Comparison between Microscopic and Macroscopic Traumatic Hyphema due to Blunt Ocular Trauma

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Abstract

***Purpose*:** This study was performed to compare complications and clinical course of microscopic and macroscopic hyphema resulting from blunt ocular trauma

***Methods*:** In a prospective observational case series during the period 21 March 2010 to 20 March 2011 all referred patient with traumatic hyphema to ophthalmic emergency ward of Ahvaz, main city of southwest of IRAN that met inclusion criteria were included in the study and followed for at least one year.

***Results*:** Of 197 patients with traumatic hyphema 37 patients were excluded by exclusion criteria. 160 patients who completed examinations and follow-up protocol were enrolled in the study, 99 patients (61.9%) had microscopic and 61 patients (38.1%) had macroscopic hyphema. In microscopic group 89 patients were male and in macroscopic group 46 patients were female. Clearing the anterior chamber was longer in macroscopic type (p=0.0001). Intraocular pressure (IOP) was significantly higher in macroscopic hyphema (p=0.007). Four (6/5%) cases of macroscopic hyphema required surgery, but no patient needed surgery in microscopic hyphema (p=0.02). Concomitant injuries to ocular structures like commotio retina, vitreous hemorrhage, retinal hemorrhage, macular hole and corneal epithelium defects were significantly less in macroscopic group than microscopic group (p=0.006).

***Conclusion*:** Despite a higher incidence of microscopic hyphema due to blunt ocular trauma, its secondary complications are rare. Microscopic hyphema do not require hospitalization and short intervals of follow-up examination but require attention to concomitant ocular injury.

***Keywords*:** Microscopic Hyphema, Microhyphema, Macroscopic Hyphema, Blunt trauma, Traumatic Hyphema

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Introduction

Hyphema is the occurrence of blood in the anterior chamber as a result of damage to peripheral vascular iris. Microscopic hyphema (microhyphema) is the occurrence of red blood cells in the anterior chamber noted within 24 hours after trauma.[1] Sometimes the blood is deposited in the anterior chamber and is grossly visible, but in many cases the bleeding is minor and there is only red blood cells floating in the anterior chamber detected by biomicroscopy.[1-3] In microscopic type prognosis seems good and complications such as glaucoma, optic atrophy or corneal blood staining are less common.[1-3]

Clinical course and complications of traumatic macroscopic hyphema has been extensively evaluated[4-9] but there is less information about traumatic microscopic hyphema, its clinical course and complications. The question arises that is microscopic hyphema complication as serious as macroscopic hyphema? Is it needs to close observation or not? Thus we designed a prospective study to enroll all patients with traumatic hyphema referring to our referral ophthalmic center, separating patients with microscopic type and comparing them with the rest that have macroscopic hyphema. To our knowledge there is no prospective study comparing traumatic microscopic and macroscopic hyphema.

Methods

In a prospective observational case series all patients with hyphema caused by blunt trauma and without globe laceration were enrolled and divided to microscopic and macroscopic groups. Patient with coagulopathy disorders, anticoagulant consumption, history of ocular surgery or underlying ocular diseases like glaucoma in the same eye and patients less than 7 years old or patients unable to cooperate for tonometry, funduscopy and gonioscopy were excluded. Study was approved by Ethics committee of Ahvaz Jundishapur University of Medical Sciences.

During the period 21 March 2010 to 20 March 2011 all referred patient with traumatic hyphema to ophthalmic emergency ward of Ahvaz Jundishapur University of Medical Sciences that met inclusion criteria were included in the study. Demographic information, mechanism of trauma, medical and surgical history and medication were recorded. Complete examination including visual acuity (VA) measurement, slit-lamp examination determining the type of hyphema and the degree of macroscopic hyphema, applanation tonometry and funduscopy were performed. Gonioscopy was performed one month after trauma. Concomitant injuries to ocular structures were documented. Rebleeding was considered as blood clot gets larger in macroscopic hyphema and appearing blood clot in microscopic hyphema.

Patients were followed up outpatient daily until the anterior chamber became clear of red blood cell. From then on patients visited one week, one month, three months, six months and one year later. Patients suffering uncontrolled high intraocular pressure (IOP), rebleeding, early sign of corneal blood staining and those who couldn't obey outpatient daily visit were admitted. Need to surgery and type of it was recorded.

At first visit Homatropin 2% drop three times a day and Betamethasone1% drop four times a day were prescribed for all patients and protective eye shield was put on the involved eye. If IOP was greater than 20 mmHg, Timolol maleate 0.5% drop twice a day was prescribed. If IOP was greater than 30 mmHg Dorzolamide 2% drop was added. In the presence of gross hyphema graded 2 or more oral prednisone 1 mg/kg/d was prescribed. Comparison between the two groups was carried out using the chi-square test. A p-value of less than 0.05 was accepted as statistically significant.

Results

Of 197 patients with traumatic hyphema 37 patients were excluded by exclusion criteria. 160 patients who completed examinations and follow-up protocol were enrolled in the study, 99 patients (61.9%) had microscopic and 61 patients (38.1%) had macroscopic hyphema.

Mean of age in microscopic group was 23.82±10.21 years and in macroscopic group was 21.67±10.29 years (p=0.23).

In both groups male involvement was more common so that in macroscopic group 90% were male and in microscopic group 75% were male (p=0.02).

Patients follow-up time was 11 to 20 months (mean=14.33±2.4 months). Absorption time in microscopic group was 8.42±5.44 days and in macroscopic group was 14.79±5.57 days that is significantly longer in macroscopic group (p=0.0001).

Increased IOP in the first visit was significantly more common in macroscopic group (p=0.007) (Table 1).

Concomitant ocular injuries were significantly less common in macroscopic group (p=0.006) (Table 2).

Complications related to hyphema, were significantly more common in macroscopic group (p=0.008) (Table 3).

Secondary increase of IOP happened between third and fifth day after trauma. Rebleeding happened on the third day in one patient of microscopic group and between the third and fourth day in 5 patients of macroscopic group. Corneal blood staining started in 3 patients of macroscopic group. Angle recession was observed in one patient of each group that was associated with PAS in the patient of microscopic group.

Six patients were admitted due to rebleeding, one of them was from microscopic group and the other five patients were in macroscopic group. Corneal blood staining started in three of them and one of them had uncontrolled IOP. The admitted patient of microscopic group improved with medication but the four of admitted patients of macroscopic group needed operation, and the fifth patient improved with medication. Anterior chamber wash out was the procedure performed for the operated eyes. Difference in the need for surgery between the two groups was statistically significant (p=0.002).

Table 1. Elevated intraocular pressure in the first visit in hyphema patients

Group of hyphema	Total number of patients	Number of patients with normal intraocular pressure	Number of patients with increased intraocular pressure
Microscopic	99	94 (94.94%)	5 (5.05%)
Macroscopic	61	49 (80.32%)	12 (19.67%)

Table 2. Concomitant injuries to ocular structures in hyphema patients

Type of injury	Microscopic	Macroscopic	Sum
Without injury	67 (67.67%)	53 (86.88%)	120 (75%)
Commotio retina	27 (27.27%)	6 (9.83%)	33 (20.62%)
Vitrous hemorrhage	7 (7.07%)	3 (4.91%)	10 (6.25%)
Traumatic mydriasis	5 (5.05%)	3 (4.91%)	8 (5%)
Retinal hemorrhage	6 (6.06%)	0	6 (3.75%)
Corneal epithelial defects	4 (4.04%)	2 (3.27%)	6 (3.75%)
Macular hole	1 (1.01%)	0	1 (0.62%)

In some patients, more than one ocular injury have been seen.

Table 3. Complications related to hyphema

Type of complications	Microscopic	Macroscopic	Sum
Without complication	91 (91.91%)	47 (77.04%)	138 (86.25%)
Increased intraocular pressure	7 (7.07%)	11 (18.03%)	18 (11.25%)
Rebleeding	1 (1.01%)	5 (8.19%)	6 (3.75%)
Corneal blood staining	0	3 (4.91%)	3 (1.87%)

Discussion

Traumatic hyphema has extensively been studied but microscopic hyphema (microhyphema) had been studied less and a prospective comparison between microscopic and macroscopic hyphema has not been performed.

The main complication of hyphema is rebleeding with the prevalence of %5 that isn't related to the grade of hyphema.[10] Other complications such as glaucoma, optic nerve atrophy and corneal blood staining have also been reported.[11]

In both macroscopic and microscopic groups most of the patients were males that is similar to other studies because men are in the risk of trauma more than women.[5,11-13]

A large number of patients were in the range of 20-30 years old contrary to some other studies that age range was lower.[5,11,13] This could be related to the exclusion of patients less than seven years old and better care for children now.

For the first time we compared absorption time between macroscopic and microscopic groups and it was significantly longer in macroscopic hyphema.

The most common complication of hyphema in our study was elevation of IOP which is similar to other studies.[4,5] Our study revealed that elevation of IOP in microscopic hyphema is less common than in macroscopic hyphema. Incidence of angle recession in our study was lower than other studies. This difference may be due to different clinical judgment between researchers.

In our study one patient of microscopic hyphema group suffered rebleeding and required hospitalization (1%) that is less than other studies on microscopic hyphema.[1-3] In Recchia study three patients showed rebleeding (1.9%),[3] in Wilson study incidence of rebleeding was reported 5%[2] and in McKinney study three of the 31 eyes rebled (9.6%).[1] We considered rebleeding as appearing blood clot in microscopic hyphema but in Recchia study rebleeding was defied as an increase of floating erythrocytes in anterior chamber (i.e., an increase of at least 10 erythrocytes/high-power field). This difference may be the cause of lower incidence of rebleeding in our study. Wilson and McKinney did not define their assessment of rebleeding.
In our series need to surgery in macroscopic hyphema group was 6.5% but in microscopic hyphema was 0, by now there is not any report in this regard.

In our study commotio retina was the most common concomitant injury to ocular structures and was more common in microscopic type but in Kearns study traumatic mydriasis was the most common concomitant injuries to ocular structures.[6] In Shiuey study corneal abrasion was the most common associated ocular injury and commotio retina was the second.[5] Our study revealed concomitant injury to ocular structures in traumatic microscopic hyphema is less common than in traumatic macroscopic hyphema.

Although management of traumatic hyphema especially type and duration of treatment is controversial,[4-7] management of microscopic hyphema seems straightforward because in our study and other studies about microscopic hyphema[1-3] secondary complications are infrequent. In our opinion outpatient management of microscopic hyphema including relative bed rest, eye shield, control of IOP, topical corticosteroid and cycloplegic in the presence of inflammation and pain is judicious.

This study has some limitations including lack of coverage of all cases because patients less than seven years old and non-cooperative patients were excluded and number of patients is not high.

Conclusion

Although microscopic hyphema is more common but has less secondary complications and better prognosis comparing to macroscopic type. As hyphema patients are admitted only if they need surgery, microscopic hyphema will not require hospitalization and short intervals of follow-up examination but require attention to concomitant ocular injury.

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