

Ten-year review of traumatic hyphaema cases in a tertiary hospital in the east coast of Malaysia

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Abstract

Purpose: Traumatic hyphaema is a common sequela following blunt trauma. The aim of this study was to analyse the demographics, complications, and visual outcome of patients presenting with traumatic hyphaema at a tertiary hospital in the East Coast of Malaysia.

Methods: Retrospective study based on medical records from 2011 to 2021.

Results: A total of 41 eyes from 41 patients were included in the study. The mean age of patients was 22.2 years (± 15.1 SD), with 39.1% within 25–59-years of age. The incidence was higher among males (90.2%). Sports and recreational activities were the most common causes (61.0 %), followed by occupational (12.2%) and domestic causes (12.2%). More than half the patients sought treatment within 24 hours of injury (56.1%). The majority of patients presented with grade 1 hyphaema (68.3%), while 2.4% came with severe hyphaema (grade 4). Re-bleeding was noted in 2 patients, both were below 12 years old, on day three and day eleven respectively. Six patients (14.6%) had presenting intraocular pressure IOP > 30 mmHg. Mean presenting visual acuity was 6/36 (± 0.89 SD) and mean visual acuity post-treatment was 6/7.5 (± 0.15 SD). There was a significant difference between mean presenting visual acuity and visual outcome ($p < 0.05$).

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Conclusion: Despite serving mainly a rural population, sports and recreational activities remained the most common cause of traumatic hyphaema in this centre. Raising public awareness for protective eyewear should be advocated in this population.

Keywords: east coast Malaysia, ocular blunt injury, ophthalmic trauma, traumatic hyphaema

Kajian semakan selama sepuluh tahun kes kes hyphaema akibat kecederaan di hospital tertiary yang terletak di Pantai Timur Malaysia

Abstrak

Tujuan: Hyphaema merupakan sekuela yang sering terjadi akibat kecederaan objek tumpul. Tujuan kajian ini adalah untuk menganalisa demografi, komplikasi dan tahap penglihatan pesakit yang mengalami hyphaema akibat kecederaan di salah sebuah hospital tertuari yang terletak di pantai timur Malaysia.

Kaedah: Kajian retrospektif berdasarkan rekod perubatan dari tahun 2011 hingga 2021.

Keputusan: Sebanyak 41 mata daripada 41 orang pesakit telah terlibat dalam kajian ini. Purata umur pesakit adalah 22.2 (\pm 15.1) tahun, di mana 39.1% daripadanya berumur antara 25–59 tahun. Kebanyakan melibatkan pesakit lelaki (90.2%). Aktiviti sukan dan rekreasi merupakan penyebab utama (61.0%) berlakunya hyphaema traumatik diikuti oleh kecederaan akibat kecederaan sewaktu bekerja (12.2%) dan kecederaan domestik (12.2%). Lebih daripada separuh pesakit (56.1%) mendapatkan rawatan dalam tempoh 24 jam. Kebanyakan pesakit datang dengan hyphaema gred 1 (68.3%) sementara hanya 2.4% datang dengan hyphaema gred 4. Pendarahan berulang berlaku pada dua pesakit, kedua-duanya berumur di bawah 12 tahun. Seramai enam orang pesakit (14.6%) merekodkan tekanan intraokular (IOP) melebihi 30 mmHg. Purata tahap penglihatan sebelum rawatan adalah 6/36 (\pm 0.89) dan purata tahap penglihatan setelah rawatan adalah 6/7.5 (\pm 0.15). Terdapat perbezaan ketara secara statistik antara tahap penglihatan sebelum dan sesudah rawatan ($p < 0.05$).

Kesimpulan: Walaupun kajian ini melibatkan penduduk luar bandar, aktiviti sukan dan rekreasi kekal menjadi penyebab terbesar hyphaema traumatik. Usaha untuk meningkatkan tahap kesedaran tentang kepentingan penggunaan alat pelindung mata seharusnya lebih digiatkan dalam masyarakat untuk mencegah terjadinya kecederaan ini.

Kata kunci: hyphaema traumatik, kecederaan tumpul pada mata, pantai timur Malaysia

Introduction

Hyphaema can be defined as the accumulation of red blood cells in the anterior chamber of the eye. Traumatic hyphaema is a common sequela following ocular blunt trauma and one of the most frequent causes of presentation to the emergency department.^{1,2} To date, the annual incidence of traumatic hyphaema is 17 to 20 per 10,000. Approximately 38% of traumatic hyphaema is caused by blunt, non-penetrating ocular injuries.^{3,4} Although it usually carries a good prognosis, the poor visual outcome of traumatic hyphaema is also related to the presence of complications such as secondary glaucoma, re-bleeding, and corneal blood staining, as well as the presence of associated ocular injuries, such as posterior segment involvement.⁴⁻⁶ The aim of this study is to analyse the demographics, complications, and visual outcome of patients with traumatic hyphaema following blunt trauma at a tertiary hospital on the east coast of Malaysia.

Methods

This is a 10-year retrospective study of patients with traumatic hyphaema due to ocular blunt injuries who were referred to a tertiary hospital in the east coast of Malaysia from 2011 to 2021. Ethical approval for this study was obtained from by the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH). The data for this study was collected from medical records between January 2011 and December 2021. The collected data included demographic data (age, sex, cause of injury, history of bleeding diathesis or taking blood-thinning medication, ocular comorbidities), baseline clinical presentation including visual acuity, grade of hyphaema, intraocular pressure (IOP), interventions and complications during treatment (medical or surgical treatment, presence of secondary glaucoma, and re-bleeding), and follow-up (6 months).

The records of all patients that were referred to or sought treatment at this tertiary hospital from January 2011 to December 2021 were included in this study. Individuals with traumatic hyphaema who did not complete the treatment were excluded from the study. Completion of treatment was defined as total disappearance of hyphaema regardless of duration of treatment.

The mechanism of injury was classified into 5 major groups: sports and recreational, occupational, domestic injury, motor vehicle accident and assault-related injury. Sports and recreational-related injuries were then grouped into shuttlecock, football (field football and futsal), and others (including firecrack-

ers, stones or pebbles, toy guns, and rubber band injuries). Domestic injuries included injuries that happened at home such as a fall or accidents while doing daily activities.

The patients were grouped as children (≤ 14 years), adolescents (15–24 years), adults (25–59 years), and elderly (> 60 years) based on the age group standardised by the World Health Organization (WHO).⁷ Visual acuity was documented using the Snellen notation and converted to logMAR units for statistical analysis.

Hyphaema levels were graded according to Edward and Layden:

- Grade 0: dispersed red blood cells with no visible layering (microhyphaema).
- Grade 1: layered blood occupying less than one third of the anterior chamber.
- Grade 2: layered blood occupying one third to less than the total of the anterior chamber.
- Grade 3: layered blood occupying half to less than total of the anterior chamber.
- Grade 4: total filling of the anterior chamber with blood or a blood clot.⁸

IOP at presentation was classified into:

- normal: less than 21 mmHg
- mild elevation: 21–25 mmHg,
- moderate elevation: 25–30 mmHg,
- highly elevated: more than 30 mmHg.

Re-bleeding was defined as a significant increase in the measurement of the level of blood in the anterior chamber, the appearance of fresh blood over an organised clot, or a recurrence of layering after the blood in the anterior chamber had completely cleared. In the setting of a Grade 4 hyphaema, re-bleeding was defined as the appearance of fresh blood over old clots in the anterior chamber.⁹

Medical treatment included bedrest and topical eye drops, such as topical dexamethasone for inflammation control and antiglaucoma eye drops for high IOP. Systemic antiglaucoma medications, such as oral acetazolamide and intravenous mannitol, were given to those whose IOP was uncontrolled. Surgical evacuation of the blood was performed when IOP reached 50 mmHg for more than 5 days or 30 mmHg for more than 7 days despite maximal antiglaucoma medications; when there was no sign of absorption of blood within 3–4 days after injury in patients with total hyphaema; and when there was impending corneal blood staining.⁸

Results

Of 52 patients who presented with traumatic hyphaema, only a total of 41 eyes from 41 patients were eligible for this study. Eleven patients who received initial treatment did not complete the treatment and were excluded from this study. The demographic distribution is shown in Table 1. None of the patients had history of bleeding diathesis. Two patients were on antiplatelet medication at the time of the injury.

An overwhelming majority of the injuries occurred in males and in the age group of 25–59 years. There were almost 4 times more injuries in male children compared to female children. The predominant mechanism of injury was sports-related (Table 2). Other types of injury included firecrackers (7.3%), stones or pebbles (7.3%), toy guns (4.9%), and rubber bands (2.1%). Palm field-related

Table 1. Demographics of the study population

Gender	Age group				Total n (%)
	< 14 years (children)	15–24 years (adolescents)	25–59 years (adults)	≥ 60 years (elderly)	
Female	3	0	0	1	4 (9.8)
Male	11	10	16	0	37 (90.2)
Total n (%)	14, (34.1)	10, (24.4)	16, (39.1)	1, (2.4)	41 (100)

Table 2. Mechanism of injury in the study population

Mechanism of injury	n	(%)
Sports and recreational	25	61.0
Shuttlecock	11	26.8
Football	4	9.8
Others	10	24.4
Occupational	5	12.2
Palm fruit/leaves	4	9.8
Wrench	1	2.4
Domestic	5	12.2
Motor vehicle accident	4	9.7
Assault	2	4.9

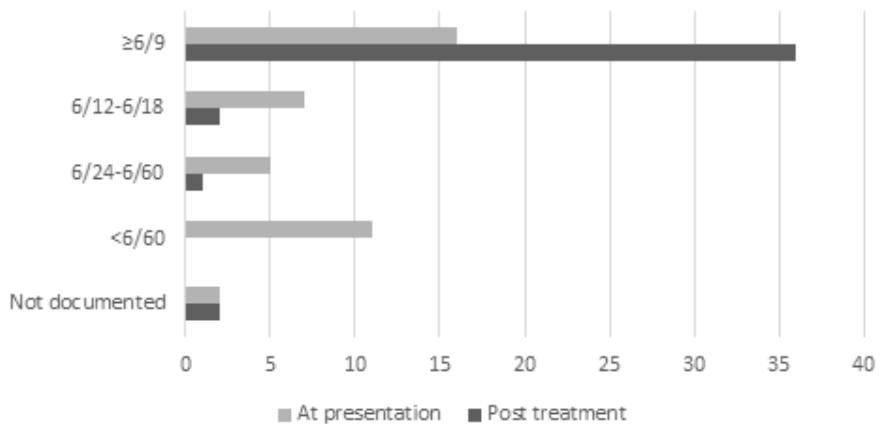


Fig. 1. Visual acuity at presentation and post-treatment.

injury occurred most frequent for hyphaema caused by occupational injury.

More than half the patients sought treatment within 24 hours of their injury (56.1%), and only two patients (4.8%) sought treatment after 72 hours. Most of the cases presented with Grade 1 hyphaema (68.3%), followed by Grade 0 hyphaema (19.5%), and only one patient with Grade 4 hyphaema. The mean presenting IOP was 19.6 mmHg (± 9.43 SD), with more than two-thirds having non-elevated IOP ($n = 30$). Six patients (14.6%) presented with IOP greater than 30 mmHg.

Mean presenting Snellen visual acuity was 6/36 (± 0.89 SD). Sixteen patients (39.0%) presented with moderate to severe visual impairment (less than 6/24). Most of them ($n = 11$, 68.8%) were caused by sports and recreational-related injury, while more than one-third of them were children ($n = 6$, 37.5%).

Two patients developed re-bleeding. A further two patients required surgical intervention (anterior chamber washout) due to IOP not returning to normal levels despite maximal medical treatment. Two patients developed secondary angle-recession glaucoma after four months of follow-up. Mean visual acuity post-treatment was 6/7.5 (± 0.15 SD). None of the patients had a worse visual outcome than 6/60, and 7.2% had mild to moderate visual impairment post-treatment (6/12 to 6/60, Fig. 1). There was a significant difference ($p < 0.05$) between mean presenting visual acuity and visual outcome. We found no statistical association between age, time of presentation, grade of hyphaema, presenting IOP, re-bleeding, and visual outcomes.

Discussion

Our study is the first to report the epidemiology of traumatic hyphaema in blunt ocular trauma in Terengganu, one of the states located on the east coast of Malaysia. The latest estimated population of the state is 1.19 million, with *bumiputera* (Malays and Orang Asli) comprising 95.4% of the population. The working age population (15–64 years of age) comprises 65.8% of the population and children below the age of 14 years comprise 28.4% of the population. There is only one tertiary hospital in this state, which serves mostly rural populations.¹⁰

Limited access to medical facilities and low awareness of eye care might be the reasons for the small number of subjects in this study. Approximately half the subjects sought treatment after 24 hours, and 4.8% sought treatment after 72 hours, which might reflect the low awareness of ophthalmic health care among the population.

The male-to-female ratio in this study was 9:1, almost similar to a study from Jakarta, Indonesia but higher than most other studies.^{3,6,8,9,11} The high number of males involved in activities that are prone to ocular trauma reflects the imbalanced ratio. We also found that the incidence of traumatic hyphaema was highest in adults, similar to previous studies. This likely reflects the high engagement in sports and recreational activities in this age group.^{6–8} Children aged less than 14 years ranked second, with an incidence 3 times higher in males. This gender bias likely reflects the more adventurous activities among boys.

Sports and recreational activities ranked first for the mechanism of injury for traumatic hyphaema in our centre. Shuttlecock-related injuries accounted for most of the injuries (11 of 25 cases). This finding is similar to that of the earlier study conducted in an urban area of Malaysia.¹² Like other studies, occupational-related injury placed as the second most common cause of traumatic hyphaema, with the majority occurring in the palm fields.^{6,9} Theoretically, these two common causes of injury could be prevented by wearing protective eyewear. This could be due to a lack of awareness of preventive measures or a lack of access to protective eyewear.

While poor visual outcome could be linked to some factors in other studies, such as age, concurrent injuries, and complications, this study could not find any significant differences in factors that could cause poor visual outcome.^{5,6,9} The limitations of this study are its small sample size and low incidence of complications, which made identifying associated risk factors challenging.

Conclusion

In conclusion, despite serving a mainly rural population, sports and recreational activities remained the most common cause of traumatic hyphaema in the east coast of Malaysia. Public awareness about the importance of protective eyewear should be promoted in this population.

Declarations

Ethics approval and consent to participate

Ethical approval for this study was obtained from by the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH).

Competing interests

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References

1. Jan S, Khan S, Mohammad s. Hyphaema due to blunt trauma. *J Coll Physicians Surg Pak.* 2003;13(7):398–401. <https://doi.org/07.2003/jcpcsp.398401>
2. Ashaye AO. Traumatic hyphaema: a report of 472 cases. *BMC Ophthalmol.* 2008;8:24. <https://doi.org/10.1186/1471-2415-8-24>
3. Kennedy RH, Brubaker RF. Traumatic hyphaema in a defined population. *Am J Ophthalmol.* 1988;106(2):123. [https://doi.org/10.1016/0002-9394\(88\)90822-7](https://doi.org/10.1016/0002-9394(88)90822-7)
4. Chen A, McGwin G Jr, Justin GA, Woreta FA. The United States Eye Injury Registry: Past and Future Directions. *Ophthalmology.* 2021 May;128(5):647-648. <https://doi.org/10.1016/j.ophtha.2020.11.026>
5. Cho J, Jun BK, Lee YJ, Uhm KB. Factors associated with the poor final visual outcome after traumatic hyphaema. *Korean J Ophthalmol.* 1998;12(2):122–129. <https://doi.org/10.3341/kjo.1998.12.2.122>
6. S Simanjuntak GW, Farinthska G, M Simanjuntak GA, Artini W, Natali R. Risk factors for poor visual outcome in traumatic hyphaema: Jakarta eye trauma study. *Niger J Clin Pract.* 2018 Jul;21(7):921-924. https://doi.org/10.4103/njcp.njcp_251_17
7. Department of Economic and Social Affairs Population Division, United Nation. World population ageing. 2015. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2015_Report.pdf

8. Edwards WC, Layden WE. Traumatic hyphaema. A report of 184 consecutive cases. *Am J Ophthalmol.* 1973;75:110–116. [https://doi.org/10.1016/0002-9394\(73\)90659-4](https://doi.org/10.1016/0002-9394(73)90659-4)
9. Iftikhar M, Mir T, Seidel N, et al. Epidemiology and outcomes of hyphaema: a single tertiary centre experience of 180 cases. *Acta Ophthalmol.* 2021 May;99(3):e394-e401. <https://doi.org/10.1111/aos.14603>
10. Jabatan Perangkaan Malaysia. Laporan sosioekonomi negeri Terengganu 2022. Available from: <https://open.dosm.gov.my/>
11. Low RC. The management of traumatic hyphaema. *Singapore Med J.* 1975;16(2):122–127.
12. Ulagantheran V, Ahmad Fauzi MS, Reddy SC. Hyphaema due to blunt injury: a review of 118 patients. *Int J Ophthalmol.* 2010;3(3):272-6. <https://doi.org/10.3980/j.issn.2222-3959.2010.03.22>