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# **Protecting Sight in Sports: Traumatic Eye Injuries in Badminton Players - A Case Series Report**

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**Keywords:** Traumatic eye injuries, badminton, traumatic hyphema, post-traumatic mydriasis, secondary glaucoma, protective eyewear.

#### Case 1

A ten-year-old male presented to eye OPD with complaints of severe photophobia and pain in right eye after a history of sustaining injury to eye with badminton shuttle cork two days back. The symptoms were gradually progressive and associated with blurring of vision. On evaluation he was found to have distant visual acuity of 6/18 in affected eye. Intraocular pressure in affected eye was 20 mmHg as measured by Goldmann Applanation Tonometry (GAT). Anterior segment evaluation revealed traumatic hyphema covering one-third of anterior chamber, a thick organised immobile clot filled the lower third of anterior chamber. Pupils were Central Circuar Reacting to Light (CCRL). Dilated evaluation revealed Commotio Retinae (CR) in infero-

## Abstract

**Background:** Traumatic eye injuries are a significant risk in badminton, potentially leading to long-term visual impairment.

**Methods:** We present a case series of three badminton players who sustained traumatic eye injuries, highlighting varying presentations, management strategies, and outcomes.

**Results:** Case 1 demonstrated resolution of traumatic hyphema with conservative management. Case 2 presented with post-traumatic mydriasis, managed with topical steroids and cycloplegics. Case 3 developed secondary glaucoma requiring surgical intervention.

**Discussion:** Prompt recognition and management of traumatic eye injuries are crucial. Traumatic hyphema requires monitoring for secondary glaucoma and other complications. Surgical intervention may be necessary in cases with uncontrolled IOP or significant vision loss.

**Conclusion:** This case series emphasizes the importance of prompt and appropriate management of traumatic eye injuries in badminton players to prevent long-term visual impairment. Protective eyewear and education on safety precautions are essential preventive measures.

temporal quadrant. The patient was managed with topical cycloplegics, steroids in tapering doses and topical antiglaucoma medication. Hyphema resolved completely in a period of ten days and the CR resolved completely with no residual signs of trauma in fundus. Visual acuity at the end of two weeks resumed to 6/6. A follow up gonioscopy after one month showed open angles in all four quadrants.

# Case 2

A thirty-year-old male reported to eye OPD with history of his left eye being hit by a shuttle cork while playing a friendly match. The impact was followed by sudden onset diminution



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of vision, which he describes as suddenly wiped vision. However, with rest he noticed there was improvement in his vision. He describes, 'by the time he reached the clinic his vision had significantly improved'. On evaluation he was found to have distant visual acuity of 6/6 in the affected eye. Intraocular pressures were 24 in the affected eye. Slit lamp evaluation showed a streak of blood settled at bottom of anterior chamber with dispersed microhyphema. There was some corneal endothelial staining. Iris showed multiple sphincter tears between 5'o clock and 7'o clock position. Fundus evaluation showed large cups in both the eyes with good Retinal Nerve Fibre Layer (RNFL) thickness bilaterally. He was managed with topical steroids and cycloplegics. A detailed Optic Nerve Head (ONH) evaluation showed physiologically large cups in both eyes. Follow up evaluation revealed a distant visual acuity of 6/9 and near visual acuity of N8 in the affected eye with no further improvement. Gonioscopy after two months showed open angles. He was diagnosed as a case of post traumatic mydriasis.

#### Case 3

A thirty-two-year-old man, known to be an active sportsperson injured his right eye while playing badminton as the shuttle hit his eye. Following the trauma he developed gradually progressive pain and diminution of vision. On reporting at eye Opd he was found to have IOP of 60 mmHg with corneal stromal and microcystic edema. There was microhyphema in anterior chamber with two mm of hyphema at bottom of anterior chamber and a mid-dilated, sluggishly reacting pupil. He was managed with topical steroids, cycloplegics and topical and systemic IOP lowering agents. However, on day five the IOP with Maximal Medical Therapy (MMT) remained 58mmHg. The patient was taken for surgical drainage of hyphema on day six. IOP settled to 36mmHg on post-operative day one with MMT. However, on day ten his IOP shot to 62 mmHg. A gonioscopy and Ultrasound Biomicroscopy (UBM) revealed swelling of trabecular meshwork 270 degree. Due to poor control of IOP with MMT patient was taken up for trabeculectomy on day 12. Post-operatively his IOP came to 12 mmHg. On follow up visit at day 15 he was found to have distant visual acuity of 6/9 in affected eye with iop of 14 mmHg.





Figure 2: Traumatic hyphema in a ten year old male during badminton play (case 1).



**Figure 3:** Sphincter tears in a case of trauma during badminton play (case 2) after resolution of hyphema. Multiple sphincter tears can be seen between 5'o clock and 7'o clock.

#### Discussion

This case series highlights the variety of presentations and outcomes of traumatic eye injuries sustained during badminton play. The three cases demonstrate the importance of prompt and appropriate management in achieving favourable visual outcomes.

#### Traumatic hyphema

Traumatic hyphema, as seen in Cases 1 and 3, is a common complication of blunt eye injuries (Spaeth, 1975) [1]. The management of traumatic hyphema involves topical steroids, cycloplegics, and antiglaucoma medication to reduce inflammation, prevent synechiae formation, and control Intraocular Pressure (IOP) (Kunik et al., 2017) [2]. In Case 1, the patient responded well to medical management, with complete resolution of hyphema on conservative management. However, in Case 3, the patient developed secondary glaucoma, requiring surgical intervention.

#### Surgical drainage of hyphema

The timing of surgical drainage for traumatic hyphema remains a topic of debate among ophthalmologists. The decision to proceed with surgery depends on various factors, including the severity of the hyphema, Intraocular Pressure (IOP), and visual acuity.

# Indications for early surgical drainage (< 5-7 days)

- 1. Severe hyphema (> 50% of anterior chamber) (Kunik et al., 2017) [2]
- High IOP (> 35 mmHg) despite maximal medical therapy (Ahmed et al., 2019) [3]
- Significant vision loss (visual acuity < 20/200) (Jampel et al., 2018) [5]</li>
- 4. Presence of corneal blood staining or endothelial damage (Lam et al., 2018) [4]

# Benefits of early surgical drainage

- 1. Reduced risk of secondary glaucoma (Kunik et al., 2017) [2]
- 2. Improved visual outcomes (Jampel et al., 2018) [5]
- 3. Decreased risk of corneal complications (Lam et al., 2018) [4]

In case 3 the patient had persistently raised intraocular pressure (>35 mmHg) with severe diminution of vision. A delayed drainage in such cases is likely to complicate the case with increased risk of secondary glaucoma (Kunik et al., 2017) [2], Permanent vision loss (Jampel et al., 2018) [5], Corneal endothelial decompensation (Lam et al., 2018) [4]. Thus, delayed surgical drainage (> 7-10 days) may be considered for mild hyphema with controlled IOP and stable vision.

#### Post-traumatic mydriasis (PTM)

The condition can result from various types of trauma, including blunt, penetrating, or concussive injuries. Case 2 presented with post-traumatic mydriasis, characterized by sudden onset diminution of vision and mydriasis.

PTM is thought to result from, trauma-induced disruption of the iris sphincter muscle (Lam et al., 2018) [4], damage to the oculomotor nerve (III cranial nerve) (Kunik et al., 2017) [2], release of inflammatory mediators and chemical transmitters (Ahmed et al., 2019) [3].

PTM is known to cause, sudden onset dilation of the pupil, decreased reactivity to light and decreased visual acuity. However, in case 2, the patient's visual acuity was not significantly affected.

#### Trabecular meshwork swelling in traumatic hyphema

Trabecular Meshwork Swelling is known to clinically present with, elevated IOP (>35 mmHg), reduced aqueous outflow facility, gonioscopic evidence of TM swelling and increased risk of secondary glaucoma. Management protocol in less severe cases involves, topical corticosteroids and cycloplegics to reduce inflammation and IOP-lowering medications (e.g., beta-blockers, prostaglandin analogs). In refractory cases, surgical intervention (trabeculectomy) may be warranted.

European Glaucoma Society (EGS) suggests UBM and OCT imaging to monitor TM changes (EGS, 2020) [6]. American Academy of Ophthalmology (AAO) recommends prompt treatment of TM swelling to prevent secondary glaucoma (AAO, 2019) [5]. In case 3, surgical intervention significantly altered the course of disease.

## Key considerations

- 1. Prompt recognition and management of traumatic eye injuries are crucial in preventing long-term visual impairment (Kunik et al., 2017) [2].
- Traumatic hyphema requires careful monitoring for secondary glaucoma and other complications (Ahmed et al., 2019) [3].
- 3. Surgical intervention may be necessary in cases with uncontrolled IOP or significant vision loss (Jampel et al., 2018) [5].
- 4. Regular follow-up is essential to monitor IOP and visual acuity.

#### Preventive measures

- 1. Protective eyewear should be mandatory for badminton players (Mihalik et al., 2017) [8].
- Education on proper playing techniques and safety precautions can reduce the risk of eye injuries (Solberg et al., 2017) [9].

## Conclusion

This case series highlights the importance of prompt and appropriate management of traumatic eye injuries sustained during badminton play. Ophthalmologists should be aware of the potential complications, including secondary glaucoma, and take a proactive approach to prevent long-term visual impairment.

## **Author declarations**

## **Conflict of interest**

The authors have no conflict of Interest.

#### Consent

A written consent was taken from all the patients.

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