Is topical corticosteroid necessary in traumatic hyphema?

Les corticostéroïdes topiques sont-ils nécessaires dans l’hyphéma traumatique?

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Summary

Purpose. — To compare the outcomes in the management of traumatic hyphema treated with topical corticosteroid plus supportive therapy versus only supportive therapy.

Patients and methods. — In this retrospective study, 206 patients were divided into two groups; group I, 98 eyes were treated with topical corticosteroid 12 × 1 and supportive therapy including bed rest, keeping the head elevated (45 degrees), and hydration. In group II, 108 eyes were treated with only supportive therapy. Hyphema size, initial and final visual acuities and intraocular pressure, time to hyphema clearance, and incidence of rebleeding were evaluated.

Results. — The time needed for hyphema resorption in the two groups were 60.25 ± 33.9 and 62.3 ± 28.9 hours respectively (P = 0.62). There was no significant difference in rebleeding rate between the topical corticosteroid group (4.01%) and non-steroid group (6.48%) (P = 0.67). The initial and final visual acuities were similar in the two groups (P = 0.86). In Groups I and II, the average intraocular pressures were 19.7 ± 8.01 and 14.2 ± 10.2 mmHg respectively. The difference between the two groups was statistically significant (P = 0.04).

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Introduction

Hyphema (blood in the anterior chamber) occurs mainly by blunt or lacerating trauma. In the literature, two thirds of traumatic hyphemas are due to blunt ocular trauma [1,2]. Complications of traumatic hyphema such as increased intraocular pressure, secondary hemorrhage, optic atrophy, and corneal bloodstaining can cause worse visual acuity [3–5]. For this reason, physicians should prevent these complications early and ensure the recovery. Some suggestions about treatment are: use of various medications (e.g., cycloplegics, systemic or topical steroids, antifibrinolytic agents, analgesics, and antiglaucoma medications); the patient’s activity restriction; use of a patch and shield; outpatient vs. inpatient management; and medical vs. surgical management [6]. Despite the fact that much has been written on this subject, the management of traumatic hyphema still remains controversial. In this paper, we aimed to explore the effectiveness of topical steroid with supportive therapy (bed rest, activity restriction, water supplement) against only supportive therapy in traumatic hyphemas without serious complications.

Material and methods

From February 2009 to April 2013, 206 patients with the diagnosis of hyphema due to blunt trauma of the globe were reviewed retrospectively. Patients with open globe injury, preexisting eye pathological features, prior intraocular surgery, a history of aspirin usage, and a concomitant ocular pathology which affect the final visual acuity and IOP such as iridodialysis, lens subluxation, traumatic cataract, retinal detachment, macular edema were excluded. The study was approved by the ethics committees of the institutions and was conducted in accordance with the Declaration of Helsinki.

According to the files of patients, at the initial examination a detailed history had been taken about the mechanism of trauma, also a general medical history about other systemic diseases and medications used. All patients had been hospitalized. Patients had been monitored daily with ocular examination and vital sign testing for the five days of treatment. The eye examination included visual acuity with Snellen charts, pneumatic tonometry, slit-lamp biomicroscopy, and fundus examination. Gonioscopy was performed two weeks after the hyphema was absorbed to avoid the risk of rebleeding. In certain cases, the patients underwent orbital tomography.

The hyphema size was graded according to the percentage of the anterior chamber filled with blood. Grade 1 occupied less than one third of the anterior chamber (Fig. 1), Grade 2 greater than one third but less than half of the anterior chamber, Grade 3 one half or more of the anterior chamber, Grade 4 was a complete blood clot in the anterior chamber 2. A secondary hemorrhage was defined as an

Conclusion. — Patients who were treated with topical corticosteroids were no less likely to experience a rebleed or a poor visual outcome than those treated with supportive therapy alone. Supportive therapy alone may be convenient and cost-effective management strategy in uncomplicated traumatic hyphema.

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increase in the measured quantity of layered blood in the anterior chamber. In grade 4, hyphema secondary hemorrhage was defined as the appearance of fresh blood over old clots in the anterior chamber (Fig. 2).

Patients were divided into two groups; group I, 98 eyes were treated 12 times a day with topical corticosteroid eye drops (Pred forte, Allergan, USA) and three times a day with a cycloplegic agent (Tropamid, Bilim, Turkey), bed rest and to keep the head elevated (45 degrees), water supplement. The steroid treatment was continued 12 times a day for five days and ended by decreasing the dose. In group II, 108 eyes were treated three times a day with a cycloplegic agent, bed rest and to keep the head elevated (45 degrees), water supplement but were not received topical corticosteroids. The treatment effectiveness had been assessed with final (one month after the presentation) visual acuities and intraocular pressure (IOP), time to hyphema clearance, incidence of secondary hemorrhage, time to secondary hemorrhage.

SPSS 11.5 (Chicago, IL, USA) software program was used for statistical analysis. Chi² test was used to analyze age and gender distribution of the patients. Visual acuities were converted from Snellen scale to the logarithm of the minimum angle of resolution (logMAR) for statistical analyses. Separate multivariate logistic regressions were used to explore the association between the grade of hyphema, final visual acuity and the elevation of IOP. The Mann Whitney U test was used for analyzing the outcomes of two independent groups.

### Table 1: Grade of hyphema on initial examination in two groups.

<table>
<thead>
<tr>
<th>Grade of hyphema</th>
<th>Group I n (%)</th>
<th>Group II n (%)</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38 (38.7)</td>
<td>42 (38.8)</td>
<td>0.725</td>
</tr>
<tr>
<td>2</td>
<td>32 (32.6)</td>
<td>40 (37.0)</td>
<td>0.536</td>
</tr>
<tr>
<td>3</td>
<td>16 (16.3)</td>
<td>14 (12.9)</td>
<td>0.812</td>
</tr>
<tr>
<td>4</td>
<td>12 (12.2)</td>
<td>12 (11.1)</td>
<td>0.892</td>
</tr>
</tbody>
</table>

* Multivariate logistic regression.

P values less than 0.05 were considered as statistically significant.

### Results

There were 18 female and 80 male patients with a mean age of 27.1 ± 10.1 years (8–66 years) in group I. In group II, there were 22 female and 86 male patients and the mean age was 28.7 ± 12.7 years (10–72 years).

The hyphema sizes on the initial examination were summarized in Table 1. In group II, patients with grade 2 hyphema have a little larger number than group I, but the difference of initial hyphema size between two groups was not significant statistically (P = 0.536).

The time needed for hyphema resorption in groups I and II were respectively 60.25 ± 33.9 and 62.3 ± 28.9 hours, the difference between two groups was not statistically significant (P = 0.62).

Rebleeding occurred in 4 eyes of 98 patients in group I (4.01%), seven eyes of the 108 patients in group II (6.48%) between 2nd and 7th days. There was no significant difference in rebleeding rate between two groups (P = 0.67).

The initial and final visual acuities in groups were summarized in Table 2. The difference between two groups was not statistically significant (P = 0.86).

The initial and final IOP in groups were summarized in Table 3. In group I, the average IOP was 19.7 ± 8.01 mmHg, and in group II, it was 14.2 ± 10.2 mmHg. The difference between two groups was statistically significant (P = 0.04). In group I, there were 31 patients with elevated IOP and 34 patients in group II. The initial average IOP of these patients were respectively 29.4 ± 8.1 mmHg and 26.7 ± 10.2 mmHg. They were controlled medically (timolol, dorzolamide, brimonidine or combinations). The

![Figure 1](image1.png) Grade 1 traumatic hyphema.

![Figure 2](image2.png) Grade 4 traumatic hyphema.
Table 3  The initial and final intraocular pressure in groups.

<table>
<thead>
<tr>
<th>IOP (mmHg)</th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial (n)</td>
<td>Final (n)</td>
</tr>
<tr>
<td>0–10</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>11–20</td>
<td>62</td>
<td>68</td>
</tr>
<tr>
<td>21–30</td>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td>31–40</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>≥41</td>
<td>4</td>
<td>—</td>
</tr>
</tbody>
</table>

IOP: intraocular pressure.

The final average IOP of these patients were 20.4 ± 6.1 mmHg and 19.7 ± 8.2 mmHg. There were three patients in group I with 32.7 ± 8.1 mmHg average IOP and five patients with 34.4 ± 7.2 mmHg IOP in group II who underwent anterior chamber washout to control the elevated IOP. The average IOPs in these patients were respectively 22.4 ± 2 mmHg and 21.6 ± 3.1 mmHg in groups.

Discussion

The aim of our study was to investigate whether only supportive therapy is sufficient or topical steroid is necessary in the management of traumatic hyphema. And we observed that there was no significant difference in final visual acuities and IOP, time to hyphema clearance, and incidence of secondary hemorrhage between topical steroid group and only supportive therapy group.

The main goal in management of hyphema is to prevent secondary hemorrhage and IOP elevation. Because rebleeding is associated with serious ocular complications such as elevated IOP, corneal bloodstaining, worse visual acuity [6,7]. The treatment of hyphema includes two therapy type; pharmacological therapy and supportive therapy (e.g. bed rest, eye patching, water drinking). In pharmacological therapy, there are a lot of alternative drugs such as systemic antifibrinolytic agents (aminocaproic acid, tranexamic acid), topical aminocaproic acid, systemic corticosteroids, topical corticosteroids, conjugated estrogens, cycloplegic agents. The using of systemic antifibrinolytic agents has been limited because of the systemic complications. They can cause systemic hypotension, renal dysfunction, and also retinal artery and vein occlusion [8,9].

Corticosteroids use in treatment of hyphema because of the blood-ocular barrier stabilizing effect. Because after the blunt trauma generally blood-ocular barrier can damage, and some fibrinolytic plasma proteins release into the anterior chamber, and increase the risk of rebleeding [10]. Agapitos et al. [11] reported that the incidence of secondary hemorrhage was 7.6% (24 of 316 patients) who treated with an antifibrinolytic agent or topical steroids. They observed the risk of rebleeding did not correlate with the patient’s age, use of topical steroids, or cycloplegics. In a retrospective review, Witteman et al. [12] did not find a reduced incidence of secondary hemorrhage associated with topical steroid use. However, in Ng et al.’s [13] study, their data have demonstrated that topical steroid therapy reduced approximately half the incidence of rebleeding in patients with traumatic hyphema. A 6.6% rebleeding rate was calculated for the group of patients treated with only topical steroids vs. a 12% rebleeding rate for the group treated without drugs. But these authors did not report the dose of the topical steroids.

In our study, final visual acuities of patients improve in two groups, because there were not concomitant ocular pathology which affect the final visual acuity such as lens subluxation, traumatic cataract, cystoid macular edema, retinal detachment. Several publications demonstrate that hyphema without further complications has a good visual acuity prognosis and no intervention had a significant effect on visual acuity. And poor visual acuity is generally related to lens or posterior segment lesions [4,8,14–17].

In our study; in two groups, the final average IOPs were in normal limits, but in group I the IOP was higher than group II, although the sizes of hyphema were similar. In patients with hyphema, IOP can raise in acute phase because of trabecular meshwork blockage by clot, red blood cells, or inflammatory debris [3,14,18,19]. And also high dose steroids may suppress phagocytic activity which may lead to observations such as clot, red blood cells, inflammatory debris or increased deposition of material in the juxtaocular meshwork of eyes [20,21]. Our patients in group I received high dose steroid (prednisolone asetat, 12 times a day), and our IOP outcomes may be due to high dose steroid.

Conclusion

In conclusion, patients who were treated with topical corticosteroids were not less likely to have rebleed or a poor visual outcome than those treated with supportive therapy alone. Result of this current study is that only supportive therapy may be convenient and cost-effective management strategy in traumatic hyphema. Also, we observed that topical steroids can raise IOP after the treatment of hyphema due to blunt trauma. We should avoid unnecessary use of topical steroids in traumatic hyphema without serious complications.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

References

Efficacy of topical steroid in traumatic hyphema