

# Blunt Ocular Trauma Commonly Presenting to the Emergency Department: A Case Series from a Tertiary Care Hospital in Banaskantha, Gujarat, India

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## ABSTRACT

Blunt ocular trauma is a leading cause of ocular morbidity and visual impairment. Blunt ocular trauma is also involved with trauma to other parts of the body. Head injury is commonly accompanied with blunt ocular trauma. Common causes of blunt ocular trauma are road traffic accidents, assault, alcohol-related incidents and workplace injuries. This case series includes some common ocular manifestations of blunt ocular trauma, like lid oedema, periorbital ecchymosis, subconjunctival haemorrhage and chemosis, that commonly present to the emergency department along with trauma to other parts of the body. Common presenting symptoms include pain, loss of vision, blurring of vision, redness, increased watering, swelling around the eye and bleeding. This case series mainly deals with anterior segment manifestations of blunt ocular trauma that are frequent in the emergency department. Ocular trauma can significantly affect the future quality of life. Ocular trauma is a preventable public health problem worldwide. Preventive measures should be taken by the government to educate people regarding safety precautions in the workplace, better vehicular safety measures and prevention of blunt ocular trauma. Community education is an essential part in prevention. Early diagnosis and prompt intervention can help prevent visual impairment.

**Keywords:** Chemosis, Head injury, Lid oedema, Ocular morbidity, Periorbital ecchymosis, Subconjunctival haemorrhage, Visual impairment

## INTRODUCTION

Ocular trauma is one of the common presentations to the emergency department [1]. The impact of ocular trauma is concerning due to its devastating effect on the individual as well as the burden it places on socio-economic and health resources of any nation [2]. Prompt detection and intervention are crucial for avoiding complications and preserving vision. Present series describe polytrauma cases that commonly present to the emergency department.

## CASE SERIES

### Case 1

A 33-year-old male presented to trauma centre with history of road traffic accident, complains of pain, bleeding from nose and giddiness. On examination, he was conscious, his temperature was normal, pulse was 84/min and blood pressure was 130/80 mmHg. He had a Contused Lacerated Wound (CLW) over left forehead measuring 3 cm×1 cm, a deep CLW on the left-side upper lip measuring 1 cm×1 cm, and tenderness in the left wrist and elbow.

He was investigated with Complete Blood Count (CBC), Erythrocyte Sedimentation Rate (ESR), C-Reactive Protein (CRP), Liver Function Test (LFT), Renal Function Test (RFT), Random Blood Sugar (RBS), serum electrolytes, Human Immunodeficiency Virus (HIV) testing, and Hepatitis B Surface Antigen (HBsAg). Urgent Computed Tomography (CT) scan of the brain and orbit and X-ray of the left wrist and elbow (Anteroposterior [AP] and lateral views), was performed; sutures were placed, and dressing done. All reports were within normal limits.

The patient was managed with Injection (Inj.) ceftriaxone (Inj. XONE) 1 gram (gm) intravenous (i.v.) twice a day (BD) for three days, Inj. Ringer's Lactate (RL) one pint i.v. slowly, Inj. Normal Saline (NS) one pint i.v. slowly, Inj. ranitidine 2 mL every eight hours for three days, Inj. ondansetron (Emeset) 2 mL Intramuscular (IM) stat, Inj. Tetanus

Toxoid (TT) 0.5 mL IM stat, Inj. levetiracetam (Levipil) 1 gm i.v. stat, and Inj. Diclofenac (Diclo) one ampoule BD for three days. He was managed by surgery, ortho and ENT department and referred to ophthalmology Outpatient Department (OPD).

On ocular examination, his visual acuity in the Right Eye (RE) and Left Eye (LE) was 6/6. There was no history of dimness of vision or diplopia. RE anterior segment was normal, with the pupil reacting to light; however, there was an abrasion over right upper lid. LE upper and lower lid oedema and lower lid abrasion [Table/Fig-1], pupil reactive to light, anterior segment was normal, eye movements were normal. His CT scan orbit report was normal. There was no subperiosteal or retrobulbar haematoma and no orbital fracture was noted, as there was no displacement of the globe or restriction in eye movements. His Intraocular Pressure (IOP) was 18 mm of Hg in both eyes, measured by applanation tonometry. There were no visual field defects and fundus examination was normal. Gonioscopy was also normal.



[Table/Fig-1]: Head injury with Left Eye (LE) lid oedema in case 1.

He was advised to use cold compresses and prescribed ciprofloxacin (Ciplox) eye drops, four times a day (QID), and lubricating eye drops containing Carboxymethylcellulose (CMC) three times a day (TDS) for seven days. Additionally, he was prescribed tablet cefixime 200 mg

BD for five days and a combination tablet of aceclofenac 100 mg, paracetamol 325 mg, and serratiopeptidase 15 mg (T. Akilos SP) for 10 days, along with tablet pantoprazole 40 mg orally once a day (OD) for 10 days. He was also given calcium (Ca++) OD, multivitamin/B-complex tablets along with vitamin C (T. MV/BC) OD, and a vitamin D3 sachet for 30 days. The patient was followed-up after seven days and two weeks, and one month. The lid oedema subsided by two weeks, and his visual acuity remained at 6/6 in Both Eyes (BE), with gonioscopy results being normal.

### Case 2

A 30-year-old male presented to trauma centre with history of road traffic accident, complaining of dizziness, nasal bleeding and pain in left shoulder. The patient was conscious and oriented to time, place and person. On examination, he had CLW over forehead measuring approximately 2 cm × 4 cm, swelling present over LE, and difficulty moving the left shoulder.

Urgent Non Contrast Computed Tomography (NCCT) brain and orbit, chest X-ray, X-ray left shoulder and Electrocardiography (ECG) was performed. Laboratory investigations, like CBC, RBS, LFT, RFT, HIV and HBsAg, were done. All reports were normal. He was managed with Inj. TT 0.5 mL IM stat, Inj. diclo IM stat, Inj. emset i.v. BD for 3 days, Inj. panto i.v. BD for three days, Inj. Levetiracetam (Levipil) 1 g IV stat, and Inj. xone 1 .5 gm i.v. BD for three days. He was given clavicle brace and was collectively managed by surgery, ENT and orthopaedic departments before being referred to the ophthalmology department.

On ocular examination, his visual acuity in both eyes was 6/6. The right eye's anterior segment was normal; LE there was upper and lower lid ecchymosis with lid oedema [Table/Fig-2a,b]. Both pupils were reactive to light and eye movements were normal. His IOP, as measured by an applanation tonometer, was 16 mmHg in both eyes. Gonioscopy was normal, there were no visual field defects and the fundus examination was normal. NCCT scan of the brain and orbit was normal, with no subperiosteal or retrobulbar haematoma or orbital fracture observed. He was managed by

- T. Cefixime 200 mg BD for five days
- T. Akilos SP BD for 10 days
- T. Ranitidine (Rantac) BD for 10 days
- T. MV/BC BD for 10 days
- T. Vitamin C 1 OD for 10 days



**[Table/Fig-2a,b]:** Head injury with Left Eye (LE) periorbital ecchymosis and lid oedema in case 2.

He was advised to use ice packs, antibiotic-moxifloxacin eye drops (TDS) for seven days alongside lubricating CMC eye drops for seven days. He recovered completely after one month, with visual acuity of 6/6 and IOP of 16 mmHg BE.

### Case 3

A 35-year-old female presented to emergency department with history of road traffic accident, complaining of bleeding from nose, vomiting, injury to the upper back, forehead and swelling over the head. On examination, there was 1 cm×2 cm abrasion over left mid-forehead region, with moderate swelling around it, and an approximately 5 cm × 4 cm abrasion over right upper back region. Urgent NCCT scan of the brain and orbit was performed, along with an ECG and other pathological investigations, like CBC, LFT, RFT, serum electrolytes, HIV, HBsAg, and an X-ray of the right clavicle AP. All reports were within normal limits.

She was managed with Inj. diclo 1 amp IM stat and Inj. TT 0.5 mL IM stat. The patient was managed by surgery, ortho and ENT departments, and then sent for an ophthalmology opinion. Patient had ocular complaints of eye ache and watering. On ophthalmological examination, her visual acuity in both eyes was 6/6, RE anterior segment was normal, and the pupil was reactive to light. LE there was periorbital ecchymosis with lower lid oedema and subconjunctival haemorrhage [Table/Fig-3a,b], pupil was reactive to light, and there was a nasal pterygium. There were no restriction in eye movement and there was no history of dimness of vision or diplopia. Her IOP was 18 mmHg in Both Eyes (BE) as measured by an applanation tonometer. There were no visual field defects, fundus was normal and gonioscopy was also normal. A CT scan of the orbit and brain was normal. There was no subperiosteal or retrobulbar haematoma, orbital fracture, or globe perforation.



**[Table/Fig-3a,b]:** Left Eye (LE) subconjunctival haemorrhage with periorbital ecchymosis and lower lid oedema in case 3.

She was prescribed T. cefixime 200 mg BD for seven days, T. panto 1 OD for seven days, T. Akilos SP BD for seven days, T. MV/BC BD and T. Vitamin C 1 OD for 10 days. She was advised cold compress, antibiotic and lubricating eye drops-ciplox eye drops QID for seven days and CMC eye drops TDS for seven days. The patient was followed-up after seven days, three weeks and one month. The subconjunctival haemorrhage resolved after three weeks and resolution of periorbital ecchymosis resolved after one month, with her visual acuity remaining 6/6 and IOP normal at 18 mmHg in both eyes.

### Case 4

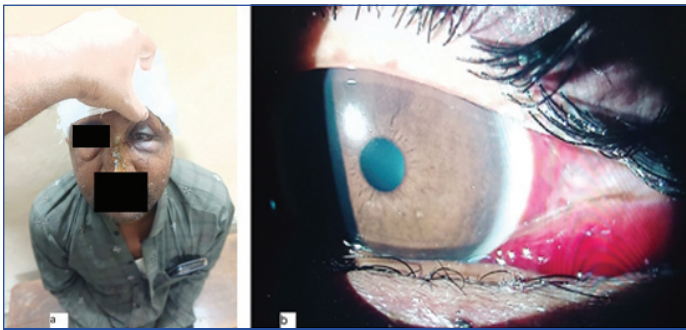
A 37-year-old male presented with history of road traffic accident, complaining of headache, face pain, bleeding from nose and head injury at trauma centre. Urgent NCCT brain and orbit with RBS, CBC, RFT, LFT, serum electrolyte, HIV, HBsAg, glycosylated haemoglobin HbA1c, Ultrasonography (USG) of the abdomen. All reports were normal. On examination patient was conscious and well-oriented to time, place and person. There was CLW over left eyebrow extending up to forehead, measuring 8 cm×1 cm. Sutures were placed and dressing was done. His vital signs were normal.

He was managed by Inj TT IM stat, Inj diclo IM stat, Inj levipil (500 mg) IV TDS for three days, Inj X One 1 gm IV BD for three days, Inj panto IV BD for three days, Inj emset 1 amp IV BD for three days, Inj diclo 2cc IM BD for three days, Inj RL 1 pint IV slowly. He was



well managed by surgery and ENT department and was referred to eye OPD.

On ophthalmological examination, his visual acuity was 6/6 in both eye. The right eye's anterior segment was normal, with lower lid oedema. LE there was upper and lower lid oedema, periorbital ecchymosis, extensive subconjunctival haemorrhage and chemosis [Table/Fig-4a,b]. Both pupils were reactive to light and eye movements were unrestricted. IOP was 16 mm of Hg in RE and 18 mm of Hg in LE as measured by applanation tonometer. There were no visual field defects and gonioscopy and fundus examination were within normal limits. His CT scan of the orbit was normal and there was no orbital fracture or globe perforation. The USG B-scan of the orbit was also normal.



**[Table/Fig-4]:** (a) Head injury with Right Eye (RE) lower lid oedema and Left Eye (LE) periorbital ecchymosis with lid oedema; and (b) LE subconjunctival haemorrhage with chemosis in case 4.

He was advised to use cold compress, antibiotic and lubricating eye drops ciplox eye drops for seven days, CMC eye drops for seven days, T. cefixime 200 mg BD for seven days, T. Akilos SP BD for seven days, T. Pantoprazole 40 mg OD, T. MV/BC one OD and T. Vitamin C one OD for seven days. The patient was followed-up after seven days, 15 days and one month. He completely recovered after one month, with visual acuity of 6/6 in both eyes, IOP of 16 mm of Hg and 18 mm of Hg, gonioscopy normal.

### Case 5

A 24-year-old patient presented to the emergency department with history of assault by 8-10 people. He complained of pain over right side of chest, pain during breathing, headache, pain over right orbit and bleeding from mouth and nose. A CT scan of the brain and orbit, a CT scan of the face, X-ray of the chest (PA view), X-ray of the right wrist, USG chest and abdomen and all relevant laboratory investigations (CBC, RFT, LFT, HIV, HBsAg, RBS, etc.) were done urgently. All reports were within normal limits. The patient also reported a complaint of convulsions and the patient as chronic alcoholic.

The patient was started with Inj. Levetiracetam (Levara Inj.), 4 amp in 100 cc NS IV stat, then Inj. Levara 1 amp every eight hourly for one day. He received Inj. Augmentin (amoxicillin 1000 mg+clavulanic acid 200 mg) (1.2 g) IV BD for three days, Inj. panto (40 mg) IV BD

for three days, Inj. emset i.v. BD for three days, Inj. Tramadol in 100 cc NS IV BD for three days, and Inj. NS i.v. slowly over 24 hours. A below-elbow slab was applied to the right side.

The patient was well managed by surgery, ortho, psychiatry, medicine, ENT and dental department and was sent to ophthalmology OPD for expert opinion.

On ophthalmological evaluation, his visual acuity in both eyes was 6/6. in RE there was upper and lower lid oedema and periorbital ecchymosis and subconjunctival haemorrhage [Table/Fig-5a,b]. The left eye's anterior segment was normal, with minor abrasion on upper lid and brow. Direct light reflex was present in both the eyes, and there was no history of diplopia or dimness of vision. Surprisingly, his CT scan of the brain and orbit was normal and there was no evidence of an orbital fracture. IOP was 16 mmHg in both eyes, as measured using an applanation tonometer. There were no visual field defects, no restriction of eye movements and gonioscopy and fundus examination were normal.



**[Table/Fig-5]:** (a) Right Eye (RE) periorbital ecchymosis with lid oedema and subconjunctival haemorrhage; (b) RE subconjunctival haemorrhage in case 5.

He was managed with T. cefixime 200 mg BD for five days, T. Akilos SP BD for 15 days, T. panto 1 OD for 15 days, T. Vitamin C 1 OD for 15 days, T. MV/BC 1 OD for 15 days, T. Calcium (Ca++) 1 OD for 15 days, and T. Chymoral Forte TDS for five days. He was advised to use cold compresses and prescribed antibiotic and lubricating eye drops: Ciplox eye drops QID for seven days, CMC eye drops TDS for seven days, and NSAID eye drops (Bromfenac) TDS for seven days. He was called for follow-up after seven days. The patient was followed-up after seven days, 15 days and one month. He recovered completely after one month without any sequelae, with visual acuity of 6/6, IOP of 16 mmHg BE, gonioscopy normal.

A summary of all five cases described is given in [Table/Fig-6].

## DISCUSSION

Ocular trauma is a common cause of ocular morbidity and monocular blindness worldwide [1-3]. Patients with polytrauma are frequently affected by eye injuries, which can have grave consequences, requiring early detection and treatment by an ophthalmologist [4]. Blunt ocular trauma can result from road traffic accidents, agricultural

Cases and aetiology	Investigations and results	Examination findings	Ocular findings	Diagnosis	(Ocular) Management	Outcome
Case 1: 33-year-old male, H/O Road Traffic Accident (RTA)	CBC, ESR, CRP, LFT, RFT, RBS, serum electrolytes, HIV, HBsAg, CT scan brain and orbit, X-ray Lt wrist, Lt elbow-AP and lateral. All reports normal	CLW left (lt) forehead 3×1 cm deep to skin, CLW left-side upper lip 1×1 cm deep to skin, tenderness left-Lt wrist and Lt elbow.	Visual acuity Both Eyes (BE) 6/6, abrasion over right upper lid, Left Eye (LE) upper and lower lid oedema and lower lid abrasion, IOP 18 mmHg BE	RE Upper lid abrasion and LE lid oedema.	Cold compression, antibiotic and lubricating eye drops for seven days, oral antibiotics for five days, analgesics along with serratiopeptidase for 10 days and tab calcium, multivitamins, vitamin C and vitamin D3 for 30 days.	Resolution of lid oedema by two weeks, visual acuity 6/6 BE and gonioscopy was normal.
Case 2: 30-year-old male, H/O RTA	CBC, LFT, RFT, RBS, electrolytes, HIV, HBsAg, ECG, NCCT brain and orbit, X-ray left shoulder, chest X-ray. All reports normal	CLW over forehead 2×4 cm, difficulty movement of left shoulder.	Visual acuity BE 6/6, LE upper and lower lid periorbital ecchymosis with lid oedema, IOP 16 mmHg BE	LE periorbital ecchymosis.	Ice packs, antibiotic and lubricating eye drops for seven days and oral antibiotics for five days and analgesics along with serratiopeptidase for 10 days with oral multivitamins and vitamin C for 10 days.	Periorbital ecchymosis resolved after 1-month, Visual acuity 6/6 and IOP 16 mm Hg BE.

Case 3: 35-year-old female, H/O of RTA	CBC, LFT, RFT, electrolyte, HIV, HBsAg ECG, NCCT brain and orbit, X-ray right clavicle-AP. All reports normal	1x2 cm abrasion in mid forehead region with swelling, 5x4 cm abrasion over rt upper back region, nasal bleeding.	Visual acuity BE 6/6, LE periorbital ecchymosis with lower lid oedema, subconjunctival haemorrhage with nasal pterygium, IOP 18 mmHg BE	LE periorbital ecchymosis along with subconjunctival haemorrhage.	Cold compression, antibiotics and lubricating eye drops for seven days and oral antibiotics for seven days, analgesics along with serratiopeptidase for seven days and multivitamins along with vitamin C for 10 days.	Resolution of haemorrhage after 3 weeks, resolution of periorbital ecchymosis after one-month, visual acuity 6/6 BE, IOP normal 18 mmHg BE.
Case 4: 37-year-old male, H/O RTA	CBC, RFT, LFT, electrolytes, RBS, HIV, HBsAg, HbA1c, CT scan brain, orbit and face, USG orbit and abdomen	CLW over LE brow up to forehead 8x1 cm, head injury.	Visual acuity 6/6, RE lower lid oedema, LE upper and lower lid oedema with periorbital ecchymosis and conjunctival chemosis with subconjunctival haemorrhage, IOP 16 mmHg RE and 18 mmHg LE	RE lid oedema LE periorbital ecchymosis with chemosis and subconjunctival haemorrhage.	Cold compress, antibiotic and lubricating eye drops for seven days and oral antibiotics, analgesics along with serratiopeptidase for seven days and multivitamins along with vitamin C for seven days.	Resolution of periorbital ecchymosis, subconjunctival, haemorrhage after one-month, visual acuity BE 6/6, IOP RE 16 mm Hg and LE 18mm Hg, gonioscopy normal.
Case 5: 24-year-old male, H/O assault	CT scan brain and orbit, CT face, X-ray chest PA view, X-ray Rt wrist, USG chest and abdomen, CBC, RBS, RFT, LFT, HIV, HBsAg. All lab reports are normal	Pain Rt side chest, headache, Pain Rt wrist. Rest within normal limits.	Visual acuity 6/6 BE, RE upper and lower lid oedema and periorbital ecchymosis with subconjunctival haemorrhage, LE minor abrasions on upper lid and brow, IOP 16 mm Hg BE	RE periorbital ecchymosis with subconjunctival haemorrhage.	Cold compress, antibiotic and lubricating eye drops, NSAID eye drops for seven days, oral antibiotics for five days, analgesics along with serratiopeptidase for 15 days, tablet chymoral forte for five days and multivitamins along with vitamin C for 15 days.	Complete recovery after one month without any sequel, visual acuity 6/6, IOP 16 mm Hg BE, gonioscopy normal.

**[Table/Fig-6]:** Summary of cases of blunt ocular trauma.

incidents, falls, sports-related injury, assaults, household accidents, etc. Blunt ocular trauma is a major cause of visual impairment, leading to injury of the globe, optic nerve and adnexa, ranging from superficial injuries to vision-threatening complications [5].

The manifestations of blunt ocular trauma are lid ecchymosis, oedema, contusion, lid laceration, subconjunctival haemorrhage, chemosis, corneal abrasion, blood staining of the cornea, corneal endothelial changes, hyphema, tears of pupillary margin, traumatic miosis or mydriasis, peripheral anterior synechiae, traumatic iridocyclitis, iridodialysis, iridodonesis, traumatic cataract with Vossius ring, lens subluxation or dislocation, traumatic glaucoma, angle recession glaucoma, orbital fracture, retrobulbar haemorrhage, globe rupture and globe luxation, among others [6,7]. The posterior segment manifestations of blunt trauma include vitreous haemorrhage, posterior vitreous detachment, chorioretinal injury, choroidal rupture, retinal detachment, retinal tear, retinal haemorrhage, Central Retinal Artery Occlusion (CRAO), Central Retinal Vein Occlusion (CRVO), commotio retinae and traumatic optic neuropathy [7].

Orbital haematomas can be classified as subperiosteal or intraorbital [8]. The clinical features of subperiosteal haematoma include proptosis, downward displacement of the globe, absence of lid ecchymosis, chemosis with subconjunctival haemorrhage, motility impairment and varying degree of visual impairment. Treatment includes conservative management, needle aspiration and surgical evacuation when there is visual impairment [8,9]. Ecchymosis is the hallmark of intraorbital and retro-orbital haematomas. Other signs include proptosis, chemosis, diplopia, subconjunctival haemorrhage, increased IOP, tense globe, decreasing visual acuity, loss of direct pupillary light reflex and ophthalmoplegia [10,11].

Hyperosmotic agents, carbonic anhydrase inhibitors and corticosteroids are the main modalities of treatment. Lateral canthotomy can be vision-salvaging procedure [7,10,11]. Management is based on orbital decompression done with different surgical approaches, with the aim of reducing the pressure on the nerve and vascular structures inside the orbit [10,11].

The signs and symptoms of orbital fracture include change in the position of the globe (enophthalmos or exophthalmos), diplopia, reduced visual acuity, subconjunctival haemorrhage, restriction of extraocular movement and change in sensation in maxillary division of trigeminal nerve [12]. A CT scan is an indispensable modality for diagnosis and management of orbital fracture, as it is useful in identifying complications of orbital fracture like entrapment of extraocular structures and orbital compartment syndrome resulting

from retrobulbar haemorrhage or haematoma [12]. A hanging teardrop sign on the radiograph results from herniation of orbital fat into the maxillary sinus [7]. Urgent surgical intervention is required in cases of entrapped muscle and for oculocardiac reflex [13,14].

Extraocular motility should be assessed and forced duction test should be done to rule out extraocular muscle entrapment, ischaemia, or haemorrhage [14]. Orbital blowout fractures occur within the bony orbit, usually along the medial walls or the floor, while the orbital rim remains intact [7]. In blowout fracture, ocular contents may herniate into the maxillary sinus (with orbital floor fractures) or into the ethmoid sinus (with medial wall fractures) [7]. In a trapdoor orbital fracture, a segment of the bone is displaced with tissue herniation and then hinges back to more normal position, usually in paediatric age group and most often with inferior rectus muscle. Trapdoor fracture with muscle entrapment are a special indication for urgent surgery [15].

The most common orbital fracture includes the medial wall and floor [16,17]. A surgical approach is considered in patients with persistent diplopia or enophthalmos and surgery is not performed until swelling subsides, typically 7-10 days following injury [7]. None of the patients in present series had subperiosteal or retrobulbar haematoma or orbital fractures with muscle entrapment which warrant immediate medical and surgical intervention.

Head injury was found in majority of the patients in present series. Head injury frequently associated with ophthalmic manifestations and consequent morbidity. Pupil size and reaction to light are important in initial assessment of head injury cases. Pupillary examination aids in diagnosis of supratentorial injury, extradural and subdural haemorrhages and pontine lesions [18]. A relative afferent pupillary defect is a sign to look out for. The causes of fixed and dilated pupil in head injury patient are transtentorial/uncal herniation (Hutchinson's pupillary signs), traumatic 3<sup>rd</sup> nerve palsy, traumatic mydriasis and orbital blowout fracture [19]. In head injury patients, causes of pinpoint pupils are Horner's syndrome, traumatic miosis, pontine haemorrhage, and Hutchinson's pupil [18,19].

Papilloedema is a common neuro-ophthalmic manifestation of head injury. Papilloedema occurring within 48 hours indicates extra- or intracerebral haemorrhage and is an indication of immediate surgical intervention [18,19]. Papilloedema occurring after first week of head injury is due to cerebral oedema [19]. Ocular motor cranial nerve palsy, leading to strabismus and ocular motility disorders, is a common neuro-ophthalmic manifestation [19]. Lagophthalmos occurs in head injury patients due to facial nerve palsy. Diplopia is commonly seen in head injury patient, majority of cases of diplopia

resolves spontaneously in 6-12 months after head injury [19]. Visual field testing should be done [18,19]. The patients in present case series had normal pupillary reactions; none of the patients had cranial nerve palsies, diplopia, or papilloedema, and all CT scan reports were normal.

Another finding missed in present case series is hyphema. Management of hyphema includes hospital admission, bed rest with restricted activities and elevation of the head. Medical management of hyphema includes topical cycloplegics and corticosteroid (an antibiotic-steroid combination) and tablet vitamin C 500 mg. In cases of raised IOP (>21 mmHg) along with the antibiotic-steroid combination, timolol maleate eye drops and tab acetazolamide are given. Paracentesis is indicated when IOP is more than 25 mm Hg for five days with total hyphema, or when the IOP is 60 mm Hg or more for two days, to prevent blood staining of cornea and to prevent optic atrophy. A small hyphema usually takes 4-5 days to resolve and does not cause visual impairment [20].

Uncomplicated periorbital ecchymosis and lid oedema was seen in most patients in present series typically resolves within 3-4 weeks with conservative management. Treatment includes head elevation, cold compresses, analgesics, along with serratiopeptidase and reassurance. Presence of bilateral raccoon eyes may indicate basilar skull fracture [7]. The patient described in case one had resolution of lid oedema after two weeks and periorbital ecchymosis described in patients in case two, three, four, and five resolved after one month.

Subconjunctival haemorrhage seen in present case series is caused by rupture of small subconjunctival vessels. Pain on extraocular movements and bloody chemosis should prompt suspicion for injury to globe. Subconjunctival haemorrhage that takes some hours to develop and in which the posterior limit of the haemorrhage cannot be traced, suggests the possibility of fracture. Patients with bilateral subconjunctival haemorrhage and inability to identify the posterior extent might be associated with an anterior base of skull fracture [21]. Treatment of subconjunctival haemorrhage consists of reassurance and local cold compress for 24 hours. Subconjunctival haemorrhage resolves spontaneously in two to four weeks [7]. Subconjunctival haemorrhage observed in case three resolved after three weeks and subconjunctival haemorrhage described in case four and five resolved after one month.

Globe ruptures are most common at insertion of intraocular muscles or at limbus, where the sclera is thinnest. Signs and symptoms of globe rupture include decreased visual acuity, severe bullous subconjunctival haemorrhage involving the entire bulbar conjunctiva, deep or shallow anterior chamber, restricted extraocular motility, low IOP, irregularly shaped pupil, iridodialysis, exposed uveal tissue and vitreous haemorrhage [7].

Long-term follow-up of patients is recommended to rule out angle recession and glaucoma [1]. Posterior segment injury has grave consequences and visual prognosis is less favourable [6]. All patients in present series had resolution of their injury with observation and conservative management.

## CONCLUSION(S)

Blunt ocular trauma can lead to visual impairment. Institution of prevention programs is of dire need to reduce ocular morbidity due to ocular trauma. Emphasis on educating the importance of wearing eye protection to reduce occupational hazards and better vehicular safety measures can reduce the ocular mishap. Measures to prevent trauma, like eye health education, enforcement of law, campaign through media like radio, television, internet, can help increase awareness. The potential impact of blunt ocular trauma on visual outcomes necessitates the importance of timely intervention to prevent permanent visual impairment.

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