 6/12 vision at follow-up while 2 of 74 in whom no re-bleeding occurred had worse than 6/12. This difference is also significant ( $\chi^2 = 9.23$ ,  $P < 0.01$ ). (Table 5.)

## DISCUSSION

The low proportion of late presentation and re-bleeding in this series indicates important differences between this study population and that of other series.<sup>7</sup> The incidence of industrial cases and assaults is less than other series.<sup>5,8,9</sup>

A recent study in Adelaide found 48% of sports related hyphaemas were due to squash injuries (personal communication from Dr D. Tamblyn). The incidence of 57% in the present series indicates a need for education in the squash playing public with regard to protective eyewear.

Spaeth and Levy<sup>9</sup> and Spoor et al.<sup>5</sup> have concluded that, with the exception of black ball hyphaemas, poor vision following traumatic hyphaema almost always results from the original injury rather than from re-bleeding. The results of this trial however, indicate that poor vision can result from re-bleeding, although the mechanism is unclear. the retrospective design and incomplete follow-up in this study mean that the results are inconclusive, so a prospective trial is planned.

The incidence of secondary haemorrhage in this series was 9.6% (13 cases) of which one case developed a black ball hyphaema. This case improved rapidly after cyclocryotherapy administered 48 hours after the development of

black ball hyphaema. In two recent series of black ball hyphaemas receiving prompt surgical management 6/12 or better vision was achieved in 75%<sup>10</sup> and 80%<sup>11</sup> respectively. The visual prognosis for this small group of cases depends largely on the timing of effective surgical intervention before secondary damage occurs.

The average duration of admission was 5.8 days and the bed cost \$185.00 per day, so the results of in-patient management were achieved at a minimum average cost of \$1,073 per hyphaema, and a total of over \$148,000 for the 138 patients. If in-patient management is aimed simply at reducing the incidence of black ball hyphaema, then it may be difficult to justify on economic grounds. The morbidity associated with black ball hyphaema has been much reduced with the availability of effective surgical therapy and the value of hospitalization for prevention remains unproven.

Double padding and bed rest considered separately have not reduced the re-bleeding rate in small trials,<sup>12-14</sup> but are not amenable to prospective double blind analysis. Systemic steroids and oestrogens have proved ineffective when subjected to such analysis,<sup>5,9</sup> while the anti-fibrinolytics, tranexamic acid,<sup>6</sup> and aminocaproic acid,<sup>15</sup> are effective in high doses systemically. Since topical delivery of aminocaproic acid is impractical<sup>16</sup> and large doses are required systemically, its routine use may not be justified until the safety of such doses is established. Most secondary haemorrhages occurred at night in this series, so the use of barbiturates or selected tricyclic antidepressants to reduce rapid eye movements during sleep<sup>17</sup> may be more rational in routine cases. Anti-fibrinolytic therapy might be reserved for those cases not amenable to conservative management, or those at greater risk of re-bleeding (previous re-bleed, urgent orbital surgery, mentally retarded patients, etc.). Once the safety of high dose anti-fibrinolytic therapy is established routine inpatient management will be even more difficult to justify, since the use of anti-fibrinolytics appears to make most other forms of therapy redundant.<sup>15,18</sup>

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