Traumatic Hyphema: A Review of Experience at the Medical College of Virginia During the Past Decade

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Hyphema (hemorrhage into the anterior chamber of the eye), as the result of blunt injury to the eye, carries a potential danger of visual loss if not properly treated. This review of cases seen in the MCV Hospitals over the last decade lists some of the complications and stresses some of the important factors in the management.

Traumatic hyphema from nonperforating injuries was not considered a specific problem until the last decade, in spite of Cordes' (1932) warning that ocular contusion, even if complicated only by hyphema, must be regarded as a potentially serious condition. A little more than 10 years later, Rychener (1944) emphasized that the hazardous results from secondary hemorrhage could in most instances be avoided only by early and effective treatment, for attempts to treat complications already present when the patient came for treatment were frequently unsuccessful. This author reported gratifying results in the use of miotics and simple paracentesis in treating 13 cases of traumatic hyphema complicated by increased intraocular pressure. Laughlin (1948) showed that eyes with repeated hemorrhages had a poor prognosis. Lock (1950) pointed out that although most cases of traumatic hyphema subsided without further incident, secondary glaucoma was always a possible complication. Thygeson and Beard (1952) reported a high incidence (38%) of secondary hemorrhage. In the 13 cases with secondary hemorrhage, glaucoma developed in seven. None of the patients that had only a single hemorrhage developed glaucoma. In five of the seven cases of secondary glaucoma, vision was reduced to mere light perception, and enucleation had to be performed in several of those.

In the last decade various attempts have been made to prevent prolonged or repeated hemorrhages and to enhance blood absorption from the anterior chamber. Based upon experiments in rabbits, Benedict and Hollenhorst (1953) warned against the use of cortisone in treating traumatic hyphema, as it reduced the rate of blood absorption from the anterior chamber. Wilson et al. (1954) advocated early air injection. Wilkinson (1956) and Loring (1958) favored medical management first, followed by surgery where indicated. Goldberg (1960) used conjugated estrogen. Glaser (1960) applied diathermy coagulation as a prophylatic measure. Scheie (1963) reported good results from irrigation of the anterior chamber with fibrinolysin to dissolve blood clots.

The use of miotics or mydriatics for treatment of traumatic hyphema is still debated. Mydriatics, however, appear to be used more

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often. Adequate bed rest has always been stressed as an important factor in preventing secondary hemorrhage. Cordes (1932) considered inadequate physical rest the most important cause for secondary hemorrhage, and Kronfeld (1951) noted that, in his experience, treatment with drugs was less important than complete bed rest. Smith (1952) and Kreman and Hagigh (1959) showed a greater incidence of secondary hemorrhage in ambulatory patients than in those at bed rest. Glaser (1964), in a poll of ophthalmologists, found that most of them considered adequate bed rest the most important single factor in preventing complications.

Description of Patients in This Review

The charts of patients admitted to the MCV Hospitals from 1954 through 1964 with a diagnosis of traumatic hyphema from nonperforating injuries were reviewed. Among 4,798 patients admitted to the Eye Service during that period, there were 209 cases (4.3%) of traumatic hyphema. After excluding inadequate records, 198 cases remained. These cases were arbitrarily classified into two categories:

1) Those seen within 24 hours after injury. There were 152 in this group. Biomicroscopic examination revealed hyphema in five patients; 135 had hyphema affecting less than three-fourths of the anterior chamber, and 12 had involvement of more than three-fourths of the chamber.

2) Those seen later than 24 hours after injury (two to six days). There were 46 in this group. Most of these patients came late simply because of negligence. There were 28 with hyphema of less than three-fourths, and 18 with hyphema of over three-fourths of the anterior chamber.

Age

The ages ranged from 2 to 67, but 115 patients (58%) were below 15 (table 1).

Sex and Race (table 2)

The majority (87%) of patients were male. Slightly more than one-third (41%) were Caucasian. Since there is a preponderance of Negro patients in our clinic population as a whole, the significance of this racial incidence is uncertain. There were no cases of bilateral hyphema.

Incidence by Season and Month (table 3)

In approximately half of the cases, trauma occurred during the four summer months, May through August. Approximately half of the injuries from BB shot happened in December and January.

TABLE 1
Age Incidence of 198 Cases of Traumatic Hyphema

Age	No. of Patients
2– 5	20
6–10	50
11–15	45
16–20	11
21–30	30
31–40	24
41–50	10
51–67	8

TABLE 2
Race, Sex, and Eye Incidences of 198 Cases of Traumatic Hyphema

Race		Sex		Eye	
N	W	M	F	OD	OS
140	58	175	23	88	110

TABLE 3
Month Incidence of 198 Cases of Traumatic Hyphema

Month	No. of Cases
January	12
February	13
March	14
April	13
May	32
June	21
July	13
August	25
September	16
October	17
November	7
December	15

TABLE 4
Objects Causing Contusion of 198 Cases of Traumatic Hyphema

Objects	Cases
Rock	44
BB pellet	17
Struck, fight, blackjack	16
Wood, tree branch	15
Stick	14
Various working tools	12
Baseball	11
Various household objects	10
Fall and hit	8
Elbow, hand, fist (at game)	8
Bullet, shell	6
Various fruits	6
Automobile accident	5
Kicked in eye	3
Arrow	3
Snowball	3
Marble	2
Toy gun	2
Handball	2
Softball	2
Plastic ball	2
Fishing rod, golfball	2
Shuttlecock	1
Oyster shell	1
Unknown	3

TABLE 5
Associated Ocular Lesions in 198 Cases of Traumatic Hyphema

Lesions	Cases seen within 24 hours	Cases seen after 24 hours	Total
Fracture of orbital rim	3		3
Lid lesions	40	7	47
Subconjunctival hemorrhage	35	5	40
Conjunctival tear	8		8
Corneal abrasion	57	3	60
Iris tear/rupture of sphincter	4	1	5
Iridodialysis	15		15
Iridoplegia	16	1	17
Traumatic iritis	6	9	15
Traumatic cataract	10	4	14
Subluxation of lens	5		5
Vitreous hemorrhage	12	2	14
Retinal hemorrhage, edema, tear	18	4	22
Macular lesions	5	5	10
Choroidal rupture	4		4
Severance of optic nerve O.U.	1		1
Papilledema	1		1
Secondary glaucoma on admission	5	18	23
Secondary glaucoma later	5		5

TABLE 6
Incidence of Secondary Hemorrhage

Author	Year	No. Cases	1. Secondary hemorrhage (%)	2. Glaucoma associated with secondary hemorrhage (% of 1)
Laughlin	1948	49	37	
Thygeson	1952	34	38	54
Smith	1952	27	22	
Wilson	1954	27	7	
Shea	1957	113	14	25
Loring	1958	56	30	59
Kushner	1959	100	16	38
Kreman	1959	20	35	71
		34	21	86
Henry	1960	204	17	51
Goldberg	1960	63	19	83
Gregersen	1962	200	6	46
This series	1966	152	7	40

Causes of Hyphema (table 4)

Of various objects causing contusion, rock was by far the most common (44 cases), followed by BB pellet; industrial accidents were rarely the cause for hyphema.

Associated Ocular Lesions (table 5)

These were often not detected at the time of admission, but were found when the hyphema cleared and the general condition of the eye permitted a thorough examination. In the 46 patients seen two to six days after injury, only three showed evidence of corneal abrasion. There were 18 cases of secondary glaucoma among these 46 patients at the time the patient came for treatment. Pain undoubtedly caused these patients to seek medical aid. Traumatic cataract and dislocation of the lens occurred in 19 (9.6%) of the 198 cases. Retinal and macular lesions were found in 32 eyes (16%).

Complications

Table 6 lists the incidence of secondary hemorrhage in our series, along with the experience of others. Among 152 cases seen within 24 hours of injury, only 10 (6.6%) developed secondary hemorrhages. Gregersen (1962) reported an incidence of secondary hemorrhage of 5.5% in a series of 200 cases of traumatic hyphema. Most secondary hemorrhages in our series occurred about the third day after injury, which is in agreement with other reports (Gregersen, 1962; Henry, 1960; Kushner, 1959; Loring, 1958; Shea, 1957; Wilson et al., 1954; Thygeson and Beard, 1952).

Table 7 gives the course of the 10 cases of secondary hemorrhage in our series. It occurred in eyes with varying degrees of hyphema treated by different methods, and affected all age groups. Once secondary hemorrhage occurred, the

TABLE 7
Course of Illness in 10 Patients with Secondary Hemorrhage (Admitted 24 Hr after Injury)

Patient No.	Age	Sex	Race	Severity of hyphema	Treatment	Day of 2nd hemorrhage	Later complications	Final results
1	59	M	N	Less than 3/4 anterior chamber	D, S, P*	10th	Corneal staining	20/200
2	21	M	N		D, S,* Chymar	4th	Secondary glaucoma	Evisceration
3	30	F	N		Air injection	3rd	Secondary glaucoma, corneal staining	Enucleation
4	13	M	N		D, P*	2nd	Secondary glaucoma	Hand movement (H.M.)
5	11	M	N		D, S, P*	3rd	Secondary glaucoma, posterior synechiae, aphakia, postop.	Aphakic correction, 20/50
6	39	M	N		Bed rest only	2nd	Corneal opacity	Count Fingers (C.F.)
7	30	M	N		S, P*	2nd	Failed to follow	
8	9	M	W		Bed rest only	3rd	Failed to follow	
9	27	M	N	Over 3/4 anterior chamber	Bed rest only	3rd	Vitreous hemorrhage uveitis	Unknown
10	13	M	N		D, S, P*	7th	Iris atrophy, traumatic cataract	H.M.

* D = Diamox; S = Steroid (local); P = Premarin

prognosis was poor; six of the 10 cases resulted in blindness. Two enucleations are included. The onset was most frequently on the third day after injury.

In our series there were 23 (11.6%) patients who had secondary glaucoma at admission. Five of these 23 were patients seen within 24 hours after injury. Of those five, three regained 20/30 vision or better, one suffered from secondary hemorrhage and subsequent corneal staining with resultant vision of 20/200, and one was discharged against advice. The other 18 were patients seen from two to six days after injury. The outcome of these 18 cases was as follows: seven had 30/200 or less, four had from 20/100 to 20/50, six improved to 20/40 or better, and one failed to return for follow-up. These results suggest that glaucoma occurring soon after injury has a better prognosis than that occurring later than 24 hours after the injury or after a secondary hemorrhage, which may have developed before the patient's admission.

TABLE 8
Resorption Time of Traumatic Hyphema in 121 Patients

Resorption time (days)	1	2	3	4	5	6	7	8	9	10	11	12
No. of cases	5	28	18	16	13	11	17	7	6	1	1	1

TABLE 9
Resorption Time in 12 Patients Treated by Bed Rest Only

Resorption time (days)	1	2	3	4	5
No. of cases	1	3	4	3	1

TABLE 10
Data on Four Patients Requiring Enucleation

Age	Sex	Race	Method of treatment	Reason for enucleation
30	F	N	Air injection day of admission	Painful glaucoma following secondary hemorrhage
21	M	N	Diamox, local steroid	Painful glaucoma following secondary hemorrhage (bullet wound, severance of optical nerve O.U.)
32	M	N	Extracapsular extraction of associated dislocated lens, same day	Panophthalmitis
4	F	N	Paracentesis and irrigation	Panophthalmitis

There were six cases of blood staining of the cornea in our series. Two occurred after secondary hemorrhage, associated with secondary glaucoma in the group seen within 24 hours after injury, and four occurred in eyes with secondary glaucoma in the group seen later than 24 hours after injury. Intraocular hypertension, thus, seemed to be a precipitating factor for blood staining of the cornea.

In evaluating the resorption time of hyphema, only those patients were included who: 1) were seen within 24 hours; 2) had no secondary hemorrhage; 3) were treated medically only; and 4) developed no glaucoma. There were 121 who fulfilled these criteria. The average time of resorption was 4.6 days, with a range from one to 12 days. In 105 (86.8%) of the cases, resorption occurred within one week (table 8). In these 121 cases, there were 12 patients treated by bed rest only. Their average time of hyphema resorption was three days (table 9). The influence of different drugs, including steroids, on the resorption rate of traumatic hyphema will be presented separately.

Of the four patients who had to have enucleation, three had undergone surgical treatment on the day after injury (table 10).

Visual Acuity

The prognosis of visual acuity is determined by the extent of damage to the eye at the time of injury plus ensuing complications. There were 130 patients on whom data on visual acuity were available. The results are tabulated in table 11. The causes of visual loss for these patients were mainly attributable to associated ocular lesions (table 5). However, if there was no serious associated ocular injury and no secondary hemorrhage, even those patients with total, or nearly total, hyphema seen within 24 hours after injury recovered good vision. The degree of the initial hyphema, therefore, may not necessarily be the only guide to prognosis of visual acuity.

TABLE 11
Vision in 130 Patients with Traumatic Hyphema

Visual Acuity	Hyphema less than 3/4 anterior chamber		Hyphema over 3/4 anterior chamber		Total
	within 24 hr	after 24 hr	within 24 hr	after 24 hr	
20/20 or over	22	2	1	4	29
20/25	6		1		7
20/30	14	3		3	20
20/40	12	4	2	1	19
20/50	10	1	1	1	13
20/60 to 20/70	3			1	4
20/100	3	2		1	6
20/200 to 20/400	7	2	2	1	12
Count fingers, hand movement	7	3	1	3	14
Light perception only	1			1	2
Enucleation	3		1		4
Undetermined	52	10	3	3	68
Total	140	27	12	19	198

Management

Our management of traumatic hyphema has consisted in: 1) bed rest with bathroom privileges (parents have been allowed to stay with their sick children); 2) elevation of the patient's head about 30° to 45°; 3) black eye shield for the injured eye (stenopaic patch to the normal fellow eye in special cases); 4) firm (Wheeler) eye patch for corneal abrasions; and 5) sedatives and analgesics. Drugs frequently used, either singly or combined, have included Diamox (acetazolamide), Premarin (conjugated estrogens), and local steroids.

We have not prescribed Diamox routinely or prophylactically, but only when the intraocular tension was elevated. If the elevated tension could not be controlled with this drug, oral glycerol (30 cc in orange juice one or two times daily for several days as indicated) or intravenous mannitol (10% solution, 50 to 100 mg within 24 hours) was given. In some patients, the intraocular pressure could not be lowered by any conservative treatment, and here paracentesis of the cornea with daily reopening of the incision was helpful.

Premarin was given in a few instances, although we are not aware of a controlled study of the effect of this drug in this condition. Mydriatics and miotics are not given since they may precipitate recurrence of bleeding. When surgery must be performed, it should be as simple and atraumatic as possible. Simple paracentesis of the cornea with daily reopening of the incision may be all that is needed to carry the patient over the phase when high tension cannot be controlled by conservative measures. In certain instances gentle irrigation of the anterior chamber with normal saline solution or with fibrinolysin, as described by Hörven (1962) have been beneficial. Mechanical extraction of a blood clot by forceps is always

contraindicated, since such a procedure may lead to serious complications.

Careful ocular examination is important in all patients. If possible, it should be done at the time of admission, and again during the course of hospitalization, for associated ocular lesions requiring treatment are common.

The relatively small number of cases in which there was surgical intervention (14 cases, of which three later had enucleations) reflects the prevailing opinion that traumatic hyphema from non-perforating injury for the most part is best treated conservatively.

Summary

Early treatment and strict bed rest for traumatic hyphema has resulted in a reduced incidence of secondary hemorrhage over the last decade, about 38% in 1950 as opposed to 5% to 6% in recent years.

In our series, traumatic hyphema represented 4.3% of all cases admitted to the Eye Service. The age span in these cases was from 2 to 67 years, but 58% of the patients were under age 15. The majority were males. No significant difference in incidence was found between the two eyes. Injuries occurred throughout the year, with some variation depending on the type of injury. Thrown rocks were first among the causes of injury, followed by BB shots.

Only 6.6% of the cases developed secondary hemorrhage. This low incidence is attributable to prompt admission and treatment in the hospital. However, once secondary hemorrhage occurred, the prognosis was poor; six out of the 10 cases resulted in blindness. Most of the secondary hemorrhages occurred on the third day following injury.

Blood staining of the cornea occurred only in cases of secondary hemorrhage associated with glaucoma.

Initial hyphemas were generally absorbed within a week. The average hyphema resorption time was 4.6 days.

Of 130 recorded final visual acuities, 75 (57%) were 20/40 or better, 23 (17.8%) were from 20/30 to 20/100, and 32 (24.6%) were 20/200 or worse (including total blindness). The prognostic factors which determine visual outcome in hyphema include the associated lesions sustained by the eye at the time of injury, as well as later complications, with secondary hemorrhage being probably the most important single factor.

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