"VISUAL OUTCOME AND PROGNOSTIC FACTORS IN MECHANICAL INJURY OF ANTERIOR SEGMENT OF EYE"

By

DR.DIVIJA. K, M.B.B.S

Dissertation submitted to

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, CENTRE, TAMAKA, KOLAR

In partial fulfillment of the requirements for the degree of

MASTER OF SURGERY

IN

OPHTHALMOLOGY

Under the guidance of

DR. B.O.HANUMANTHAPPA

MBBS, MS.

DEPARTMENT OF OPHTHALMOLOGY

SRI DEVARAJ URS MEDICAL COLLEGE

TAMAKA, KOLAR.

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MBBS, MS.
Professor
Department of Ophthalmology,
Sri Devaraj Urs Medical College,
Tamaka, Kolar.

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DR.SANGEETHA.T
Professor and HOD,
Department of Ophthalmology,
Sri Devaraj Urs Medical College,

Date
Place: Kolar

DR. K. PRABHAKAR
Principal
Sri Devaraj Urs Medical College,
Tamaka, Kolar.Tamaka, Kolar.

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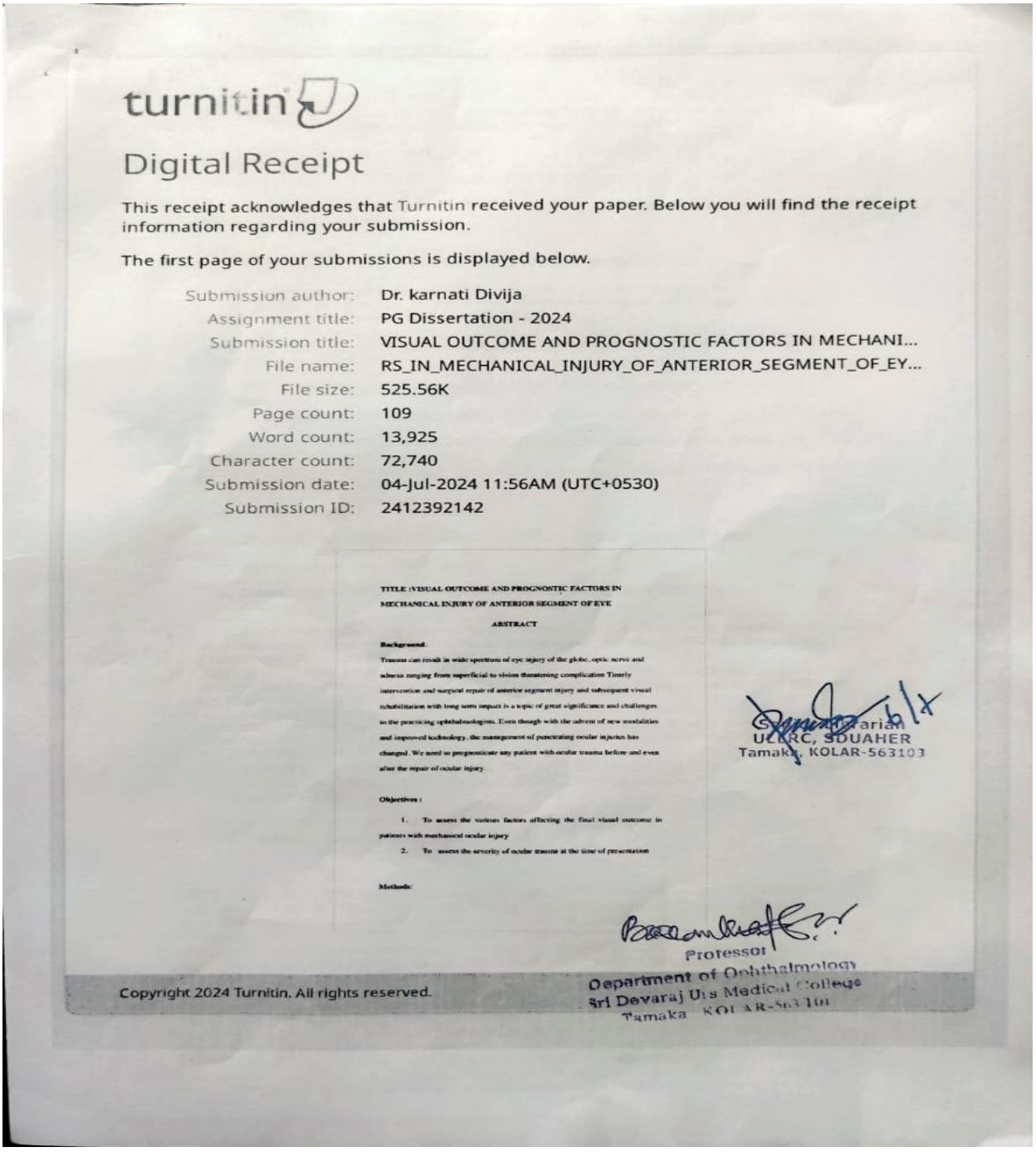

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ABSTRACT

Background:

Trauma can result in wide spectrum of eye injury of the globe, optic nerve and adnexa ranging from superficial to vision threatening complication Timely intervention and surgical repair of anterior segment injury and subsequent visual rehabilitation with long term impact is a topic of great significance and challenges to the practicing ophthalmologists. Even though with the advent of new modalities and improved technology, the management of penetrating ocular injuries has changed. We need to prognosticate any patient with ocular trauma before and even after the repair of ocular injury.

Objectives :

1. To assess the various factors affecting the final visual outcome in patients with mechanical ocular injury
2. To assess the severity of ocular trauma at the time of presentation

Methods:

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Department of Ophthalmology
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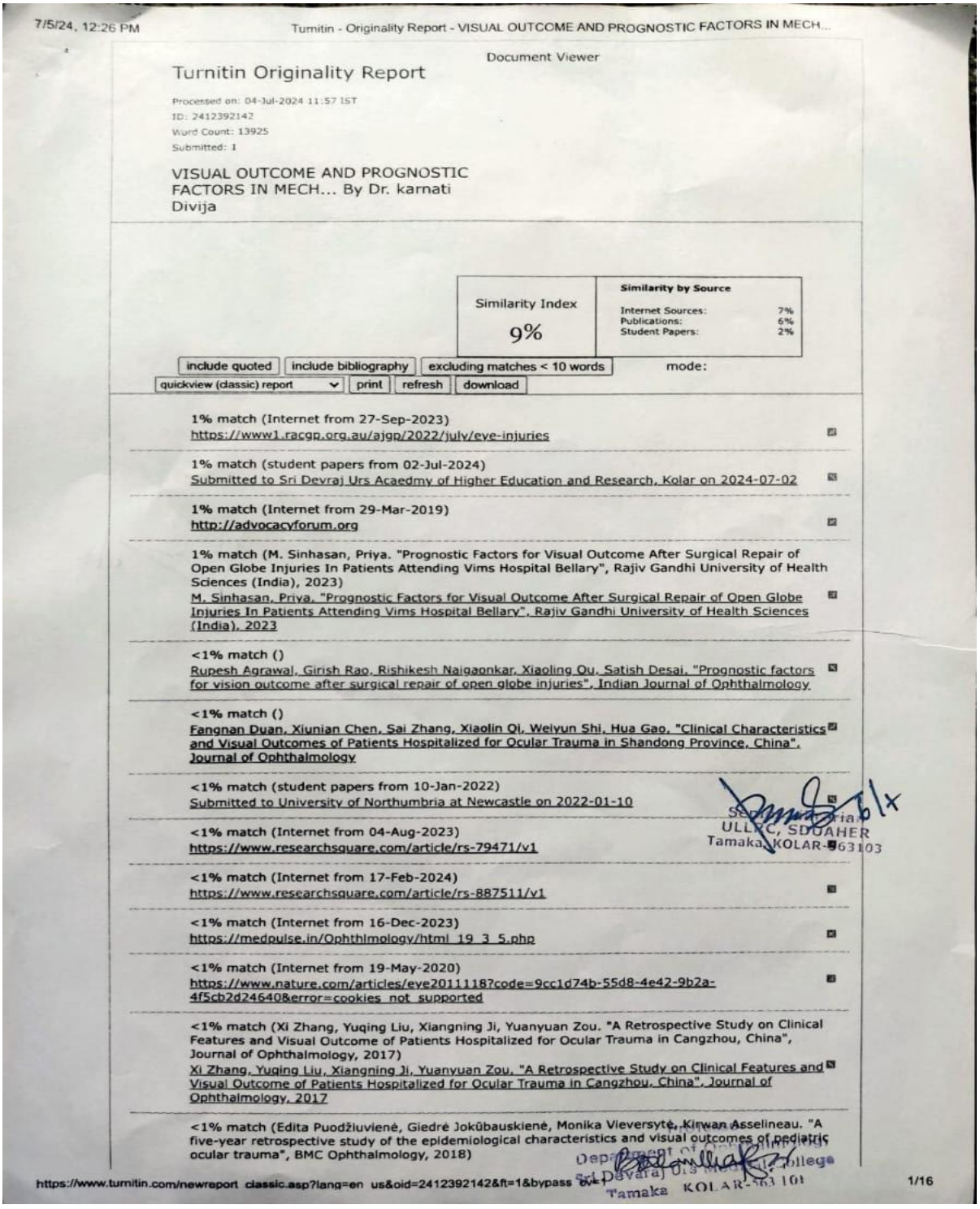

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DATE: **SIGNATURE OF CANDIDATE**

PLACE: KOLAR. **DR DIVIJA K**

LIST OF ABBREVATIONS

SL.NO	ABBREVATION	FULLFORM
1	BETT	Birmingham eye trauma terminology
2	CGI	Closed globe injuries
3	CF	Counting fingers
4	CT	Computed tomography
5	HM	Hand movements
6	IDO	Indirect ophthalmoscopy
7	IOFB	Intraocular foreign body
8	IOP	Intra ocular pressure
9	MRI	Magnetic resonance imaging
10	NLP	No Light perception
11	OGI	Open globe injuries
12	OTS	Ocular trauma score
13	PCIOL	Posterior chamber intraocular lens
14	PK	Penetrating keratoplasty
15	RAPD	Relative afferent pupillary defect
16	RTA	Road traffic accident
17	SCH	Sub conjuctival haemorrhage
18	VA	Visual acuity
19	YLD	Years of healthy life lost due to disability

ABSTRACT

Background

Trauma can result in wide spectrum of eye injury of the globe, optic nerve and adnexa ranging from superficial to vision threatening complication Timely intervention and surgical repair of anterior segment injury and subsequent visual rehabilitation with long term impact is a topic of great significance and challenges to the practicing ophthalmologists. Even though with the advent of new modalities and improved technology, the management of penetrating ocular injuries has changed. We need to prognosticate any patient with ocular trauma before and even after the repair of ocular injury.

Objectives :

1. To assess the various factors affecting the final visual outcome in patients with mechanical ocular injury
2. To assess the severity of ocular trauma at the time of presentation

Methods

This prospective study was conducted on minimum of 72 patients fulfilling the inclusion criteria in the department of Ophthalmology, R. L. Jalappa Hospital and Research centre, Kolar from August 2022 to December 2023, after obtaining ethical clearance from Institutional Ethical Committee of Sri Devaraj Urs Medical College and written informed consent from the subjects. All cases of mechanical ocular injuries involving the anterior segment of eye age more than 5 years were assessed by a detailed history regarding Time of onset an mode of injury ,Mode of Clinical examination including Visual acuity ,Color Vision ,Slit lamp examination , fundus examination , X-ray orbit , B-Scan CT and MRI orbit if needed

Results:

Among 72 eyes studied, patients' average age (years) was 31.82, and most were 11-30. Around 60% were males. The left eye was implicated among 45.8%, and 9.7% had bilateral eye involvement. Around one-fourth had trauma by RTA, followed by wooden pieces or firecrackers. At the presentation time, 44.4% had Cf 1-meter to Cf 5-meter vision, and 30.6% had 6/60 to 6/24 visual acuity. At one week follow-up, 54.2% had a VA 6/60 to 6/24, 26.4% had 6/18 to 6/6, and 19.4% had Cf 1 meter to Cf 5 meter. At one month follow-up, 25% had a VA 6/60 to 6/24, 73.6% had 6/18 to 6/6, and 1.4% had Cf 1 meter to Cf 5 meter

Corneal foreign body with epi defects was the most common complication, followed by Traumatic cataract (9.7%), IOP was high among 13.9% of the patients.11.1% of the patients had wounds involving the pupillary axis. 16.7% of the patients were immunocompromised. Most patients presented within 24 hours (75%), while 16.7% and 8.3% presented within 24-48 hours and >48 hours, respectively.

Conclusion and interpretation

This study concluded , most had ocular injury by RTA, . Corneal foreign body with epi defects is the common complications observed upon the presentation Three-fourths of those with ocular injury had good vision by follow-up. A significant association was found between visual acuity and wounds involving the pupillary axis, the immunocompromised status of the patients.

key words: ocular trauma , visual acuity , RTA , traumatic cataract

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INTRODUCTION

INTRODUCTION

Ocular morbidity and blindness are mostly caused by ocular trauma.[1] Because ocular trauma tends to be monocular and is infrequently documented by epidemiologists, its effects are typically underestimated.[2] Globally, as per the World Health Organization (WHO), around 55 million traumatic etiology for eyes occur annually. Ocular trauma contributes to more than 10% of ophthalmology consultations.[3] Ocular trauma is the primary causative factor for vision loss in the low-middle-income countries. Ocular trauma is a leading etiology for blindness globally.[4]

It affects around 500,000 individuals, often necessitating surgery and placing a heavy strain on society.[5] Literature suggests that socioeconomic factors, including the individual's residence, are risk factors for ocular injuries.[6] Generally speaking, prior studies revealed that the trauma occurred in the younger age groups and over 70 years, showing the bimodal age group distribution. Men are also more likely to sustain an eye injury.[7]

There are multiple ways in which injuries to the eye can damage the vision, leading to extreme ocular morbidity. The unavoidable consequences of losing sight of an individual's well-being and the subsequent decrease in work output are what turn blindness into a hardship. Up to 6 million children worldwide suffer from ocular trauma each year, with a fifth of those cases necessitating hospitalization.[8] The etiological variables are very varied and directly affect the final visual result. Numerous issues will be covered, including the trauma's origin, severity, first visual acuity, timing of treatment initiation, need for numerous surgeries, correlation with endophthalmitis, counseling, and the management's realistic result. Over the past three decades, the achievement of the final visual outcome has been enhanced through progress in eye surgical tools and methods, alongside shifts in our understanding of the disease processes and treatment of eye injuries. The well-being of the patient, along with

that of their loved ones and the broader community, is significantly impacted by injuries to the eye.[9]

Over the last 30 years, developments in equipment and ocular surgical methods and a better understanding of the modes of pathology and physiological mechanisms have aided in the effective therapy of vitreoretinal surgery for damaged eyes.[10] Several prognostic criteria, including the severity of the injury, the extent of anatomical degree, vision status at the time of presentation and initiation of therapy are necessary to achieve or retain usable vision.[10,11]

Understanding the characteristics of eye injuries is crucial for implementing the right measures to prevent and treat long-term complications in severe eye cases. These injuries can significantly damage the eye's overall structure and lead to a loss of vision.[12] The doctor's decision-making on patient care and rehabilitation is aided by his or her understanding of the prognostic variables.[13]

It is crucial to comprehend these characteristics in the local contexts since ocular trauma patients vary in their prognostic factors and visual acuity across the region. Thus, the current investigation has been started.

Need for the study

Trauma can result in wide spectrum of eye injury of the globe, optic nerve and adnexa ranging from superficial to vision threatening complication[2]

Timely intervention and surgical repair of anterior segment injury and subsequent visual rehabilitation with long term impact is a topic of great significance and challenges to the practicing ophthalmologists.[2]

Even though with the advent of new modalities and improved technology , the management of penetrating ocular injuries has changed.[2]

We need to prognosticate any patient with ocular trauma before and even after the repair of

ocular injury.[3]

The factors likely to predict outcome after ocular injury are: mode of injury, preinjury visual acuity , time lag between injury and surgery , site of the wound.[3]

AIMS
&
OBJECTIVES

OBJECTVES OF STUDY

- To assess the various factors affecting the final visual outcome in patients with mechanical ocular injuries involving anterior segment of eye
- To assess the severity of ocular trauma at the time of presentation and improvement in vision after 1month followup

REVIEW OF LITERATURE

REVIEW OF LITERATURE

- **Trauma**

Trauma is characterized as damage to the body part that occurs swiftly due to a mishap or aggressive behavior. It leads to immune, metabolic, and hormonal responses in the body, essential for returning to a balanced state. Even though there are many distinct ways in which an injury may occur, trauma can be largely divided into three categories: blunt, deceleration, and piercing trauma.[14]

- ***Ocular Trauma/Eye injuries***

In the general practice context, ocular injuries are frequently present.[15] Timely recommendation of severe ocular injury to the referral hospital with the investigatory logistics availability aids in assessing the degree of the ocular involvement. This aids in fixing medical or surgical management issues and ensures that action is taken promptly. Also, correct initial evaluation and early diagnosis are necessary to prevent irreversible vision loss from eye injuries. Ninety percent of eye trauma cases are thought to be avoidable. In adults, the most prevalent cause of ocular trauma is traffic accidents, followed by assault and falls. In children, on the other hand, one-fourth of ocular injuries occur during the event of play, which requires additional hospitalization.[16]

❖ ***Epidemiology-Burden***

In 2019, there were 438.4 thousand YLDs of ocular damage worldwide and 59,933.29 thousand incident cases. With an AAPC of -0.46 (95 percent confidence interval, respectively, the ASRs of incidence and YLDs declined between 1990 and 2019. In all age categories, males exhibited greater incidence and YLD rates. Adults in their youth and middle years have greater rates of illness. Geographically, the greatest ASR of YLDs per

100,000 people was found in Australasia, 9.51. New Zealand had the greatest rate of eye injuries nationwide, at 11.33 per 100,000 people. The primary causes of eye injuries globally in 2019 were foreign bodies, falls, and exposure to mechanical forces. In comparison to 1990, there was a greater global burden resulting from traffic accidents, executions, and police conflicts.[17]

- ***Risk factors***

Male gender and younger age are established risk factors for ocular trauma. Socioeconomic level and ethnicity are additional risk factors. Despite the importance of eye injuries, very few studies have looked at eye injuries in Asia from a population perspective. Most of the research that has been done focuses on how often eye injuries happen and what factors increase the risk of these injuries in Western countries.[18] Ocular trauma in Indians was shown to be more common among men and workers, according to population-based research conducted in both rural and urban settings. The correlation with socioeconomic class was not as strong.[19,20] While previous research revealed no correlation between ocular trauma and socioeconomic class, Nirmalan discovered that educated people were less likely to have ocular trauma. Research has demonstrated that smoking is directly associated with eye injuries. Specifically, there is a significant increase in average eye pressure (IOP) within injured eyes compared to those that are not injured. To assess whether this negligible difference of clinical importance, multiple studies are needed to explore the long-term danger of developing glaucoma in eyes that have been injured.[18]

Types

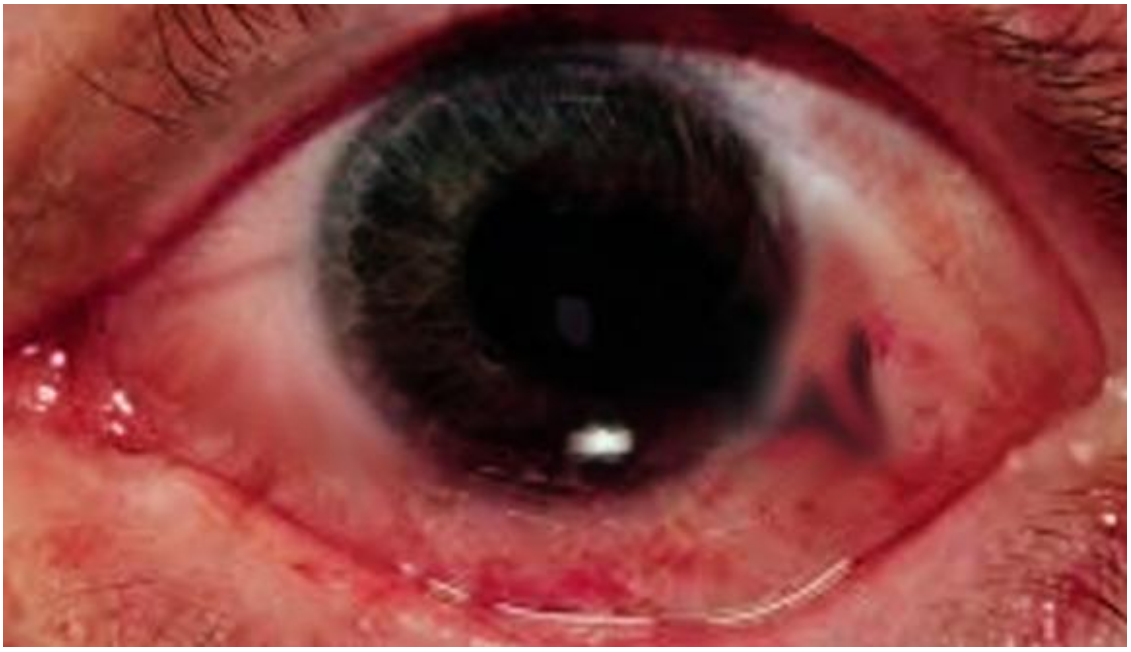
- ***Blunt Eye Trauma***

Different intrinsic eye injuries may be caused by blunt eye trauma.[21] Both open (including Lacerations and globe ruptures and closed-globe injuries (including Lamellar lacerations

and contusions).[22] Most of the laceration may result due to penetrative mode.. Anteroposterior compression, coup, countercoup, and horizontal tissue expansion are possible causes of blunt eye injuries.[23]

An unintentional blunt trauma or a direct hit to the eyeball might be the mechanism of damage. There are three types of traumatic lesions associated with forceful eye trauma: extraocular lesions, globe rupture, and closed globe damage. As will be covered below, this may impact any of the eyeball's anatomical structures. The diagnosis is clinical; seldom are imaging tests and blood work necessary. Patients in serious condition or those in need of surgery need laboratory testing.[24]

Figure 1: Blunt Eye trauma[25]



- ***Visual outcomes***

The aftermath of a blunt eye injury has a significant impact on the prognosis. According to one research, 25 percent of individuals with ocular damage had monocular blindness.[7] Studies on children have shown that blunt ocular trauma often results in greater visual acuity in comparison to penetrative impact. However, there is a greater risk of developing

glaucoma in those patients. In turn, blunt ocular injury may result in the poorest visual prognosis if the eye is ruptured since this indicates that the damage most likely happened at a high velocity.[26] The factors contributing to the poor vision adding to the injury were eyelid laceration, and preoperative vision, which is lower than 20/200.[9] In another research, 25 percent of patients with blunt ocular trauma-related commotio retinae or sclopetaria retinae documented lower in the injured eye. After the acute ocular injury, vision deteriorates by superadding factors such as retinal or hemorrhage within the internal structures. Poor visual outcomes are also predicted by traumatic optic neuropathy.[27]

Penetrating Eye injuries

Open globe injuries, also known as ocular penetrating and perforating injuries, may cause serious vision loss or even ocular loss. By definition, penetrating injuries enter the eye but do not go through; an exit wound does not exist. Both entry and exit wounds are present in perforating injuries, which is defined by the complete layer injury in the corneal structures including sclera. On the other hand, blunt eye trauma resulting in globe collapse is referred to as open globe rupture. The thinnest sclera is usually found behind the recti muscle insertions at the limbus and close to the equator. Three zones—I (limbus with cornea), II (till ora serrata without extending into the retina), and III—are used to further categorize the damage. Zone III includes any lesion involving the retina posterior to the ora serrata.[28,29]

Any sharp or fast-moving item has the potential to cause penetrating or perforating eye injuries. Men were more likely (5.5 times) to suffer from ocular injuries in comparison to females. The patient is usually in his or her 30s. The most typical places for injuries are the home and the workplace, where battery attacks, domestic abuse, and workplace accidents were the most prevalent scenarios. According to May et al., the most often reported blunt items from the document results of United States Registry were fishing weights, and

timber.[30] The adolescent population also often uses paintball and BB guns. Globe rupture is actually more prevalent in the elderly, usually due to falls and age-related structural deterioration of the eye.[31] Sticks, knives, scissors, screwdrivers, and nails were the most often found sharp items. One of these items, known as an intraocular foreign body (IOFB), may get lodged in the eye and occur in as many as 40 percent of ocular penetrating or perforating injuries.

- ***Visual Outcomes***

Penetrating eye injuries have a bad prognosis, and in this and other research. Poor pre-operative or presentation time vision were more positive prediction of a poor result. According to our research, those with alcohol use or delays in presentation (classified as missed first diagnosis) seemed to have poorer prognoses. In other investigations, smaller wounds, a mechanism of injury involving a sharp instrument, and wound position anterior to the rectus muscle insertion were positive prognostic variables.[32]

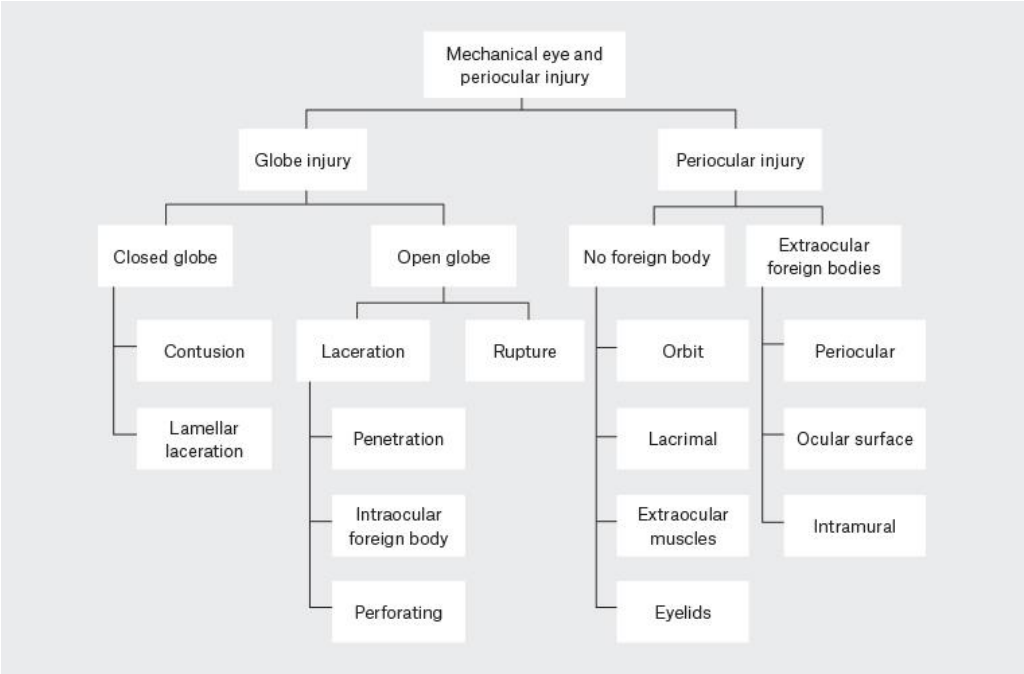
Figure 2 : Penetrating eye injury with prolapse of iris[33]

- ***Classification***
- ***Mechanical Ocular Injuries***

The first "Birmingham Eye Trauma Terminology (BETT)" framework sorted eye injuries into two types: those that involve the eye but do not penetrate it, and those that do. This

initial system overlooked injuries around the eye. The updated BETT framework corrects this oversight by covering injuries beyond the eye, regardless of whether foreign objects are involved. In Australia, injuries that penetrate the eye account for 44% of the costs associated with treating eye injuries. To ensure consistent language when talking about eye injuries from mechanical causes and injuries around the eye in general, in emergency departments, and in ophthalmology services, it is suggested to adopt the updated BETT framework (as depicted in the Figure).[34]

Figure 3 :Birmingham Eye Trauma Terminology (BETT) classification[34]



Corneal and conjunctival foreign body

Corneal abrasions are the most prevalent kind of ocular damage, while corneal foreign bodies rank second. For this documented morbidity, the final outcome of vision loss was uncommon. Although painful, a lot of foreign bodies in the cornea are superficial and harmless. The frequency of corneal foreign bodies varies according on the source; nevertheless, a research conducted in Sweden found that 8.1 out of 1000 eye injuries were attributed to external particles. Among them, around 40 percent was due to corneal or

conjunctival. As previously shown, the majority of these happen while engaging in high-risk tasks at work. It was usual to see people without wearing properly fitted eye protection. In fact, statistics from a referral clinic during Gulf War in 1991 revealed that 14 percent of the trauma was related to eye damage. Among them, over 10 percent had foreign objects lodged in their corneas, and just 3 percent of the afflicted patients had on their protective goggles.[35,36]

- ***Clinical features***

Once the right amount of eye topical anasethtic cream, usually two to three drops of oxybuprocaine 0.4 percent, is applied to reduce involuntary eye tearing and keep the eye open for inspection, it's crucial to check how well the eye can see. To accurately figure out how deep a foreign object is in the eye, a bright area or, better yet, a slit lamp with a loop should be used. Getting rid of any foreign objects, including any leftover eye sores or rust, is a key skill tauRoyal Australian College of General Practitioners (RACGP) training programers (RACGP). It's also important to watch out for any clear discharge or reaction in the front of the eye, as these might signal a new bacterial infection. The area around the foreign object, which is usually around the point of impact, can be seen more clearly with the help of a dye called fluorescein. Opening the upper eyelids and gently moving or washing the eye is an important step in the examination. This step helps to spot any small foreign objects that might have moved from the eye and were missed during the first check.[34]

- ***Management***

Treating eye injuries, removing contact lenses, and protecting the eyes from further harm are the key steps in the initial treatment for any kind of eye injury, including scratches on the

cornea, objects in the eye, or holes in the eye. For young patients or those with changing eyes, using protective eye shields can help prevent more problems from digital devices. However, using eye patches as the first step is not recommended. Medicines can be applied directly to the eye, taken by mouth, injected into the muscle, or given through a vein. The most effective eye drop for pain relief is topical tetracaine. But excessive usage might cause long-term corneal damage, so just use it for the first hour or two.[35]

To eliminate the foreign object, apply a few drops of oxybuprocaine to the affected eye. Next, utilize a damp cotton swab (sterile saline) or a 25G 16 mm hypodermic needle to extract any loose foreign body that is not deeply embedded in the corneal stroma. A needle might be necessary to extract a deeper foreign material from the base of the superficial stromal defect, along with any associated rust ring. If the foreign material was successfully removed from the deep corneal stroma, it's important to apply concentrated fluorescein to the wound to ensure a negative Seidel test outcome. To identify full-thickness corneal abnormalities, the Seidel test involves applying fluorescein eye drops to the eye surface. As the green dye is washed away by the aqueous humor as it exits the open wound, it signals a penetrating eye injury. Defects in the corneal epithelium and a prolapsed vitreous color green when fluorescein is applied. Begin applying the chloramphenicol ointment four times daily, without delay. A follow-up examination should be scheduled one or three days after treatment to ensure the epithelial defect is healing, visual clarity has improved, and there are no new infections. If a corneal infiltrate develops, the patient must be immediately referred to the nearest ophthalmology center. Similarly, the patient should be referred to an ocular specialist at the earliest opportunity if the foreign body is located in the central visual axis. Patients with challenging-to-remove foreign bodies in their corneas that require 24 to 48 hours to fully remove may be prescribed chloramphenicol ointment. Wet cotton swabs and irrigation should be used to clear foreign objects from the conjunctiva that are obstructed.

Research suggests that patching can prolong the healing process.[34]

Orbital fracture

In emergency care, orbital fractures are often triaged and treated. According to estimates, orbital fractures account for around one-fourth of trauma cases (over the face) landing in the emergency room. However, ocular injuries in new cases (incidence) with orbital fractures are typically fewer. Estimates suggest around three-fourths of cases present with orbital fracture do not experience any concurrent ocular injury. Additionally, many ocular findings associated with orbital fractures, such as subconjunctival hemorrhage or periorbital swelling, are generally benign and do not lead to any long-term ocular complications. Nevertheless, the non-ophthalmologist usually lacks the tools and training necessary to do a dilated eye exam and assess if significant ocular damage is present. Providing diagnostic and treatment or managerial advice from the emergency department healthcare workers might be limited in addressing serious and trivial ocular traumatic injuries. In majority of the facility settings in primary care level, ophthalmic examination for every patient due to specialist unavailability in certain places.[42]

- ***Clinical features***

The first thing the doctor has to do is figure out how facial damage occurs. A "blowout" fracture is often linked to a history of an item bigger than the orbital rim striking the eye. The orbital floor is most often affected; however, the medial wall may also be affected. It is believed that elevated intra-orbital fluid amount which in turn impacts the positive pressure over the bones surrounding the ocular area, thus leading to the fracture at the weakest areas. An alternative hypothesis is that the inferior orbital rim's compression results in the orbital floor directly buckling. Patients with isolated medial wall fractures often report a traumatic etiology as they fight with persons in the naso-orbital region. Zygomatic trauma may be linked to an injury mechanism that includes a hit, usually by road traffic incidents or a fight

over the person's face. All fracture types, however, may manifest via a range of causes.[43] Assessing a patient's airway, respiratory, and circulatory state is the first step in treating them after a trauma, particularly if the damage impacted many systems.

Moreover, a detailed evaluation of the eye is necessary. Often, individuals with injuries around the eye show signs of eye injuries that could threaten their vision if not identified with precision. Eye injuries such as eye inflammation, scratches on the cornea, bleeding in the eye, sudden increase in eye pressure, damage to the eye lens, bleeding in the eye's fluid, torn or detached retina, and damage to the optic nerve due to injury are some of the issues that people with eye fractures might experience.[44] Afferent papillary defect, decreased visual acuity, and colour vision—above all—can notify a doctor that traumatic optic neuropathy is present. A thorough assessment for potential globe rupture has to be carried out. Even in people who are asymptomatic visually, most diseases might be present.[45]

❖ ***Management***

Emergent surgical intervention is not necessary for isolated inferior orbital wall fractures unless there is a risk of extraocular muscle entrapment. Surgical surgery is required if there is considerable globe malposition or restricted strabismus. In order to give orbital edema and presenting symptoms time to resolve naturally, in which the monitoring is required upto 2 weeks. [46] The following signs should be repaired within the next two weeks:[47]

- Persistent diplopia, particularly in downgaze or primary vision, or worry about orbital constriction
- Enophthalmos > 2 mm
- Globe malposition, either inferior or posterior displacement
- A substantial fracture in the orbital floor (>50 percent: Floor area) or a notable raise in the orbital volume

- Related fractures that result in deformity or other pathologies related to the face (e.g., trismus with zygomaticomaxillary complex fracture)

Patients experiencing diminished vision, bulging eyes, RAPD, or intense eye pressure should be referred to an ophthalmology or maxillofacial department for further examination and possible surgery. When a patient has a retrobulbar hemorrhage, it may be necessary to perform an orbital decompression surgery through a lateral canthotomy to restore vision. Quickly fixing broken parts of the eye socket is vital to avoid complications like tissue hardening, blood pressure changes, and the oculocardiac reflex. This reflex can be set off by the compression of the medial or lower rectus muscles and the surrounding eye tissue. It's important to caution patients against blowing their noses to reduce the chance of this happening. If a patient has double vision along with a CT scan showing the eye socket is trapped, a surgery to fix the eye socket's floor is recommended right away. For young people who have been injured around the eye, have trouble moving their eyes up and down, and have a "white eye" look, a "white-eye blowout fracture" should be considered. If a CT scan shows a broken eye socket with trapped muscle or soft tissue, it's crucial to get treatment quickly. It's also important to get a CT scan with detailed slices and specific cuts for an accurate diagnosis.[34]

Closed globe injury risk factors

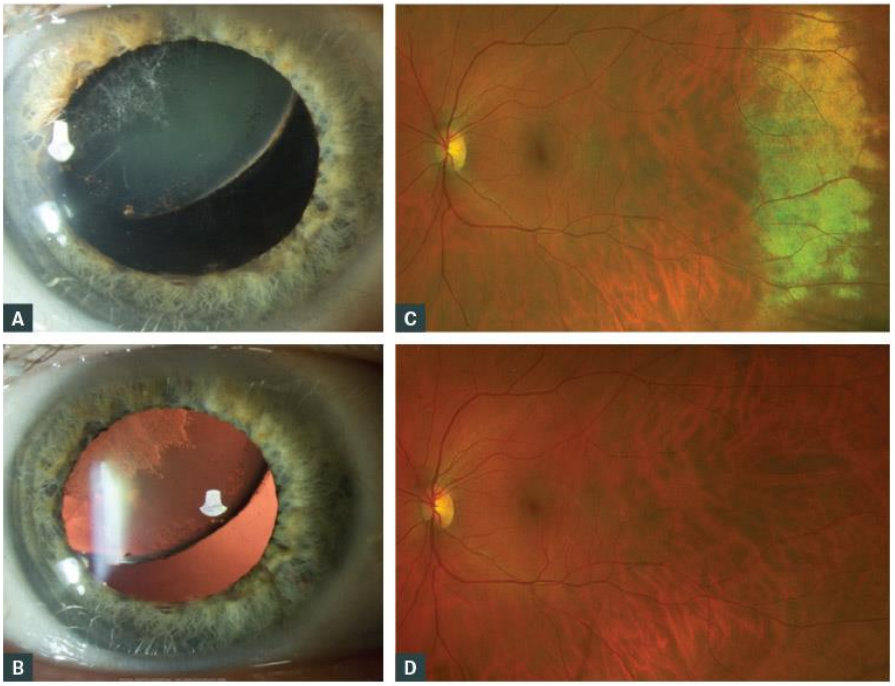
Word "contusion" refers to a closed-globe injury that is often produced by blunt items, but may also be caused by sharp ones. It's not connected to deep-seated corneal and/or scleral ulcers.[48] There are numerous factors contributing to contusion injuries, which typically occur during everyday activities. Objects that strike the eye can cause damage in two ways, depending on where they hit and how severe the injury is: (1) direct cuts at the point of impact, mainly affecting the outer layer of the eye (i.e., the cornea and sclera); and (2) indirect cuts in the inner layers of the eye (i.e., the choroid and the retina), including the

optic nerve. Ophthalmologists have been studying the type of damage caused by contusions in the back part of the eye for a long time due to the poor vision outcomes often linked to it..[28,30]

❖ ***Clinical features***

Following an eye injury, it's important to record the specific object that hit the eye, the patient's activities at the moment, and the initial medical treatment received. It's essential to assess if the force of the impact was strong enough to break the eye or if the object was sharp enough to cut it (as discussed in the next section of this article). Identifying how the injury occurred, like whether it was caused by a blunt or sharp object, can help in this process. If there was also damage to the face at the same time, signs of eyelid and eye-related injuries are common. These injuries are especially common in children and are frequently caused by dog bites during the initial ten years of age.[49]

Figure 4: Lens dislocation [A, B] and commotio retinae [C, D] are examples of contusion-related closed globe damage[34]



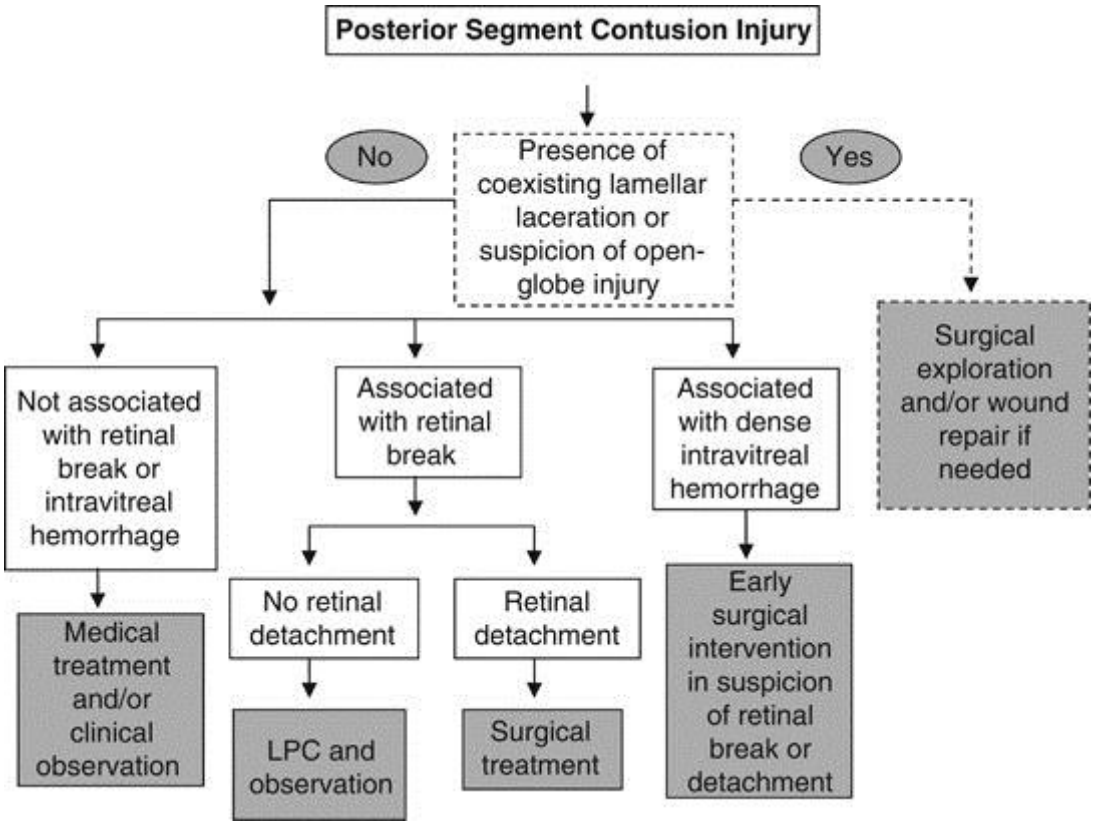
❖ ***Management***

Referrals for a thorough intraocular examination and orbital evaluation should be made right once to an ophthalmology service for patients with a RAPD, diminished vision, impaired motility, and proptosis. Moreover, individuals with lens debris in the front part of the eye, fluid accumulation, and absence of the red eye reflex must be referred away. Resting in bed, using eye drops that block muscle movement, applying Prednisolone or Moxifloxacin eye drops four times a day, and checking eye pressure frequently are all potential treatments for microhyphema. Preventive antibiotics, tetanus, and rabies shots are necessary for wounds from animal bites.[34]

It has been shown that in closed-globe injuries, the severity of the damage and the postoperative visual acuity level are strongly correlated.[50,51] (Sheard, Yeung) The visual acuities demonstrated a notable positive association ($P<0.001$). The research indicated that a visual visual of 20/400 or less was linked to a suboptimal visual outcome ($P<0.001$ and $P=0.042$ for the surgical therapy and medication treatment groups, respectively).[52]

Closed-globe injuries caused by explosive events are uncommon compared to open-globe injuries.[53] According to a research, explosive materials employed in terrorist actions caused contusion injuries in 16 instances (14 percent). In this collection of injuries to the closed globe, injuries caused by contusions from explosives demonstrated outstanding visual outcomes ($P=0.389$), unlike the findings reported by Sobaci and colleagues in their study, which involved open-globe injuries from the same medical facility.[54] Surgical investigation should be taken into consideration in the examination of these kind of ocular injuries in order to rule out a scleral laceration and potential penetrating damage.

Figure 5: posterior segment contusion injury treatment flow chart[52]



Open globe injury

The injury might be attributed from rupture or laceration. One of the eye "diseases" in ophthalmology that poses the greatest risk to vision is open globe injuries. Obtaining a concise medical history is essential in providing crucial information about the underlying causes and structural damage that need consideration before diagnosing and treating an open globe injury. This history-taking helps healthcare professionals make informed decisions regarding the acute management of the injury.[55]

❖ ***Clinical features***

In general, the damage to pertinent eye structures and the manner of injury determine how open globe injuries are classified. Moreover, based on how severe the initial injury is, various issues could arise in the subsequent years, such as retinal detachment, secondary glaucoma, or secondary traumatic cataract.[56,57] Consequently, numerous patients require

additional medical check-ups over a span of several years following their initial operation.

Kuhn (1996) categorized open globe injuries into four groups: A, which is described as a "type of injury," B, which denotes the "grade" (visual clarity before the operation), C, which refers to the "position of the injury," or "zone classification I–III), and D, which is known as the "OTS Category".[48]

The investigator with expertise (CM) calculated the OTS and classified the injuries.

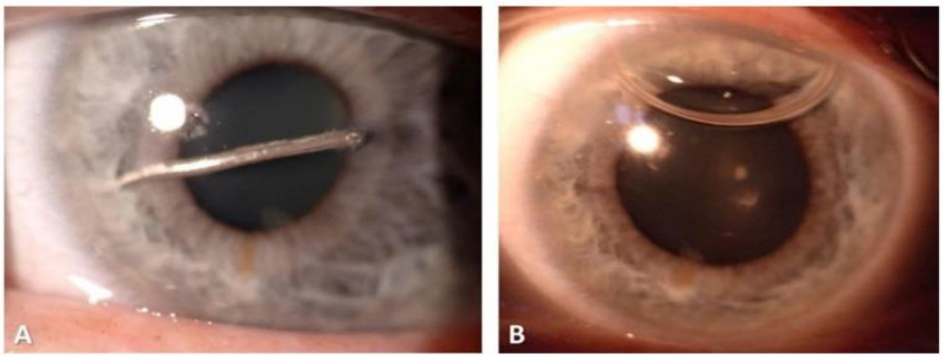
A: The damage was categorized into different categories according to etiology: eye injuries that involved objects breaking into the eye (intraocular foreign bodies), eye injuries that caused the eye to burst (due to blunt force), and eye injuries that involved the eye being pierced and damaged (by a sharp object).

B: The Ocular Trauma Score (OTS), which was initially introduced to assess the likelihood of a good outcome for vision after eye injuries of all kinds, includes a level of eye injury. Kuhn (2002) states that levels 1-4 indicate the vision clarity at the time of surgery. Cases where the initial vision clarity is unclear are labeled as level 6.[29]

C: The various sections within the zone classification are organized according to the position of the globe entire thickness scar's posterior point. Group I encompasses the most posterior point that is entirely within the cornea, including the corneoscleral limbus.

D: The predetermined guidelines were adhered to in determining the OTS.[29]

Figure 6: Nail piercing through the cornea causing Zone I damage. Prior to (A) and after (B) surgery.[58]



❖ ***Management***

Any open globe damage necessitates a prompt referral to an ophthalmologist specialist, along with a prescription for oral ciprofloxacin 750 mg twice day. To lower IOP in individuals experiencing nausea and vomiting, intravenous antiemetics may be used. The same protocols that apply to a globe laceration should also apply to a globe burst by physical trauma. As the patient is transferred to a higher-level specialist hospital, a protective eye shield must be placed over the injured eye for safety. Avoid using eye pads if you want to keep the globe from being compressed. In the event of an open globe, ointments are to be avoided as well. If a foreign body in the eye cannot be clearly seen during a physical check-up, its location and presence can be determined through a basic X-ray of the head and/or a CT scan of the eye sockets, which requires only small cuts (1-2 mm). Since the opening for small or sharp objects in the eye might be so narrow that it seals on its own, an X-ray might be needed to confirm the presence of a foreign body in the eye. In most cases, a magnetic resonance imaging scan is not essential, and it should not be done on those who have metallic foreign bodies. Patients with IOFBs and lacerations to the conjunctiva, scleral region, or periocular area must have prophylactic treatment against tetanus infection. It's also important to think about getting enough analgesia and antiemetics.[34]

Similar studies in the past on the severity and the elemts attributing visual outcome among individuals with mechanical ocular trauma

Jawade et al. investigated the causes, symptoms, presentation, and outcome of blunt ocular injuries. Twenty percent of those with ocular trauma were observed in the age range (in years) 31-40. Eighty percent of the 103 cases in our research were non-RTA cases, and twenty percent were RTA patients. There were 85 patients (82.5 percent) with lid edema and conjunctival chemosis, 87 patients (84.4 percent) with sub-conjunctival hemorrhage, and

around 15% with corneal abrasion. In addition, 31% had hyphema due to traumatic etiology, 2 percent had neuropathy in the optic nerve, and 7 percent had Berlin's edema, including angle recession glaucoma in 8 percent. In the outcome assessment, the patients' showed that 4 patients (3.8 percent) with poor visual acuity, meaning they could not see light well, and 1 patient (0.97 percent) had no sense of light at all. 45 patients (43.68 percent) restored visual acuity of 6/6.[59]

Wagh and their team aimed to document the range of clinical symptoms and outcomes following eye injuries in patients visiting a specialized hospital in a rural central Indian area, while also exploring the presence of vision loss caused by eye injuries and assessing the visual recovery of patients. Males had more ocular trauma (88.33 percent) than females (11.67 percent). Thirty percent of the patients were from cities, while seventy percent of the patients were from rural regions. Both eyes participated equally in this investigation. Of the patients, 45 percent had involvement in the right eye and 55 percent had involvement in the left eye. Notably, 20 percent of patients had open globe injuries and 80 percent of patients had closed globe injuries at presentation. The most frequent cause of eye injuries among patients at this remote hospital in central India was automobile accidents. The forms of ocular injuries and the affected ocular structures are important factors in deciding the visual result for these individuals.[60]

According to (i) the demographic profile, (ii) the form of damage, and (iii) the ocular structures implicated, Maiya et al. examined blunt ocular trauma. The ratio of male to female revealed that male predominance in the sample size was observed. Around 45% lies in 21–40 age. 52.6 percent, belonged to the agrarian class. The primary result (36 patients, 37.89 percent) was subconjunctival bleeding, which was followed by traumatic uveitis (27 patients, 28.42 percent) and lid and adnexal injuries (21 patients, 22.10 percent).[61]

Singh et al. evaluate the visual results of early vs late presentation, as well as the aetiology

and epidemiological profile of individuals presenting with ocular injuries. Included in the research were 103 instances of incident ocular damage. The ratio of open to closed globe injuries was 78:22 percent, with 9 percent of cases including an intraocular foreign body. The age group most often impacted was those under 25 who were also actively employed (64 percent). The most frequent location of injuries was at home (32 percent), followed by the workplace (29 percent). Fifty percent of the patients had a good result (vision of > 6/60 Snellen); of these, fifty three percent had entirely anterior segment lesion and twenty percent had concurrent retinal injury. There was a clear association between a good result with an early presentation in 57 percent of instances, and a bad outcome and a late presentation in 64 percent of cases.[62]

In Japan, the prognostic variables and visual outcomes of open-globe trauma were ascertained by Fujikawa et al. The most frequent cause (27 eyes) was trauma connected to work, followed by falls (19 eyes). Males were more likely to experience trauma connected to their jobs (P = 0.004), whereas females were more likely to fall (P = 0.00001). In comparison to other zones, Zone III injuries showed a statistically substantially worse prognostic factor (P = 0.04). Every single patient (100 percent) had a rupture eye. The following were deemed to be poor prognostic elements: low vision at presentation time visit, rupture eye, those with penetrating keratoplasty (PK), retinal detachment, and lens disposition. ($p<0.05$).[63]

Pre-operative factors influencing the course of posterior globe injuries were discovered by Agrawal et al.In 16 (57.1 percent) of the eyes, there was no light perception (NLP) before to surgery. The final VA for 14 eyes (50.0 percent) was NLP. According to univariate regression analysis, several factors were associated with suboptimal vision after surgery: the presence of RAPD, a low vision score before the operation, severe trauma, the extent of the injury, a cataract caused by the trauma, bleeding in the eye, loss of vitreous fluid, and

damage to the vitreous and retina.[64]

Maurya and colleagues meticulously recorded the epidemiology, trends in eye injuries, symptoms, outlook for vision, and factors that predict outcomes in cases of blunt eye injuries. This research includes 226 instances of ocular injuries induced by blunt objects out of a total of 402 cases. The majority of victims (68.6 percent) had a rural upbringing. The majority of the patients suffered trauma at home (27.9 percent) and on the road or street (30.5 percent). Road traffic accidents were the leading source of blunt trauma (26.5 percent), followed by injuries sustained in sports (22.6 percent) and physical assault (21.7 percent). Wooden objects made up the largest share of injury cases (26.0 percent), followed by materials like stone/brick (25.2 percent) and metal (23.1 percent). Most patients suffered from multiple injuries, with only 32.3 percent experiencing eye injuries alone. The majority of these injuries affected one eye, with 93.3 percent of patients suffering from unilateral injuries. A significant number of patients, 35.7 percent, lost vision in one eye, and 33.2 percent had reduced vision at the time they were first seen. Injuries to Zone III were found in 5.0 percent of cases involving open eyes and 14.5 percent of those with closed eyes. Out of eyes that were damaged, 14.9 percent had an ocular trauma score in the first category, and 7.1 percent in the second category. By six months, the risk of losing vision was seen in 14.5 percent of the right eye and 24.2 percent of the left eye.[65]

Zungu and colleagues documented the study of disease patterns and the outlook for recovery in individuals with eye injuries who received care at Queen Elizabeth Central Hospital in Malawi. Young people between the ages of 21 and 30 (22.5 percent) were the age group most impacted, followed by children under the age of 11 (35.3 percent). In terms of eye damage, male predominance was observed. The majority of subjects (n = 72, 70.6 percent) had closed globe injuries, and more than half of them (n = 62, 60.8 percent) had been hurt by blunt items. Additionally, the majority of adult injuries (n = 19, 38 percent) were

sustained during road traffic accidents (48 percent), in contrast the most of childrens injuries (61.5 percent) occur in home. Eight weeks after the first presentation, the rate of monocular blindness was 25.3 percent. Multivariate research revealed that open globe injuries and living in rural locations were related with monocular blindness. A fifth of the research participants had monocular blindness as a result of ocular damage. Preventive education on eye injuries is necessary at the household and community levels.[7]

The risk factors for a poor visual prognosis in traumatic hyphema were documented by Simanjuntak et al. There were 97 patients in the trial, and the ratio of men to females was 9:1. In addition to sports injuries (14.4 percent), road accidents (2.1 percent), employment injuries (12.4 percent), and other injuries (43.3 percent), soft gun pellets accounted for the majority of causes (27.8 percent). Iridodialysis, choroidal rupture, cataract, and vitreous hemorrhage were the causes of the poor visual result. Based on statistical analysis, the following risk variables were shown to be significant: degree of hyphema (P = 0.000), beginning of injury (0.000), IVA (P = 0.026), and causation (P = 0.018). The following major risk variables were linked to poor visual prognosis in traumatic hyphema: grade of hyphema, IVA, causation, and beginning of injury.[66]

Duan and colleagues studied the medical characteristics and predicted outcomes for patients with eye injuries who received treatment in Shandong. The study found a male to female ratio of 5.3 to 1. Among the mechanical eye injuries, there were 490 (34.4 percent) with open-globe injuries and 454 (31.9 percent) with closed-globe injuries. A total of 426 patients (29.9 percent) had eye injuries that were not mechanical, and 55 patients (3.9 percent) experienced injuries to the surrounding structures. 51.1 percent of the traumas (728 patients) had a work-related component. Surgery was used to treat the majority of patients (1,404 eyes, 87.9 percent). The ultimate visual acuities of closed-globe and open-globe injuries, as well as mechanical and nonmechanical injuries, differed significantly from one

another. The OTS score (Spearman's correlation coefficient = 0.691) and the starting visual acuity (Spearman's correlation coefficient = 0.618) showed a strong association with the end visual acuity. In Shandong Province, workplaces are the main places where young and middle-aged males have ocular injuries. The prognosis is bad and the percentage of nonmechanical injuries is significant. Prevention and treatment of blindness benefit from a thorough knowledge of the features of ocular damage.[12]

Research carried out by Jovanovic and colleagues examined patients who were admitted to hospitals with eye injuries in Bosnia and Herzegovina between the years 2006 and 2014.

The research identified several factors strongly associated with poor final visual acuity:

1. Lens subluxation
2. Vitreous prolapse
3. Vitreous hemorrhage
4. Presence of a posterior segment intraocular foreign body
5. Vitritis

that was most expected to lead to poor visual clarity consisted of individuals aged 36 and older, suffering from lens displacement, vitreous detachment, bleeding in the vitreous, inflammation of the vitreous, and bleeding in the macula.

The ultimate model underwent evaluation through different statistical indicators like AIC, log likelihood, how well it fit the data, and the c-statistic, showing that it offered a strong match to the information, backing up the conclusions of the research.[67]

The pattern, intensity, and extent of ocular injuries are described by Jahangir et al., along with the variables that contribute to ocular trauma in patients. Men between the ages of 18 and 45 were the most often impacted demographic. In only 3 percent of cases were there bilateral injuries. Sharp object penetration injuries were the most frequent kind of injury. The most typical venue for trauma to occur was the home. At presentation, the visual acuity

of almost 3/4 of the patients was less than 6/60. 57 percent of injuries were open globe injuries. The total frequency of mechanical injuries was higher than that of thermal and chemical injuries. An important part in effectively preventing ocular damage may be played by the ophthalmologist via the systematic collection of standardized data on the incidence of eye injuries. Young males should be the focus of preventive interventions.[68]

Puodžiuvienė and her colleagues from the Lithuanian University of Health Sciences Hospital examined the epidemiological characteristics and the visual outcomes of eye injuries in children. Compared to females, boys were more likely to have eye injuries. Home accounted for 60.4 percent of eye injuries, with outdoor environments (31.7 percent), schools (5.2 percent), and sports facilities (2.2 percent). Objects with a blunt edge (40.3 percent) and pointed items (29.9 percent) were the leading causes of eye injuries in kids, with burns (9.3 percent), slips and falls (6.7 percent), explosives (4.5 percent), fireworks (4.1 percent), bullets (1.9 percent), and accidents on the road (0.7 percent) coming in second, third, fourth, fifth, sixth, and seventh, respectively. The most common type of eye injury (53.4 percent) was a closed globe injury (CGI). On the other hand, open globe injuries (OGI) were more prevalent among young children (ages 0-4), while CGI was more common in older children (13-18 years). In cases of CGI, Grade 1 and 2 injuries were more frequent, whereas Grade 4 and 5 injuries were more common in OGI cases. The most typical OGI symptoms included low eye pressure, traumatic cataract, damage to the iris, vitreous detachment, and inflammation of the eye. Conversely, the most common symptoms of CGI were bleeding in the eye, secondary glaucoma, swelling of the retina, and damage to the cornea. Open globe injuries were significantly more likely to result in poor vision outcomes, such as corneal scarring, clouded cornea, low eye pressure, loss of the eye, and detachment of the retina. Despite this, 65.63 percent of children regained good vision (visual acuity of at least 0.5), while 18.4 percent experienced significant vision loss due to the

injury.[69]

Zhang et al. study the visual consequences of ocular injuries in Cangzhou and explain its clinical aspects. 45–59 years old was the biggest age group, followed by 30–44 years old. These two age groups represented two peaks of the age distribution, 28.5 percent and 27.2 percent of the total. Work-related injuries accounted for 194, 40.6 percent of all injuries, with home-related injuries coming in second at 123, 25.7 percent. Final visual acuity (VA) and initial VA were associated. There was a substantial correlation between the Ocular Trauma Score and the final VA. Working groups in their middle and early years were more likely to have eye injuries, with a greater percentage of men being affected. Ocular traumas connected to the workplace and the household were the two most common categories. The first VA was a strong predictor of the second VA, and the OTS may have been useful in predicting the third VA.[70]

In this Uttarakhand location, Dhasmana et al. examined the pattern and visual result of ocular damage. A total of 103 eyes from 88 individuals were examined. The incidence of ocular damage was twice as high in males as in women. The age range of the presentation was 6 to 80 years old, with a mean of 31.2 + 13.6 years. The majority of patients (n = 47) were between the ages of 21 and 40. In 37.86 percent of cases, ocular injuries resulting from traffic accidents were observed. Ocular trauma was more common among industrial workers (23.86 percent). There were 55 eyes (53.39 percent) with closed globe injuries and 40 eyes (38.83 percent) with open globe injuries. Seventy-six eyes (7.76 percent) sustained chemical damage. Patients with blunt ocular damage had greater first presentation visual acuity than those with penetrating injuries. At six months, the visual prognosis of the eye with superior visual acuity at presentation was improved.Young guys were often injured in the eyes. Eye injuries from traffic accidents were reported in a significant percentage of instances. Implementing traffic laws strictly, promoting health awareness, and implementing

preventative measures may all contribute to a lower risk of eye injuries.[71]

To assess the survival of the eye, the outlook for vision, and the factors predicting the outcome of open globe injuries, Rao and colleagues carried out a study that followed participants over time. The primary reason for the poor vision outcome, reported by 64% of the participants, was a severe visual impairment (less than 5/200) at the time of injury. Other factors, such as the time elapsed since the injury, the presence of a cataract, and the existence of an intraocular foreign body, were found to have no significant impact. The study found that 97% of the eyes survived. The researchers determined that certain factors played a crucial role in predicting the outcome of open globe injuries: the initial visual acuity, the presence of a hyphema, the extent and duration of the injury, the risk of retinal detachment, and the occurrence of vitreous hemorrhage.[72]

The predictive variables for visual prognosis in individuals with traumatic cataracts are investigated by Qi et al. The initial VA, the kind of damage, the location of the wound, the method used to remove the cataract, and the placement of the IOL were all related to the final VA. OTS's sensitivity in foretelling the VA at ≥20/40, LP/HM (light perception/hand motion), and NLP (nonlight perception) was 100 percent. 100 percent of the time, OTS was able to accurately forecast the final VA at 1/200-19/200 and 20/200-20/50.[73]

MATERIALS

&

METHODS

MATERIALS AND METHODS:

SOURCE OF DATA:

This prospective study was conducted on minimum of. 72 eyes fulfilling the inclusion criteria in the department of Ophthalmology, R. L. Jalappa Hospital and Research centre, Kolar from September 2022 to December 2023, after obtaining ethical clearance from Institutional Ethical Committee **[NO. SDUMC/KLR/IEC/313/2022-23,Date : 20-07-2022]**of Sri Devaraj Urs Medical College and written informed consent from the subjects.

STUDY DESIGN: prospective Study

STUDY PERIOD :September 2022 to December 2023

INCLUSION CRITERIA:

1. All cases of mechanical ocular injuries involving the anterior segment of eye age more than 5 years.

EXCLUSION CRITERIA:

1. Prior history of intra ocular surgery
2. Presence of intra ocular foreign body or endophthalmitis at the time of presentation
3. Chemical injuries of eye
4. Posterior segment of eye injury

Patients who are unconscious at the time of presentation

METHOD OF COLLECTION OF DATA:

A total of 72 eyes fulfilling the inclusion criteria will be included in this study. After prior consent from the patient or guardian, a detailed history regarding:

1. Time of onset of injury
2. Mode of injury

Preliminary general examination of patient will be done with these investigations:

3. Visual acuity assessment by using Snellen chart for distant vision.

4. Near vision by using near vision charts.
5. Color Vision by Ishihara test
6. Slit lamp bio microscopy for evaluation of anterior segment.
7. Fundus examination by IDO
8. X-ray orbit
9. B-Scan
10. CT and MRI orbit if needed

SAMPLE SIZE ESTIMATION

Sample size was estimated by using the proportion of Hyphema in subjects who had Anterior Segment Trauma of the Eye was 22% from the study by Muhammad Yasir Arfat et al. using the formula

Sample Size = $\frac{Z_{1-\alpha/2}^{2} P (1-P)}{d^2}$

$Z_{1-\alpha/2}$ = is standard normal variate(at 5% type 1 error ($P<0.05$) it is 1.96 and at 1% type1 error($P<0.01$) it is 2.58).As in majority of studies P values are considered significant below 0.05 hence 1.96 is used in formula.

P= Expected proportion in population based on previous studies or pilot studies

d= Absolute error or precision

P = 22% or 0.22

q = 78% or 0.78

d = 10% or 0.10

Using the above values at 95% Confidence level a sample size of 66 subjects will be included in the study. Considering 10% Nonresponse a sample size of 66 + 6.7 ≈ 72 subjects will be included in the study.

STATISTICAL METHODS USED FOR THIS STUDY

Data will be entered into Microsoft excel data sheet and will be analyzed using SPSS 22 version software. Categorical data will be represented in the form of Frequencies and proportions.

Chi-square will be used as test of significance. Continuous data will be represented as mean and standard deviation. Independent t test will be used as test of significance to identify the mean difference. P value <0.05 will be considered as statistically significant

RESULTS

RESULTS

Majority of the patients were in the age group of 21-30 years (25%), while 23.6% were in age group 11-20 years.

Table 1 : Distribution of subjects according to age group

Age

	Frequency	Percent
5-10 years	3	4.2
11-20 years	17	23.6
21-30 years	18	25.0
31-40 years	11	15.3
41-50 years	12	16.7
51-60 years	9	12.5
>60 years	2	2.8
Total	72	100.0

Graph 1 :Distribution of subjects according to age group

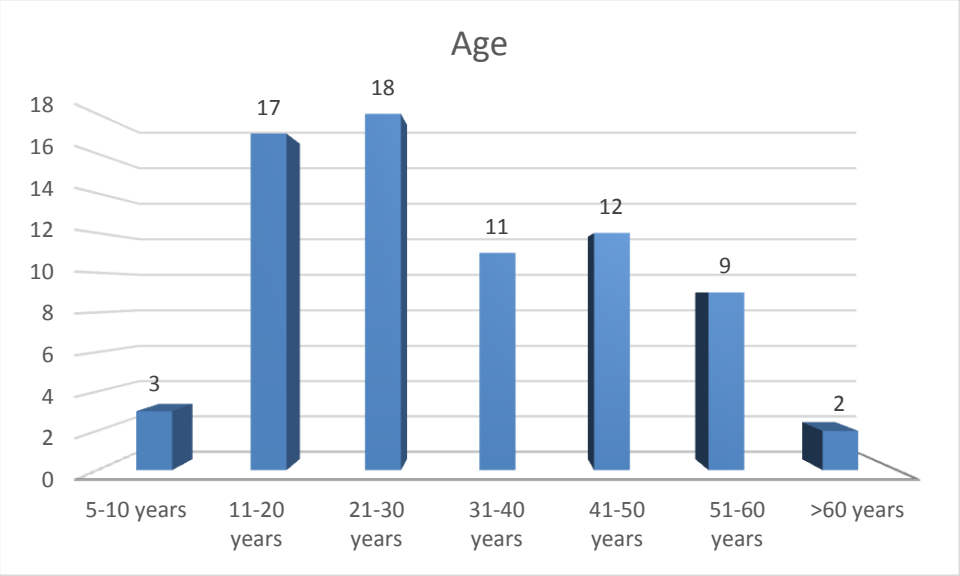


Table 2 : Statistical distribution of age

The mean age of the patients was 31.82 years.

Age (years)

Mean	31.82
Median	28
SD	15.76
IQR	19,48

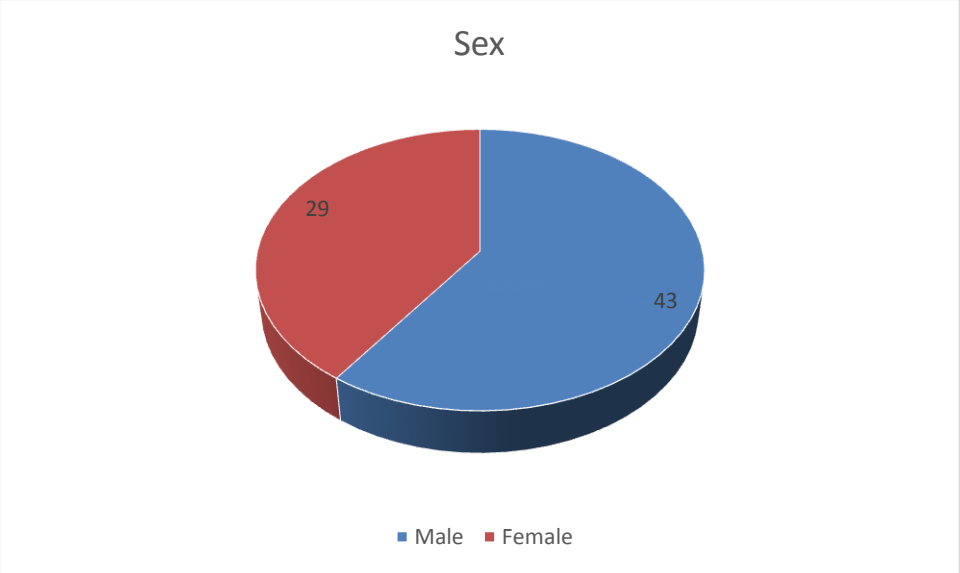
Table 3 :Distribution of subjects according to sex

Majority of the patients were males (59.7%), while 40.3% were females.

SEX

	Frequency	Percent
Male	43	59.7
Female	29	40.3
Total	72	100.0

Graph 2 :Distribution of subjects according to sex



Left eye was involved among 45.8% of the patients, while right eye was involved among 44.4% of the patients. 9.7% of the patients had bilateral eye involvement.

Table 4 :Distribution of subjects according to laterality of eye involved

Eye

	Frequency	Percent
Right eye	32	44.4
Left eye	33	45.8
Bilateral	7	9.7
Total	72	100.0

Graph 3: Distribution of subjects according to laterality of eye involved

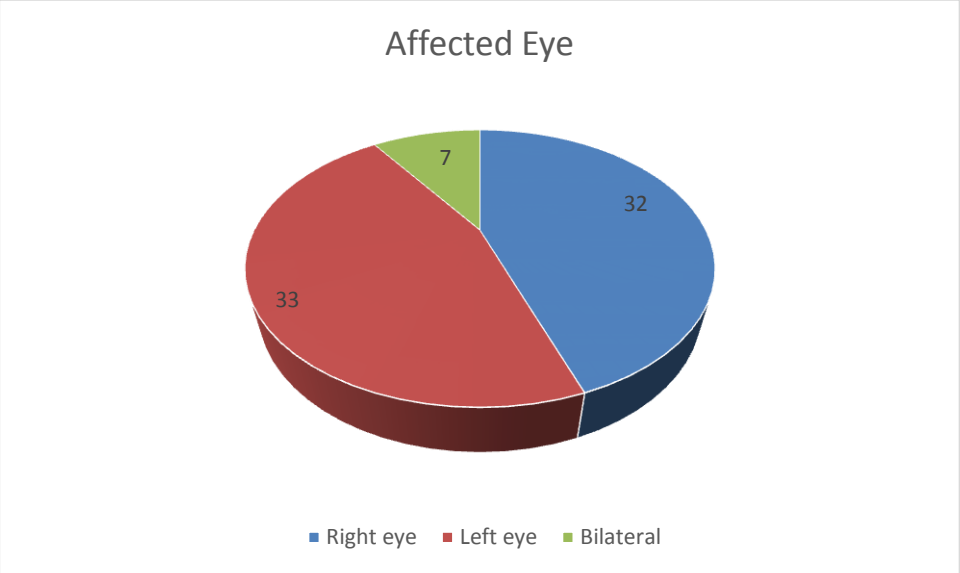
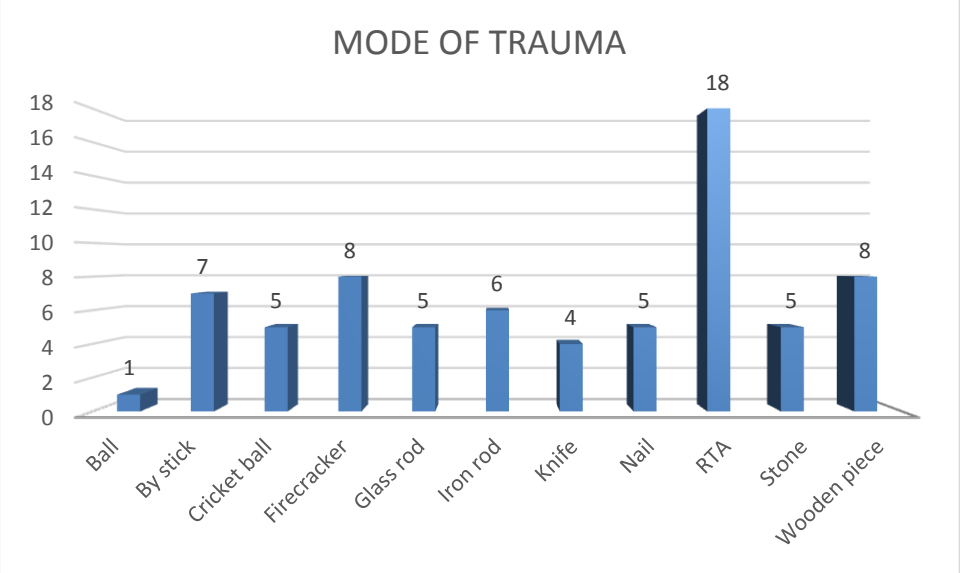


Table 5 :Distribution of subjects according to mode of trauma

MODE OF TRAUMA

	Frequency	Percent
Ball	1	1.4
By stick	7	9.7
Cricket ball	5	6.9
Firecracker	8	11.1
Glass rod	5	6.9
Iron rod	6	8.3
Knife	4	5.6
Nail	5	6.9
RTA	18	25.0
Stone	5	6.9
Wooden piece	8	11.1
Total	72	100.0

Graph 4: Bar diagram showing different modes of trauma.



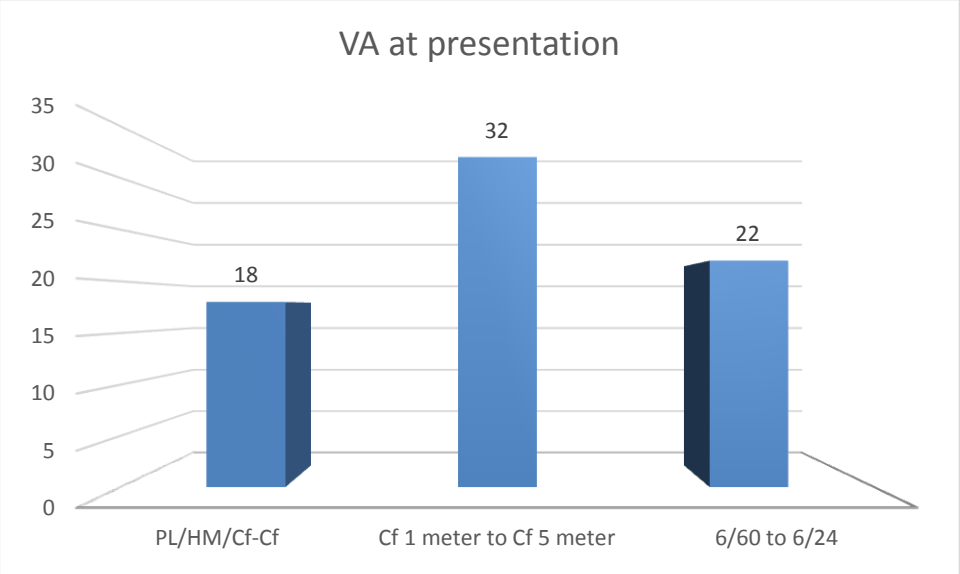
Severity of ocular trauma at presentations Most had Cf 1 meter to Cf 5 meter at presentation (44.4%).

Table 6 : Distribution of subjects according to visual acuity at time of presentation

VA at presentation

	Frequency	Percent
PL/HM/Cf-Cf	18	25.0
Cf 1 meter to Cf 5 meter	32	44.4
6/60 to 6/24	22	30.6
Total	72	100.0

Graph 5: Bar diagram showing visual acuity at time of presentation



Follow-up

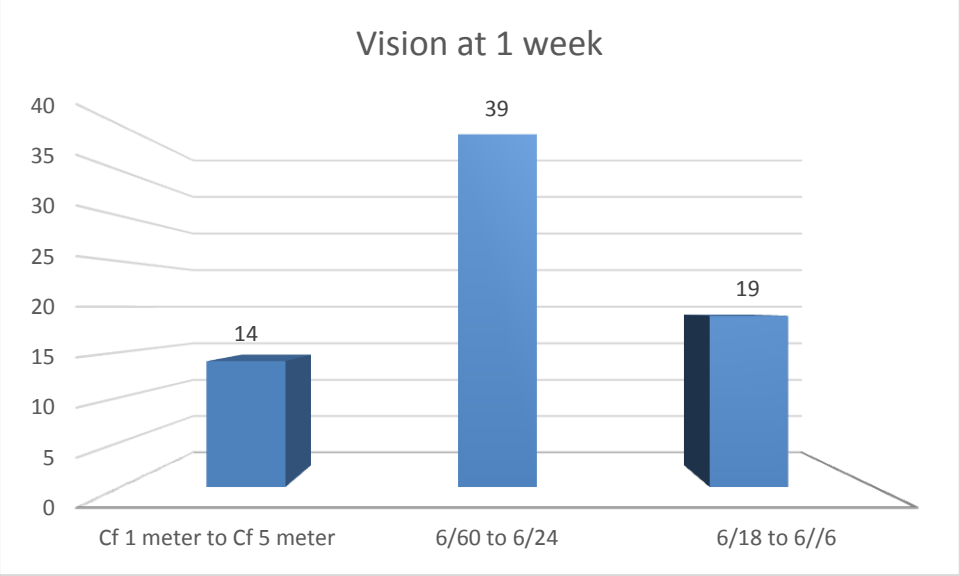
At one week follow-up, 54.2% had a VA 6/60 to 6/24, 26.4% had 6/18 to 6//6 and 19.4% had Cf 1 meter to Cf 5 meter.

Table 7 :Distribution of subjects according to visual acuity at 1 week

Vision at 1 wk

	Frequency	Percent
Cf 1 meter to Cf 5 meter	14	19.4
6/60 to 6/24	39	54.2
6/18 to 6//6	19	26.4
Total	72	100.0

Graph 6 : Bar diagram showing visual acuity at 1 week



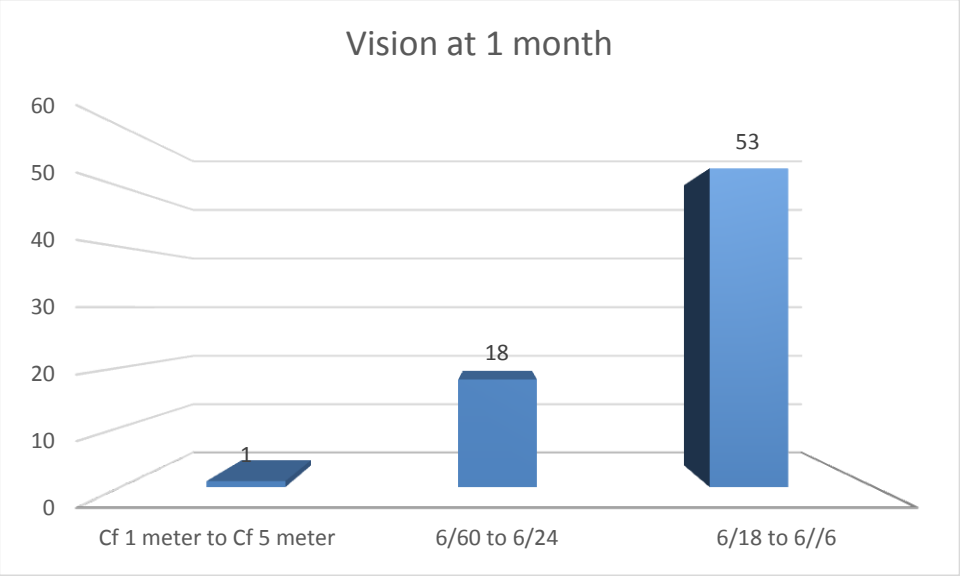
At one month follow-up, 25% had a VA 6/60 to 6/24, 73.6% had 6/18 to 6//6 and 1.4% had Cf 1 meter to Cf 5 meter.

Table 8 :Distribution of subjects according to visual acuity at 1 month

Vision at 1 month

	Frequency	Percent
Cf 1 meter to Cf 5 meter	1	1.4
6/60 to 6/24	18	25.0
6/18 to 6//6	53	73.6
Total	72	100.0

Graph 7 : **Bar diagram showing visual acuity at 1 month**



Corneal foreign body with epi defects was the most common complication, followed by Traumatic cataract (9.7%), Hyphema with sch (9.7%), Full thickness lid laceration (8.3%), SCH with Chemosis (8.3%), Corneoscleral tear (6.9%), Corneal opacity (6.9%)

Table 9:Distribution of subjects according to complications

complications

		Frequency	Percent
	Conjuctival tear	2	2.8
	Corneal f.b	1	1.4
	Corneal f.b with epi defects	9	12.5
	Corneal opacity	5	6.9
	Corneal tear	2	2.8
	Corneal tear with hyphema	4	5.6
	Corneal tear with traumatic catract	1	1.4
	Corneoscleral tear	5	6.9
	Full thickness lid laceration	6	8.3
	Full thickness U.E.lid laceration p.o.edema and chemosis	1	1.4
	Hyphema	1	1.4
	Hyphema with corneal edema	2	2.8
	Hyphema with corneal opacity	4	5.6
	Hyphema with sch	7	9.7
	Lid laceration with bicanalicular tear	1	1.4
	Re-full thickness U.E.lid laceration p.o.edema and chemosis with floor.of.orbital fracture	2	2.8
	SCH with Chemosis	6	8.3
	Traumatic cataract	7	9.7
	Traumatic hyphema	2	2.8
	Traumatic iritis	4	5.6
	Total	72	100.0

Graph 8 : **Bar diagram showing complications of trauma**

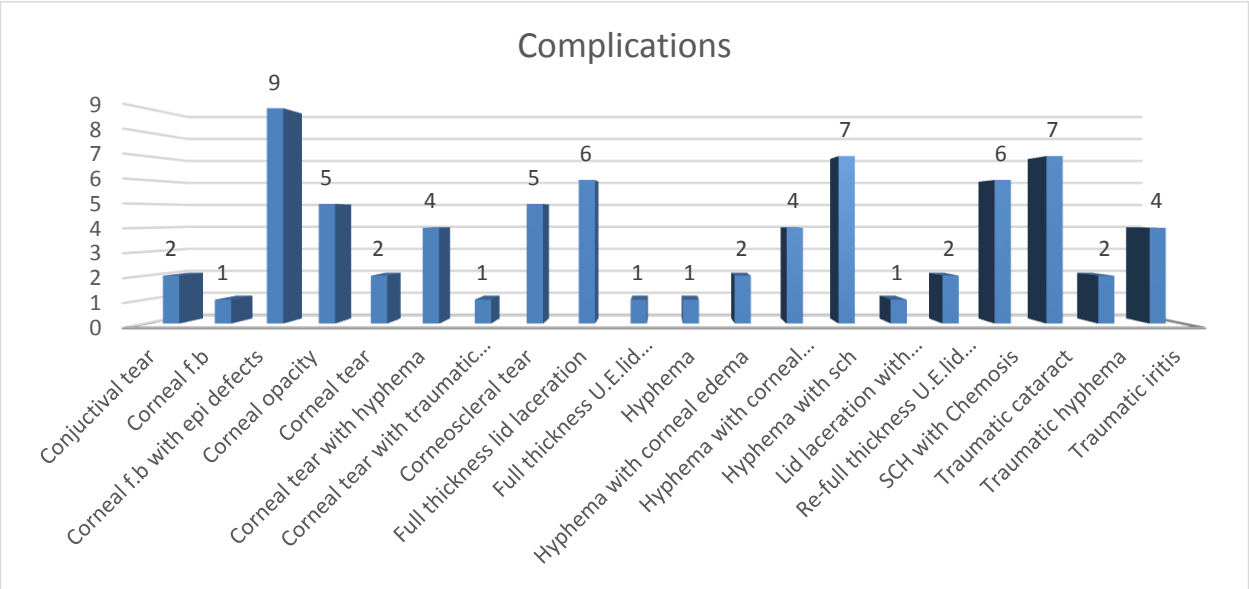


Table 10 :Distribution of subjects according to type of management

More than half of the patients were managed conservatively (51.4%).

Management

	Frequency	Percent
Conservative	37	51.4
F.b removal	8	11.1
Lid repair	8	11.1
Re-orbital floor reconstruction and lid tear repair	2	2.8
SICS with pciol	7	9.7
Tear repair	9	12.5
Tear repair with sics	1	1.4
Total	72	100.0

Graph 9 : **Bar diagram showing different modes of management**

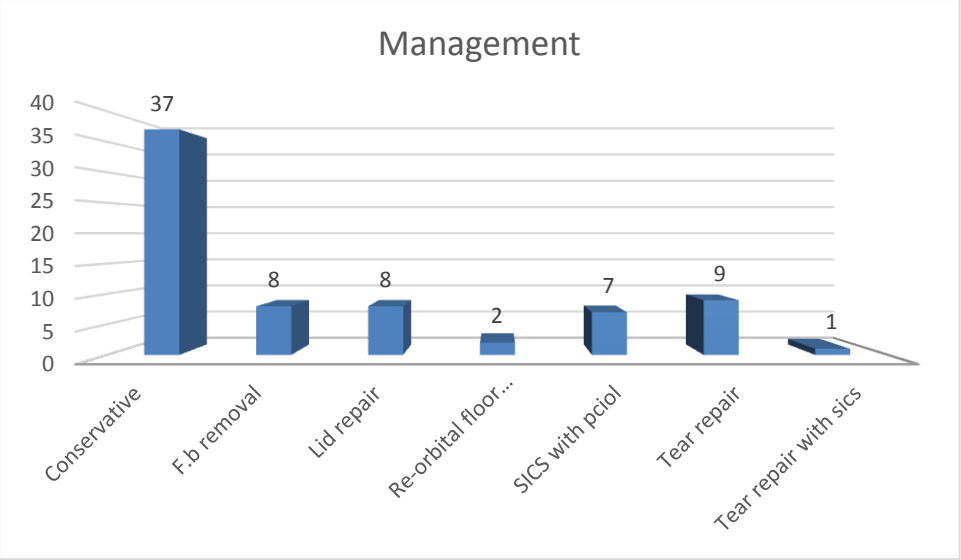


Table 11 :Distribution of subjects according to Presence of RAPD

Rapd was seen among 22 % of the patients.

RAPD

	Frequency	Percent
Normal	63	87%
High	9	13%
Total	72	100.0

Graph 10 : **Pie diagram showing distribution of subjects according to presence of RAPD**

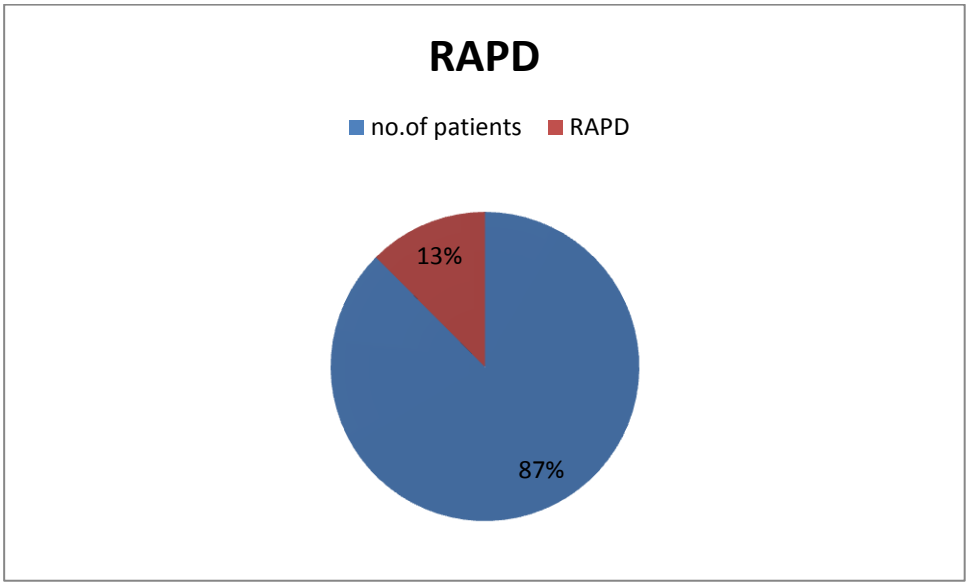


Table 12 :Distribution of subjects according to IOP

IOP was high among 13.9% of the patients.

IOP

	Frequency	Percent
Normal	62	86.1
High	10	13.9
Total	72	100.0

Graph 11 : **Pie diagram showing distribution of subjects according to iop**

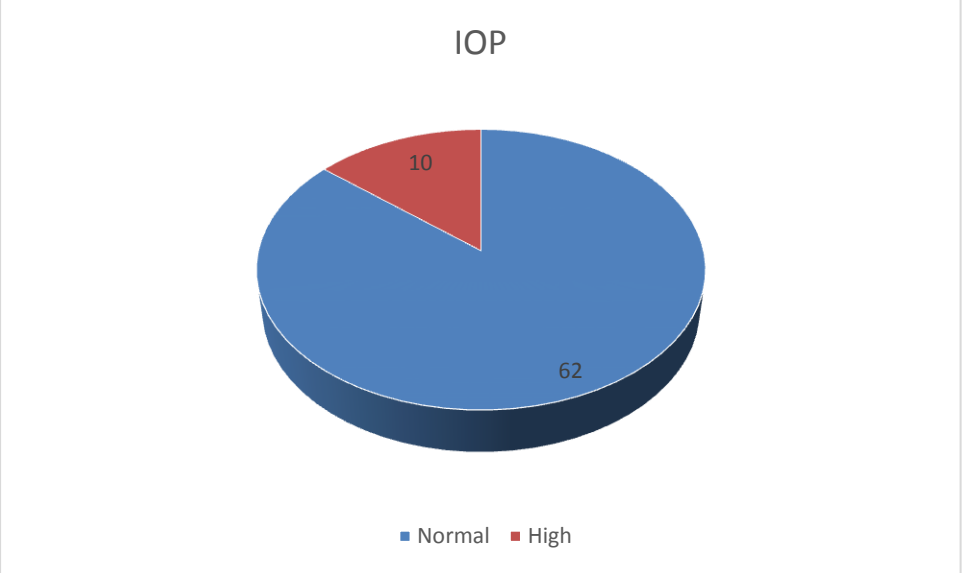


Table 13 :Distribution of subjects according to wound involving pupillary axis

11.1% of the patients had wound involving pupillary axis

Wound involving pupillary axis

	Frequency	Percent
Yes	8	11.1
No	64	88.9
Total	72	100.0

Graph 12 : **Pie diagram showing distribution of subjects according to wound involving pupillary axis**

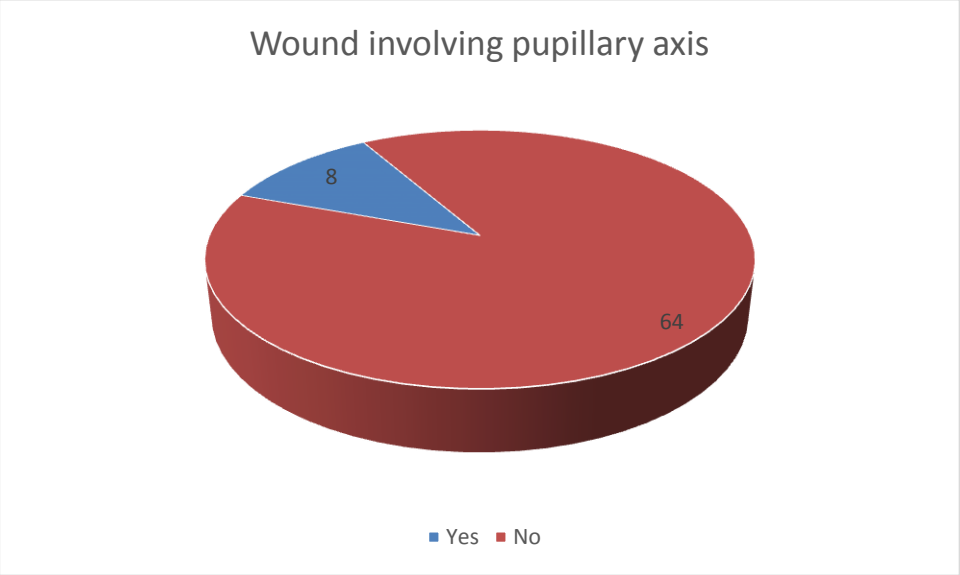


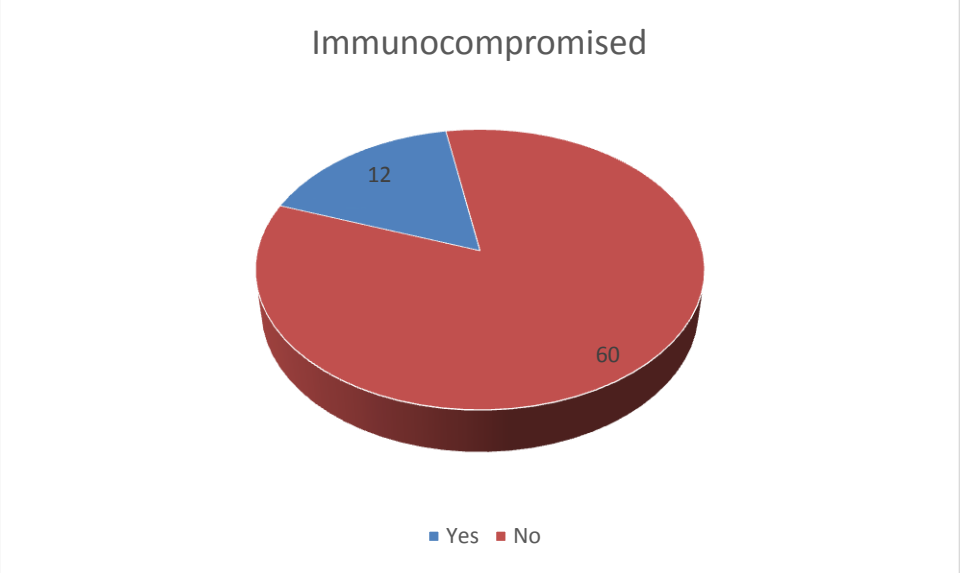
Table 14 :Distribution of subjects according to immune status

16.7% of the patients were immunocompromised.

Immunocompromised

	Frequency	Percent
Yes	12	16.7
No	60	83.3
Total	72	100.0

Graph 13 : Pie diagram showing distribution of subjects according to immune status



Majority of the patients presented within 24 hours (75%), while 16.7% and 8.3% patients presented 24-48 hours and >48 hours, respectively.

Table 15 :Distribution of subjects based on time of presentation

Time of presentation

		Frequency	Percent
	in 24 hours	54	75.0
	24 to 48 hours	12	16.7
	>48hours	6	8.3
	Total	72	100.0

Graph 14 : **Bar diagram showing distribution of subjects based on time of presentation.**

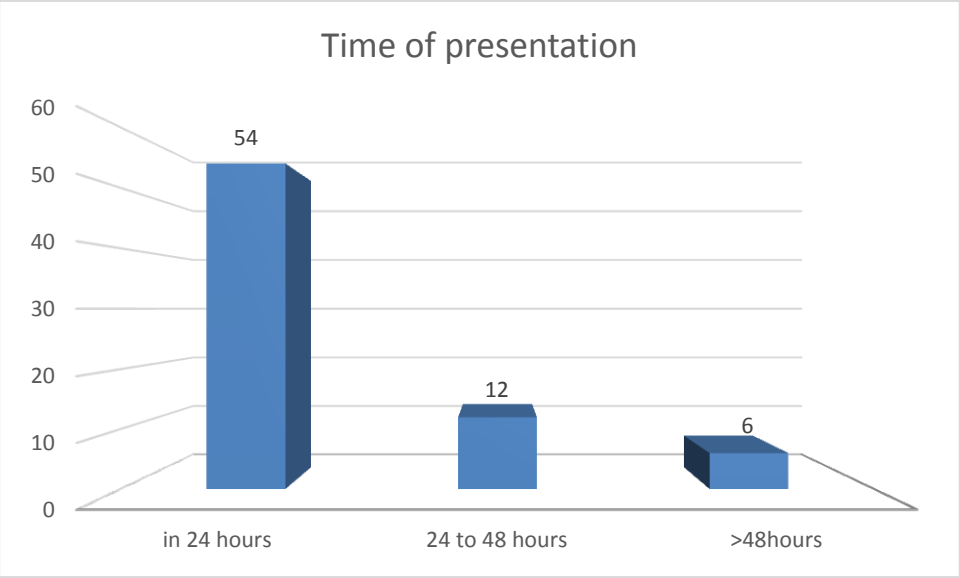


Table 16 :Distribution of subjects based on glaucoma status

Prevalence of glaucoma was 6.9%.

Glaucoma

	Frequency	Percent
Yes	5	6.9
No	67	93.1
Total	72	100.0

Graph 15 : **Pie diagram showing distribution of subjects according to status of glaucoma**

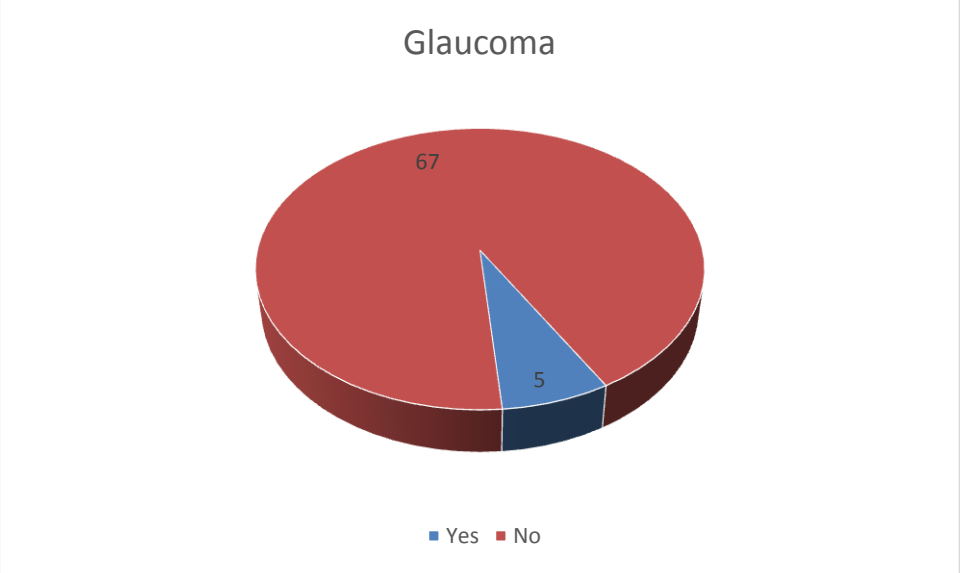


Table 17 :Distribution of subjects based on drug compliance

Drug compliance

	Frequency	Percent
Better	61	84.7
Poor	11	15.3
Total	72	100.0

Graph 16: Pie diagram showing distribution of subjects based on drug compliance

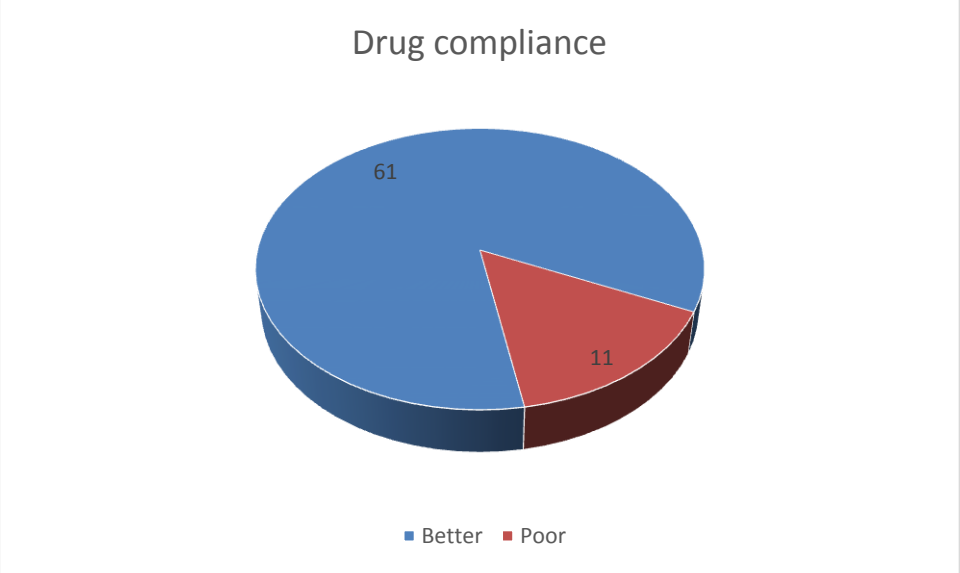


Table 18 :Distribution of subjects according to mode of trauma and visual acuity at time of presentation

Majority or all patients with stone, knife, stick and ball injuries had a vision of Cf 1 meter to Cf 5 meter at presentations. Most of the glass rod, iron rod and wooden piece injuries patients had a vision of PL/HM/Cf-Cf.

MODE OF TRAUMA * VA at presentation

			VA at presentation			Total
			PL/HM/Cf-Cf	Cf 1 meter to Cf 5 meter	6/60 to 6/24	
MODE OF TRAUMA	Ball	Frequency	0	1	0	1
		Percentage	0.0%	100.0%	0.0%	100.0%
	By stick	Frequency	3	3	1	7
		Percentage	42.9%	42.9%	14.3%	100.0%
	Cricket ball	Frequency	0	5	0	5
		Percentage	0.0%	100.0%	0.0%	100.0%
	Firecracker	Frequency	0	3	5	8
		Percentage	0.0%	37.5%	62.5%	100.0%
	Glass rod	Frequency	3	1	1	5
		Percentage	60.0%	20.0%	20.0%	100.0%
	Iron rod	Frequency	4	2	0	6
		Percentage	66.7%	33.3%	0.0%	100.0%
	Knife	Frequency	1	2	1	4
		Percentage	25.0%	50.0%	25.0%	100.0%
	Nail	Frequency	1	2	2	5
		Percentage	20.0%	40.0%	40.0%	100.0%
	RTA	Frequency	3	6	9	18
		Percentage	16.7%	33.3%	50.0%	100.0%
	Stone	Frequency	0	4	1	5
		Percentage	0.0%	80.0%	20.0%	100.0%
	Wooden piece	Frequency	3	3	2	8
		Percentage	37.5%	37.5%	25.0%	100.0%
Total		Frequency	18	32	22	72
		Percentage	25.0%	44.4%	30.6%	100.0%

Graph 17 : **Bar diagram showing frequency distribution of subjects according to mode of trauma and visual acuity at time of presentation**

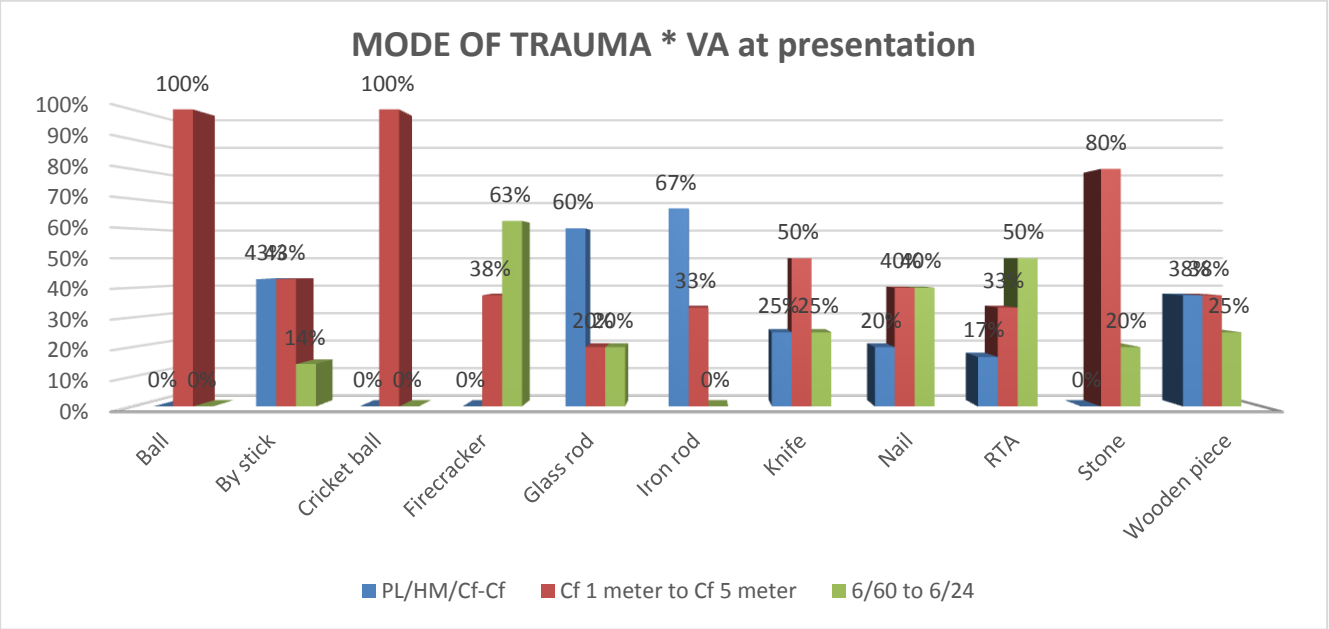


Table 19 :Comparison of frequency of visual acuity at time of presentation and after 1 week

All patients who had PL/HM/Cf-Cf at presentation showed improvement at 1 week after management, while 81.3% among the Cf 1 meter to Cf 5 meter and 77.3% among 6/60 to 6/24 patients showed improved VA.

			Vision at 1 week			Total
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
VA at presentation	PL/HM/Cf-Cf	Frequency	8	8	2	18
		Percentage	44.4%	44.4%	11.1%	100.0 %
	Cf 1 meter to Cf 5 meter	Frequency	6	26	0	32
		Percentage	18.8%	81.3%	0.0%	100.0 %
	6/60 to 6/24	Frequency	0	5	17	22
		Percentage	0.0%	22.7%	77.3%	100.0 %
Total		Frequency	14	39	19	72
		Percentage	19.4%	54.2%	26.4%	100.0 %

Graph 18 : **Bar diagram showing comparison of frequency of visual acuity at time of presentation and at 1 week**

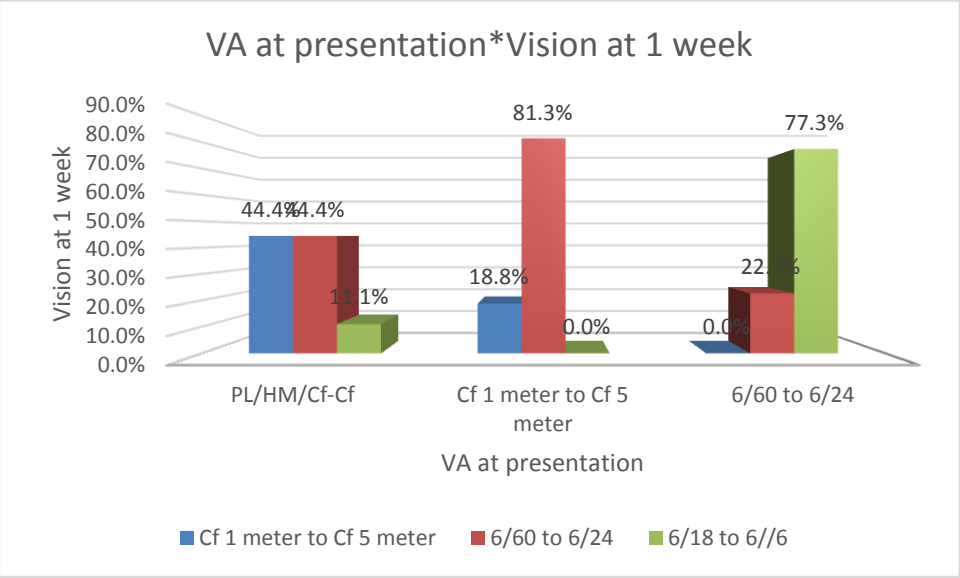
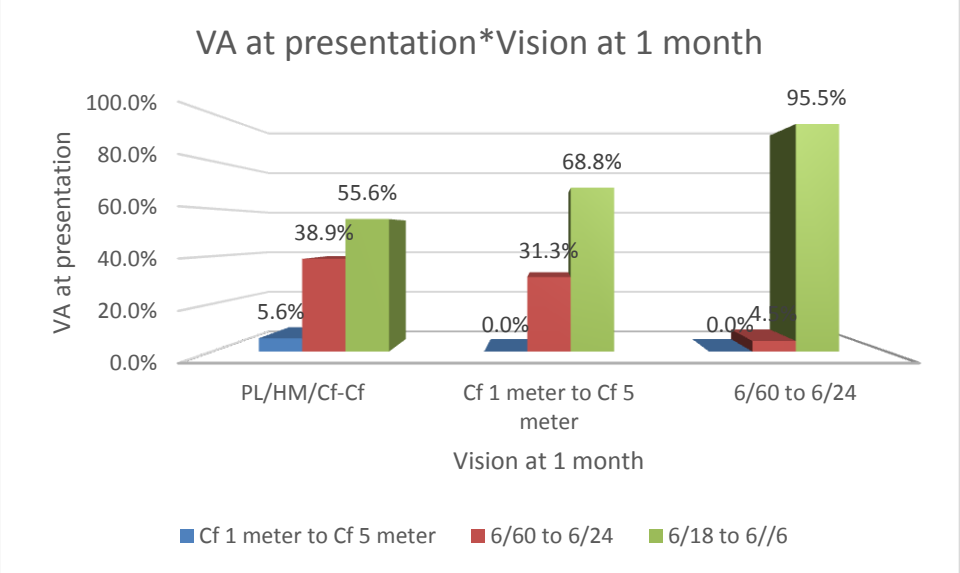


Table 20: Comparison of frequency of visual acuity at time of presentation and after 1 month

All patients who had PL/HM/Cf-Cf and Cf 1 meter to Cf 5 meter at presentation showed improvement at 1 month after management, while 95.5% among the 6/60 to 6/24patients showed improved VA. None of the patients has their VA deteriorated at 1 week or 1 month.

			Vision at 1 month			Total
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
VA at presentation	PL/HM/Cf-Cf	Frequency	1	7	10	18
		Percentage	5.6%	38.9%	55.6%	100.0%
	Cf 1 meter to Cf 5 meter	Frequency	0	10	22	32
		Percentage	0.0%	31.3%	68.8%	100.0%
	6/60 to 6/24	Frequency	0	1	21	22
		Percentage	0.0%	4.5%	95.5%	100.0%
Total		Frequency	1	18	53	72
		Percentage	1.4%	25.0%	73.6%	100.0%

Graph 19 : **Bar diagram showing comparison of frequency of visual acuity at time of presentation and at 1 month**



Factors affecting the final visual outcome in patients

Table 21 : Frequency of association between IOP and vision at 1month

There was no association between IOP and vision at 1 month.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
IOP	Normal	Frequency	1	15	46	0.862
		Percentage	1.6%	24.2%	74.2%	
	High	Frequency	0	3	7	
		Percentage	0.0%	30.0%	70.0%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 20: **Bar diagram showing frequency of association between IOP and vision at 1month**

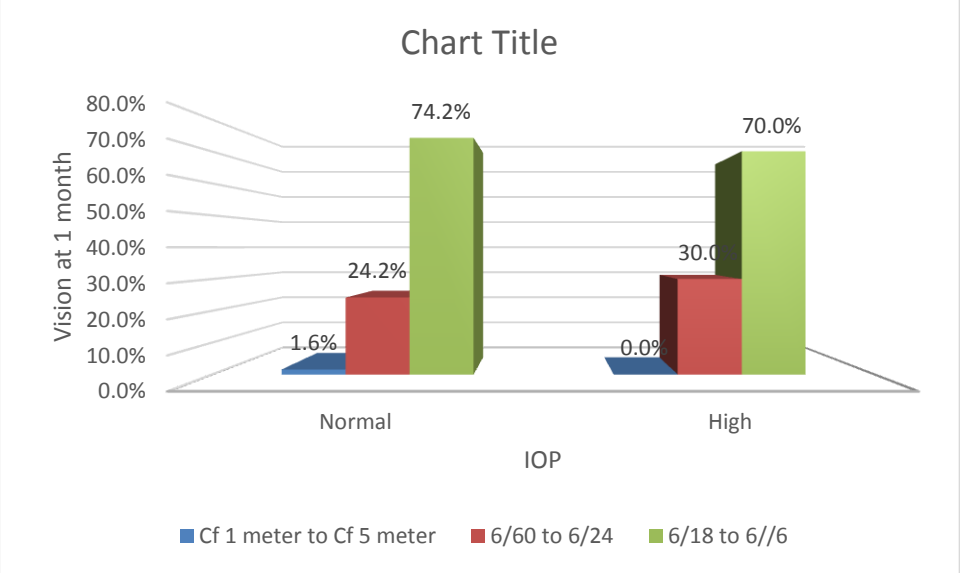


Table 22 : Frequency of association between wound involving pupillary axis and vision at 1month

There was a significant association between Wound involving pupillary axis and poor visual outcomes.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
Wound involving pupillary axis	Yes	Frequency	1	6	1	**<0.001**
		Percentage	12.5%	75.0%	12.5%	
	No	Frequency	0	12	52	
		Percentage	0.0%	18.8%	81.3%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 21 : **Bar diagram showing frequency association between wound involving pupillary axis and vision at 1month**

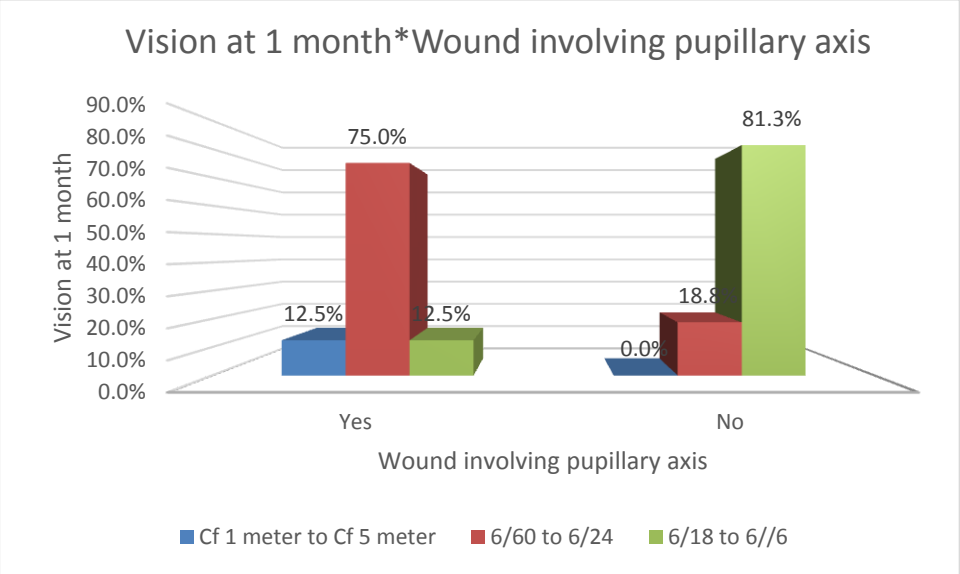


Table 23: Frequency of association between immune status and vision at 1month

There was a significant association between immunocompromised status and poor visual outcomes.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
Immunocompromised	Yes	Frequency	0	8	4	**0.001**
		Percentage	0.0%	66.7%	33.3%	
	No	Frequency	1	10	49	
		Percentage	1.7%	16.7%	81.7%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 22 : Bar diagram showing frequency of association between immune status and vision at 1month

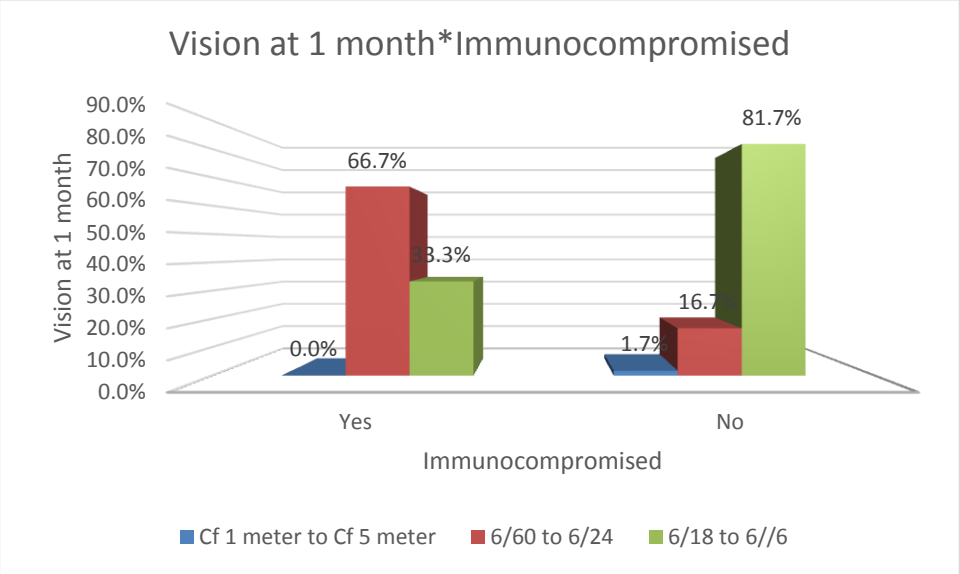


Table 24 : Frequency of association between time of presentation and vision at 1month

There was no association between Time of presentation and vision at 1 month.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
Time of presentation	in 24 hours	Frequency	1	12	41	0.645
		Percentage	1.9%	22.2%	75.9%	
	24 to 48 hours	Frequency	0	3	9	
		Percentage	0.0%	25.0%	75.0%	
	>48hours	Frequency	0	3	3	
		Percentage	0.0%	50.0%	50.0%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 23 : **Bar diagram showing frequency of association between time of presentation and vision at 1month**

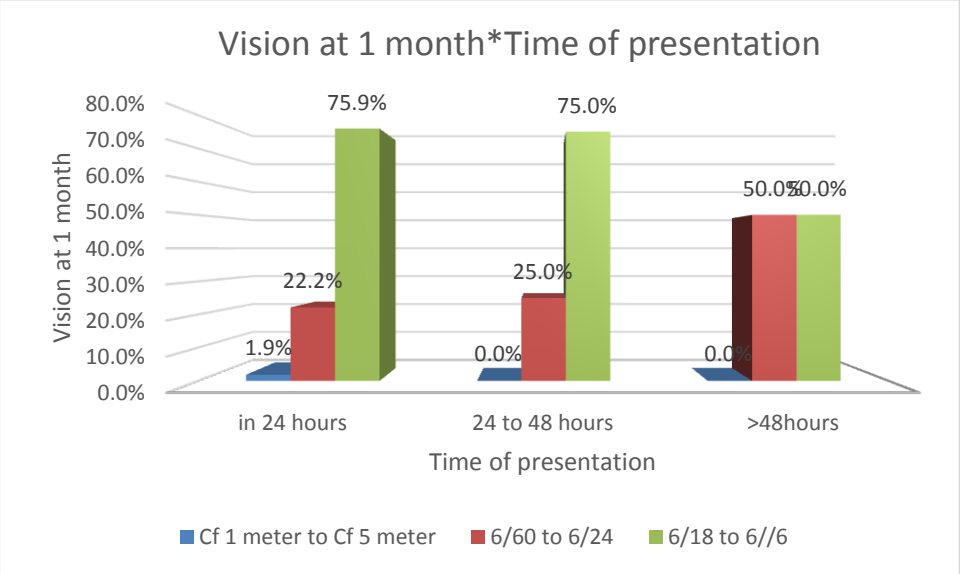


Table 25 : Frequency of association between glaucoma and vision at 1month

There was no association between glaucoma and vision at 1 month.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
Glaucoma	Yes	Frequency	0	2	3	0.707
		Percentage	0.0%	40.0%	60.0%	
	No	Frequency	1	16	50	
		Percentage	1.5%	23.9%	74.6%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 24 : **Bar diagram showing frequency of association between glaucoma and vision at 1month**

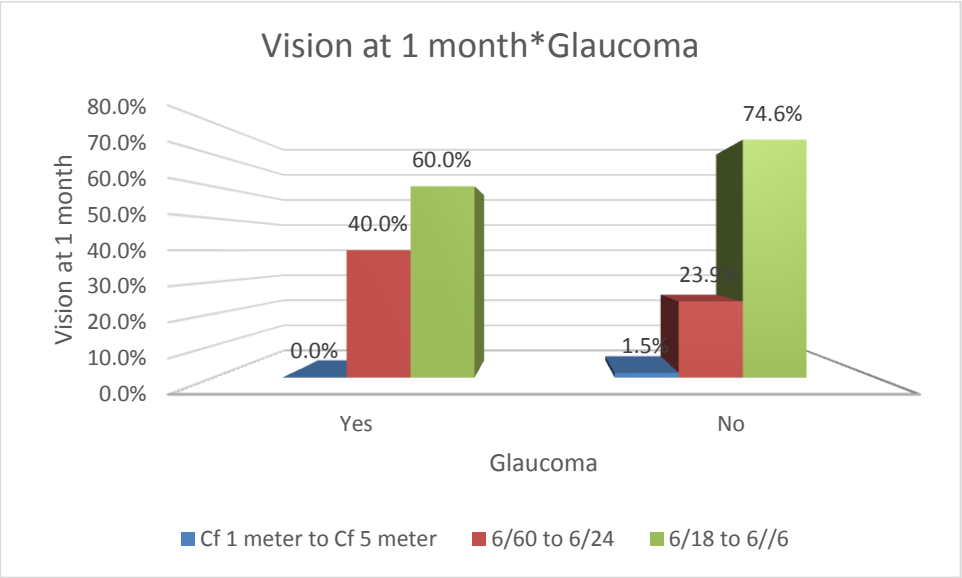


Table 26 : Frequency of association between drug compliance and vision at 1month

There was a significant association between better drug compliance and good visual outcomes.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
Drug compliance	Better	Frequency	0	12	49	**0.002**
		Percentage	0.0%	19.7%	80.3%	
	Poor	Frequency	1	6	4	
		Percentage	9.1%	54.5%	36.4%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 25: **Bar diagram showing frequency of association between drug compliance and vision at 1month**

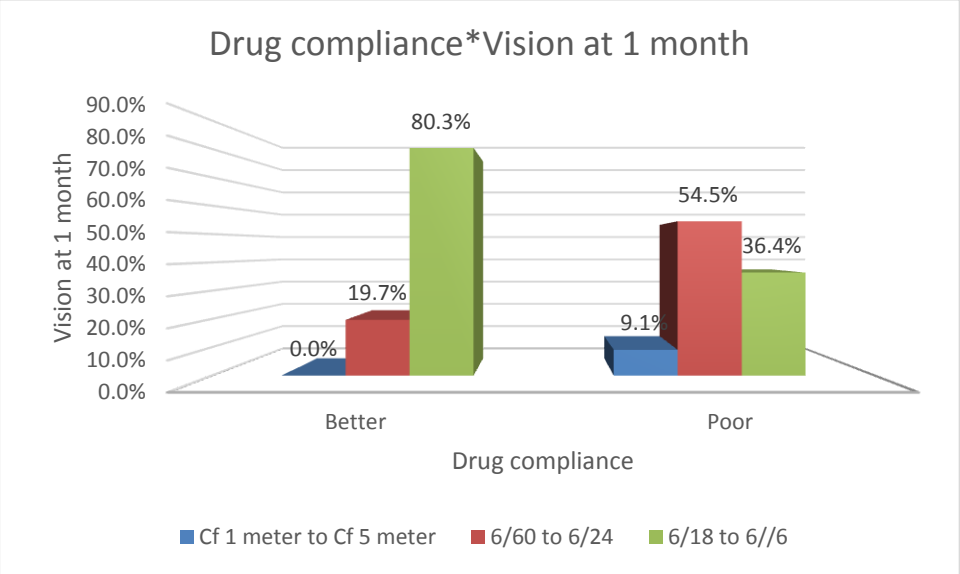


Table 27 : Frequency of association between age groups and vision at 1month

There was no association between age and vision at 1 month.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
Age	5-10 years	Frequency	0	0	3	0.061
		Percentage	0.0%	0.0%	100.0%	
	11-20 years	Frequency	0	4	13	
		Percentage	0.0%	23.5%	76.5%	
	21-30 years	Frequency	0	3	15	
		Percentage	0.0%	16.7%	83.3%	
	31-40 years	Frequency	0	0	11	
		Percentage	0.0%	0.0%	100.0%	
	41-50 years	Frequency	1	6	5	
		Percentage	8.3%	50.0%	41.7%	
	51-60 years	Frequency	0	5	4	
		Percentage	0.0%	55.6%	44.4%	
	>60 years	Frequency	0	0	2	
		Percentage	0.0%	0.0%	100.0%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 26 : **Bar diagram showing frequency of association between age groups and vision at 1month**

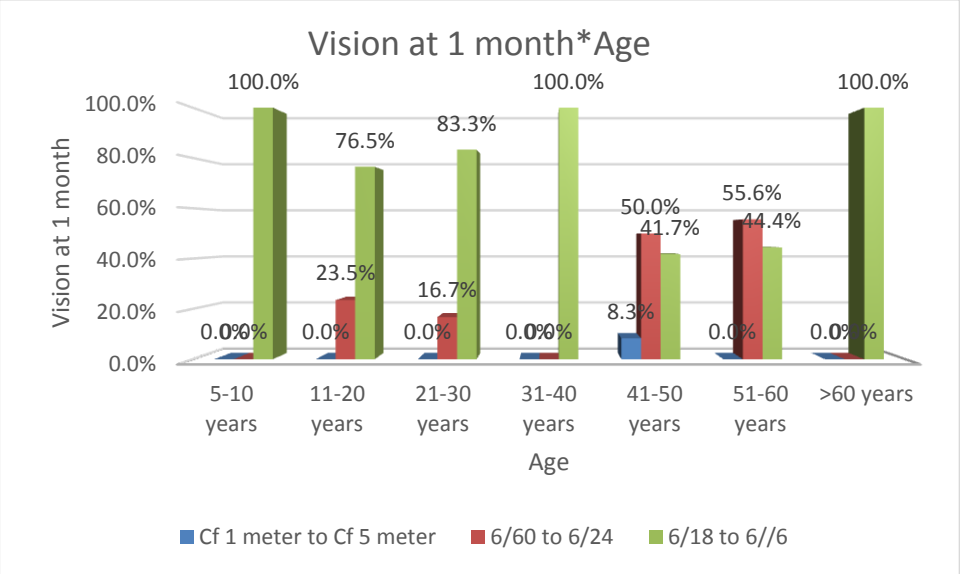
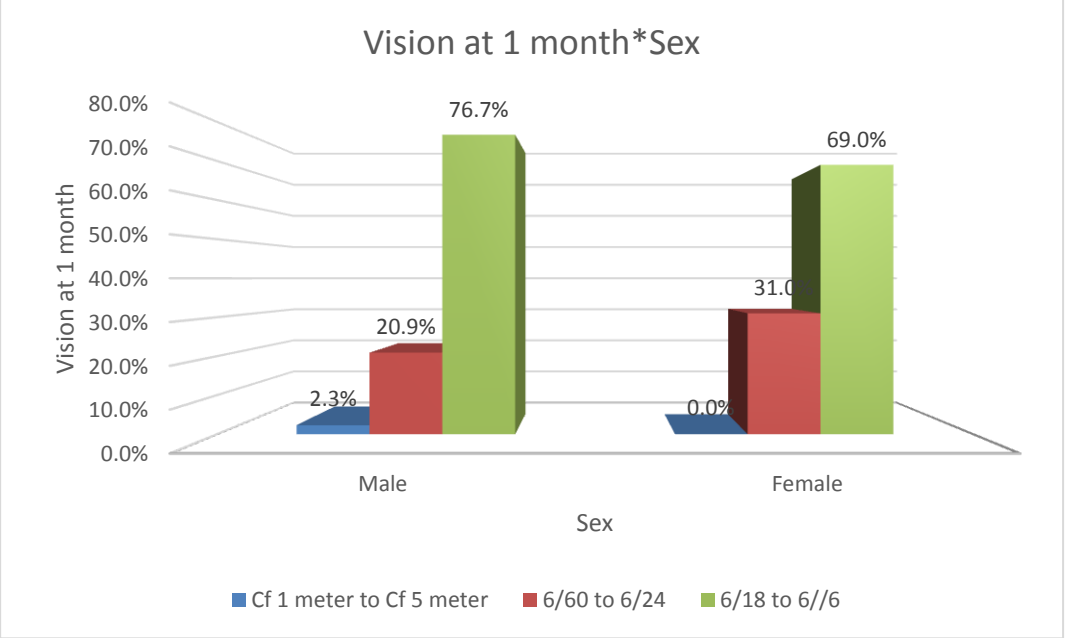


Table 28 : Frequency of association between gender and vision at 1month

There was no association between sex and vision at 1 month.

			Vision at 1 month			P value
			Cf 1 meter to Cf 5 meter	6/60 to 6/24	6/18 to 6//6	
SEX	Male	Frequency	1	9	33	0.467
		Percentage	2.3%	20.9%	76.7%	
	Female	Frequency	0	9	20	
		Percentage	0.0%	31.0%	69.0%	
Total		Frequency	1	18	53	
		Percentage	1.4%	25.0%	73.6%	

Graph 27 : Bar diagram showing frequency of association between gender and vision at 1month



DISCUSSION

DISCUSSION

Our prospective study assessed various elements influencing the final visual outcome among those with ocular injuries. We determined the grade of ocular trauma during admission. We included cases of mechanical ocular injuries involving the anterior segment among patients. We excluded those who had prior trauma or chemical injuries, foreign body in the eye, or endophthalmitis.

Demography:

Among 72 eyes studied, patients' average age (years) was 31.82, and most were 11-30. Around 60% were males. The left eye was implicated among 45.8%, and 9.7% had bilateral eye involvement. Around one-fourth had trauma by RTA, followed by wooden pieces or firecrackers. At the presentation time, 13 % had rapd ,44.4% had Cf 1-meter to Cf 5-meter vision, and 30.6% had 6/60 to 6/24 visual acuity. At one week follow-up, 54.2% had a VA 6/60 to 6/24, 26.4% had 6/18 to 6/6, and 19.4% had Cf 1 meter to Cf 5 meter. At one month follow-up, 25% had a VA 6/60 to 6/24, 73.6% had 6/18 to 6/6, and 1.4% had Cf 1 meter to Cf 5 meter.

In a prospective study conducted by Wagh et al.,[74] ocular trauma study participants were followed up at one, three, and six weeks, while the present study followed up at one and four weeks. The majority (35%) were in the age group of 11-30 years, similar to the present study. The average age was 32.28 ± 16.7, while in the present study, it was observed as 31.82±15.76 years, which is comparable. Around 90% were males, which is higher than in the present study. 55% had an injury in the left eye, while in the present study, the left eye was involved among 45.8%. Three-fourths of the patients had RTA, which is higher than the present study (25%).

In the Jawade et al.[59] study, 20% of 103 patients were due to RTA, and two-thirds were males, similar to the present study. Patients were followed up at weeks 1 and months one and six, while the present study assessed the outcomes at 1 week and 1 month.

In Malawi, among the ocular injury cases reported by Zungu et al.,[7] 22.5% were the age group, followed by children under 11 (35%), similar to the present study. In terms of eye injury, male predominance was observed, which was similarly reported in our study. Most adult injuries were due to RTA (48%), higher than in the present study.

Complications and factors affecting visual outcomes:

Corneal foreign body with epi defects was the most common complication, followed by Traumatic cataract (9.7%), Hyphema (9.7%), Full-thickness lid laceration (8.3%), SCH with Chemosis (8.3%), Corneoscleral tear (6.9%), Corneal opacity (6.9%). More than half of the patients were managed conservatively (51.4%). Rapd was seen among 13 % 0f patients IOP was high among 13.9% of the patients.

11.1% of the patients had wounds involving the pupillary axis. 16.7% of the patients were immunocompromised. Most patients presented within 24 hours (75%), while 16.7% and 8.3% presented within 24-48 hours and >48 hours, respectively. Glaucoma was present in 6.9%. Better compliance was seen in 85%.

There was no association between age, gender, IOP, presentation time, glaucoma, and vision at 1 month. *There was a significant association between wounds involving the pupillary axis, immunocompromised status, better drug compliance, and poor visual outcomes.*

In the Jawade et al. study, 83% had lid edema and conjunctival chemosis, 84% had a sub-conjunctival hemorrhage, 16% had corneal abrasion, 31% had hyphema, 2% had traumatic optic neuropathy, 7 and 8% had angle recession glaucoma. However, in our study, hyphema

(10%) and chemosis (8%) were comparatively lower. At six months, 44% had a visual acuity 6/6, which is lower than in the present study.[59]

The visual outcome in 6/18-6/6 improved from 61% at presentation to 63% in week one and 67% in six weeks in a similar prospective study.[74] In the present study, 11% of PL/HM/Cf-Cf patients at presentation showed improvement at 1 week to 6/18 to 6/6 and 56% at one month. 77.3% of patients in 6/60 to 6/24 showed improved VA in one week, and 96% showed improvement in VA in one month. The improvement to 6/18-6/6 in our study was comparatively higher than the present study, probably because the RTA causes in the our study were lesser (75% vs 25%).[74]

In the study results of Sumana et al.,[75] 9.3% had traumatic iritis, 38% had SCH, 13% had hyphema, and lid edema in 63%. In our study, the proportion of patients with Hyphema and traumatic iritis was similar to the comparison study, while the SCH was lower (8% vs 38%)

In the study results of Zagelbaum et al., 32% had corneal abrasion, 32% had traumatic iritis, 23% had SCH, 40% had lid edema, 13% had a laceration, 5% had hyphema, and 2% had traumatic cataract. In comparison, our study results on hyphema were similar. However, the proportion of traumatic iritis was lower than the results of Zagelbaum etal..[76]

In the Maiya et al. research, patients with blunt ocular trauma were enrolled. Among them, 44.2% were in 21–40 years. 48.4% agricultural injuries. 37.8% had subconjunctival bleeding, which was followed by traumatic uveitis (28%). In our study, a similar proportion of patients was in the 20-40 age group, and 8% had SCH, which was lower in comparison. The difference was probably due to the inclusion of only blunt injury patients in the Maiya et al. study.[61]

Singh et al. included 103 patients with ocular injury. They observed that one-third of injuries

were at home (32%), then by the workplace. In the present study, the majority had RTA. On follow-up, 50% of the patients had a good result (vision of > 6/60). There was an association between a good outcome and an early presentation in 57 percent of cases, while in our study, we observed no association with the presentation time of patients.[62]

In the study by Jovanovic et al., 255 were included**,** and males were 222 (87.1 %). The average age (years) was 36.8, greater than the present study. 38% had injured lids, 55% had contusion, 8% had hyphema, 12% had traumatic cataracts, 14% had lens subluxation, and 4% had retinal detachment. The hyphema proportion is comparable to the present study, and none of them in our study had lens subluxation or retinal detachment, which shows the severity might be comparatively lesser than in the comparison study. They observed a significant association for poor visual outcomes with age more than 36 years, lens subluxation, and macular hemorrhage, which was not significantly associated in the present study.[67]

A fifth of the research participants had monocular blindness due to ocular injury in Zungu et al. While none of them were reported to have blindness as a complication in our study. The difference in blindness proportion might be due to higher RTA cases reported in the Zungu et al. study than ours.[7]

The elements for a poor visual prognosis in hyphema were documented by Simanjuntak et al. Among 97 cases, 2% were due to RTA, and 12% were due to occupational injuries. Soft gun pellets accounted for the majority of cases (27.8 percent). The following major risk variables were linked to poor visual prognosis in traumatic hyphema: grade of hyphema, IVA, causation, and beginning of injury.[66] In our study, none of them were reported to have gun pellet injuries.

In the Duan et al.[12] study, the majority were males (5.3:1), similar to the present study. The average age was 39.5 ± 18.5 years, higher than the present study. In their two studied

countries, the leading cause of eye injuries among the elderly was falls at home. This discrepancy may be linked to their population's work environment.

In the study results of Puodžiuvienė et al. Compared to females, boys were more likely to have eye injuries. Home accounted for 60.4 percent of eye injuries, with outdoor environments (31.7 percent), schools (5.2 percent), and sports facilities (2.2 percent). They observed that blunt trauma contributed 40% and sharp objects 29%. In addition, burns (9%), falls (7%), explosives (5%), fireworks (4%), bullets (2%), and traffic accidents (1%) were observed. In our study, the majority had RTA, which is higher in comparison, and none had explosive or bullet injuries.[69]

In Uttarakhand, Dhasmana et al. examined the visual result of eye damage. Among 103 eyes from 88 individuals were examined. The proportion of ocular damage was twice as high in males as in women, similar to the present study. The average age (years) in their study was 31.2 + 13.6, which is similar to ours. Most patients (n = 47) were between the ages of 21 and 40. 37.9% of ocular injuries resulting from traffic accidents were observed. At six months, the visual prognosis of the eye with superior visual acuity at presentation was improved. Eye injuries from traffic accidents were reported in a significant percentage of cases like our study. At six months, 45% had visual acuity of more than 6/12, while in the present study, 73.6% had 6/18 to 6/6. The difference in proportion might be due to the visual outcome being assessed at different time points in comparison.[71]

Limitations:

- The long term follow-up visual outcomes post one month was not assessed
- Since this was an observational study, the causal relationship between the type of trauma and visual outcomes were not assessed
- Since the study was conducted on single setting, the generalizability of findings across primary, secondary and referral settings is limited

CONCLUSION

CONCLUSION

In conclusion, most had ocular injury by RTA, followed by wooden pieces or firecrackers. Three-fourths of those with ocular injury had good vision by follow-up. We documented significant association between wounds involving the pupillary axis, the immunocompromised status of the patient, and better drug compliance with final visual outcomes. Corneal foreign body with epi defects, traumatic cataracts, and hyphema were the common complications observed upon the presentation. We recommend that further studies be conducted to estimate the incidence of ocular trauma with the long-term visual outcomes of different types of ocular trauma.

SUMMARY

SUMMARY

- Ocular morbidity and blindness are mostly caused by ocular trauma.
- The present prospective research was carried out to assess the severity and various elements attributing the visual outcome in patients with mechanical ocular injuries.
- The study was conducted among 72 patients from August 2022 to December 2023 at department of Ophthalmology, R. L. Jalappa Hospital and Research center, Kolar
- Most of the patients were in the age group of 21-30 years (25%) and 11-20 years (23.6%). Their mean age was 31.82 years and most were males (59.7%)
- Left eye was involved among 45.8% of the patients. 9.7% of the patients had bilateral eye involvement.
- Most had Cf 1 meter to Cf 5 meter at presentation (44.4%).
- All patients who had PL/HM/Cf-Cf at presentation showed improvement at 1 week after management, while 81.3% among the Cf 1 meter to Cf 5 meter and 77.3% among 6/60 to 6/24 patients showed improved VA.
- All patients who had PL/HM/Cf-Cf and Cf 1 meter to Cf 5 meter at presentation showed improvement at 1 month after management, while 95.5% among the 6/60 to 6/24patients showed improved VA. None of the patients has their VA deteriorated at 1 week or 1 month.
- Corneal foreign body with epi defects was the most common complication, followed by Traumatic cataract (9.7%) and Hyphema with sch (9.7%).
- Rapd was seen at time of presentation in 13 % of the patients.
- IOP was high among 13.9% of the patients.

- Majority of the patients presented within 24 hours (75%), while 16.7% patients presented 24-48 hours
- Majority or all patients with stone, knife, stick and ball injuries had a vision of Cf 1 meter to Cf 5 meter at presentations. Most of the glass rod, iron rod and wooden piece injuries patients had a vision of PL/HM/Cf-Cf.
- There was a significant association was observed between the injuries involving pupillary axis and poor visual outcomes.
- There was a significant association was observed between immune status and visual outcomes. (immunocompromised and poor outcomes)
- There was a significant association between better drug compliance and good visual outcomes.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. Gebril M. Pattern of ocular trauma in Benghazi eye hospital, Benghazi, Libya. Libyan Int Med Univ J. 2017;2(01):40–6.
2. Mallika P, Tan A, Asok T, Faisal H, Aziz S, Intan G. Pattern of ocular trauma in kuching, malaysia. Malays Fam Physician Off J Acad Fam Physicians Malays. 2008;3(3):140–5.
3. Négrel AD, Thylefors B. The global impact of eye injuries. Ophthalmic Epidemiol. 1998 Sep;5(3):143–69.
4. Aghadoost D. Ocular trauma: an overview. Arch Trauma Res. 2014 Jun;3(2):e21639.
5. Amro MY. Visual outcomes associated with delay from trauma to surgery for open globe eye injury in Palestine: a retrospective chart review study. Lancet Lond Engl. 2021 Jul;398 Suppl:S14.
6. Al-Attas AH, Williams CD, Pitchforth EL, O'Callaghan CO, Lewallen S. Understanding delay in accessing specialist emergency eye care in a developing country: eye trauma in Tanzania. Ophthalmic Epidemiol. 2010 Mar;17(2):103–12.
7. Zungu T, Mdala S, Manda C, Twabi HS, Kayange P. Characteristics and visual outcome of ocular trauma patients at Queen Elizabeth Central Hospital in Malawi. PloS One. 2021;16(3):e0246155.
8. Barry RJ, Sii F, Bruynseels A, Abbott J, Blanch RJ, MacEwen CJ, et al. The UK Paediatric Ocular Trauma Study 3 (POTS3): clinical features and initial management of injuries. Clin Ophthalmol Auckl NZ. 2019;13:1165–72.
9. Rahman S, Hossain A, Alam S, Rahman A, Sultana C, Khan YJ, et al. Mechanical eye trauma epidemiology, prognostic factors, and management controversies—an update. Open J Ophthalmol. 2021;11(04):348–63.

10. Heidari E, Taheri N. Surgical treatment of severely traumatized eyes with no light perception. Retina Phila Pa. 2010 Feb;30(2):294–9.
11. Madhusudhan AP, Evelyn-Tai LM, Zamri N, Adil H, Wan-Hazabbah WH. Open globe injury in Hospital Universiti Sains Malaysia - A 10-year review. Int J Ophthalmol. 2014;7(3):486–90.
12. Duan F, Chen X, Zhang S, Qi X, Shi W, Gao H. Clinical Characteristics and Visual Outcomes of Patients Hospitalized for Ocular Trauma in Shandong Province, China. Mora P, editor. J Ophthalmol. 2020;2020:5826263.
13. Hihara M, Hikiami R, Kakudo N. Functional and cosmetic reconstruction of ocular laceration complicated by extensive eyelid degloving injury: A case report. Trauma Case Rep. 2023;43:100759.
14. Dumovich J, Singh P. Physiology, Trauma. In Treasure Island (FL); 2024.
15. Pidduck DHR, Dillon DMJ. Management of acute eye injuries in primary care. https://doi.org/101177/1755738014545364. 2014 Jul 31;7(9):526–32.
16. Beshay N, Keay L, Dunn H, Kamalden TA, Hoskin AK, Watson SL. The epidemiology of Open Globe Injuries presenting to a tertiary referral eye hospital in Australia. Injury. 2017 Jul;48(7):1348–54.
17. Li C, Fu Y, Liu S, Yu H, Yang X, Zhang M, et al. The global incidence and disability of eye injury: an analysis from the Global Burden of Disease Study 2019. EClinicalMedicine. 2023 Aug;62:102134.
18. Chua D, Wong W, Lamoureux EL, Aung T, Saw SM, Wong TY. The prevalence and risk factors of ocular trauma: the Singapore Indian eye study. Ophthalmic Epidemiol. 2011 Dec;18(6):281–7.

19. Krishnaiah S, Nirmalan PK, Shamanna BR, Srinivas M, Rao GN, Thomas R. Ocular trauma in a rural population of southern India: the Andhra Pradesh Eye Disease Study. Ophthalmology. 2006;113(7):1159–64.
20. Dandona L, Dandona R, Srinivas M, John RK, McCarty CA, Rao GN. Ocular trauma in an urban population in southern India: the Andhra Pradesh Eye Disease Study. Clin Experiment Ophthalmol. 2000 Oct;28(5):350–6.
21. Scott R. The injured eye. Philos Trans R Soc Lond B Biol Sci. 2011 Jan;366(1562):251–60.
22. Mutie D, Mwangi N. Assessing an eye injury patient. Community Eye Health. 2015;28(91):46–8.
23. Al-Thowaibi A, Kumar M, Al-Matani I. An overview of penetrating ocular trauma with retained intraocular foreign body. Saudi J Ophthalmol Off J Saudi Ophthalmol Soc. 2011 Apr;25(2):203–5.
24. Rajsic S, Breitkopf R, Bachler M, Treml B. Diagnostic Modalities in Critical Care: Point-of-Care Approach. Diagn Basel Switz. 2021 Nov;11(12).
25. Mohseni M, Blair K, Gurnani B, Bragg BN. Blunt Eye Trauma. In Treasure Island (FL); 2024.
26. Ram J, Verma N, Gupta N, Chaudhary M. Effect of penetrating and blunt ocular trauma on the outcome of traumatic cataract in children in northern India. J Trauma Acute Care Surg. 2012 Sep;73(3):726–30.
27. Wang BH, Robertson BC, Girotto JA, Liem A, Miller NR, Iliff N, et al. Traumatic optic neuropathy: a review of 61 patients. Plast Reconstr Surg. 2001 Jun;107(7):1655–64.
28. Kuhn F, Morris R, Witherspoon CD, Mann L. Epidemiology of Blinding Trauma in the United States Eye Injury Registry. Ophthalmic Epidemiol. 2006 Jan 1;13(3):209–16.

29. Kuhn F, Maisiak R, Mann L, Mester V, Morris R, Witherspoon CD. The Ocular Trauma Score (OTS). Ophthalmol Clin N Am. 2002 Jun;15(2):163–5, vi.
30. May DR, Kuhn FP, Morris RE, Witherspoon CD, Danis RP, Matthews GP, et al. The epidemiology of serious eye injuries from the United States Eye Injury Registry. Graefes Arch Clin Exp Ophthalmol Albrecht Von Graefes Arch Klin Exp Ophthalmol. 2000 Feb;238(2):153–7.
31. Andreoli MT, Andreoli CM. Geriatric traumatic open globe injuries. Ophthalmology. 2011 Jan;118(1):156–9.
32. Smith D, Wrenn K, Stack LB. The epidemiology and diagnosis of penetrating eye injuries. Acad Emerg Med Off J Soc Acad Emerg Med. 2002 Mar;9(3):209–13.
33. Clinical Practice Guidelines : Penetrating eye injury [Internet]. [cited 2024 Feb 3]. Available from: https://www.rch.org.au/clinicalguide/guideline_index/Penetrating_eye_injury/
34. Heath Jeffery RC, Dobes J, Chen FK. Eye injuries: Understanding ocular trauma. Aust J Gen Pract. 2022 Jul;51(7):476–82.
35. Camodeca AJ, Anderson EP. Corneal Foreign Body. In Treasure Island (FL); 2024.
36. HEIER JS, ENZENAUER RW, WINTERMEYER SF, DELANEY M, LAPIANA FP. OCULAR INJURIES AND DISEASES AT A COMBAT SUPPORT HOSPITAL IN SUPPORT OF OPERATION-DESERT-SHIELD AND OPERATION-DESERT-STORM. Arch Ophthalmol. 1993;111(6):795–8.
37. Quesada JMA, Lloves JM, Delgado DV. Ocular chemical burns in the workplace: Epidemiological characteristics. Burns J Int Soc Burn Inj. 2020 Aug;46(5):1212–8.
38. Beare JD. Eye injuries from assault with chemicals. Br J Ophthalmol. 1990 Sep;74(9):514–8.

39. Morgan SJ. Chemical burns of the eye: causes and management. Br J Ophthalmol. 1987 Nov;71(11):854–7.

40. Baradaran-Rafii A, Eslani M, Haq Z, Shirzadeh E, Huvard MJ, Djalilian AR. Current and Upcoming Therapies for Ocular Surface Chemical Injuries. Ocul Surf. 2017 Jan;15(1):48–64.

41. Lim CHL, Turner A, Lim BX. Patching for corneal abrasion. Cochrane Database Syst Rev. 2016 Jul;7(7):CD004764.

42. Rossin EJ, Szypko C, Giese I, Hall N, Gardiner MF, Lorch A. Factors Associated With Increased Risk of Serious Ocular Injury in the Setting of Orbital Fracture. JAMA Ophthalmol. 2021 Jan;139(1):77–83.

43. Joseph JM, Glavas IP. Orbital fractures: a review. Clin Ophthalmol Auckl NZ. 2011 Jan;5:95–100.

44. Cook T. Ocular and periocular injuries from orbital fractures. J Am Coll Surg. 2002 Dec;195(6):831–4.

45. Mellema PA, Dewan MA, Lee MS, Smith SD, Harrison AR. Incidence of ocular injury in visually asymptomatic orbital fractures. Ophthal Plast Reconstr Surg. 2009;25(4):306–8.

46. Hawes MJ, Dortzbach RK. Surgery on orbital floor fractures. Influence of time of repair and fracture size. Ophthalmology. 1983 Sep;90(9):1066–70.

47. Grob S, Yonkers M, Tao J. Orbital Fracture Repair. Semin Plast Surg. 2017 Feb;31(1):31–9.

48. Kuhn F, Morris R, Witherspoon CD, Heimann K, Jeffers JB, Treister G. A standardized classification of ocular trauma. Ophthalmology. 1996 Feb 1;103(2):240–3.

49. Savar A, Kirszrot J, Rubin PAD. Canalicular involvement in dog bite related eyelid lacerations. Ophthal Plast Reconstr Surg. 2008;24(4):296–8.

50. Sheard RM, Mireskandari K, Ezra E, Sullivan PM. Vitreoretinal surgery after childhood ocular trauma. Eye. 2007;21(6):793–8.

51. Yeung L, Chen TL, Kuo YH, Chao AN, Wu WC, Chen KJ, et al. Severe vitreous hemorrhage associated with closed-globe injury. Graefes Arch Clin Exp Ophthalmol. 2006;244(1):52–7.

52. Erdurman FC, Sobaci G, Acikel CH, Ceylan MO, Durukan AH, Hurmeric V. Anatomical and functional outcomes in contusion injuries of posterior segment. Eye Lond Engl. 2011 Aug;25(8):1050–6.

53. Bajaire B, Oudovitchenko E, Morales E. Vitreoretinal surgery of the posterior segment for explosive trauma in terrorist warfare. Graefes Arch Clin Exp Ophthalmol. 2006;244(8):991–5.

54. Sobaci G, Akýn TT, Mutlu FM, Karagül S, Bayraktar MZ, Sobacı G, et al. Terror-related open-globe injuries: a 10-year review. Am J Ophthalmol. 2005 May 1;139(5):937–9.

55. Rohrbach JM. Ophthalmologische Traumatologie: Textbuch und Atlas; mit 63 Tabellen. Schattauer; 2002.

56. Cherry PM. Standardized classification of ocular trauma. Vol. 104, Ophthalmology. United States; 1997. p. 344–5.

57. Knyazer B, Levy J, Rosen S, Belfair N, Klemperer I, Lifshitz T. Prognostic factors in posterior open globe injuries (zone-III injuries). Clin Experiment Ophthalmol. 2008 Dec;36(9):836–41.

58. Mayer CS, Reznicek L, Baur ID, Khoramnia R. Open Globe Injuries: Classifications and Prognostic Factors for Functional Outcome. Diagn Basel Switz. 2021 Oct;11(10).

59. Dagwar R, Jawade S, Chauhan R. Clinical profile and visual outcome of blunt ocular trauma in a tertiary care centre of central India: A prospective study. 2020;

60. Wagh V, Tidake P. Clinical Study and Profile of Ocular Trauma: Findings From a Rural Hospital in Central India. Cureus. 2022 Jul;14(7):e26915.
61. Maiya AS, Dharmesh AM, Jayaram R. Clinical profile of ocular blunt trauma in a rural hospital. J Clin Ophthalmol Res. 2018;6(1).
62. Singh K, Mutreja A, Bhattacharyya M, Dangda S. Epidemiology and Implications of ocular trauma admitted to a tertiary care hospital in North India. US Ophthalmic Rev. 2017;15:16–25.
63. Fujikawa A, Mohamed YH, Kinoshita H, Matsumoto M, Uematsu M, Tsuiki E, et al. Visual outcomes and prognostic factors in open-globe injuries. BMC Ophthalmol. 2018;18(1):138.
64. Agrawal R, Ho SW, Teoh S. Pre-operative variables affecting final vision outcome with a critical review of ocular trauma classification for posterior open globe (zone III) injury. Indian J Ophthalmol. 2013;61(10).
65. Maurya RP, Singh VP, Gautam S, Asha, Kumar A, Mishra CP, et al. Study of epidemiology, clinical profile, visual outcome and prognostic factors of blunt ocular trauma in a teaching hospital. Indian J Clin Exp Ophthalmol. 2022;8(4).
66. S Simanjuntak GW, Farinthska G, M Simanjuntak GA, Artini W, Natali R. Risk factors for poor visual outcome in traumatic hyphema: Jakarta eye trauma study. Niger J Clin Pract. 2018 Jul;21(7):921–4.
67. Jovanovic N, Peek-Asa C, Young T, Nisic F, Musa S. Eye injury and demographic parameters associated with poor visual outcome. J Fr Ophtalmol. 2019;42(8):864–73.
68. Jahangir T, Butt NH, Hamza U, Tayyab H, Jahangir S. Pattern of presentation and factors leading to ocular trauma. Pak J Ophthalmol. 2011;27(2).

69. Puodžiuvienė E, Jokūbauskienė G, Vieversytė M, Asselineau K. A five-year retrospective study of the epidemiological characteristics and visual outcomes of pediatric ocular trauma. BMC Ophthalmol. 2018;18(1):10.
70. Zhang X, Liu Y, Ji X, Zou Y. A Retrospective Study on Clinical Features and Visual Outcome of Patients Hospitalized for Ocular Trauma in Cangzhou, China. Macky TA, editor. J Ophthalmol. 2017;2017:7694913.
71. Dhasmana R, Bahadur H, Jain K. PROFILE OF OCULAR TRAUMA IN UTTARAKHAND, A HOSPITAL BASED STUDY. Indian J Community Health. 2012 Dec 31;24(4 SE-Original Article):297–303.
72. Rao LG, Ninan A, Rao KA. Descriptive study on ocular survival, visual outcome and prognostic factors in open globe injuries. Indian J Ophthalmol. 2010;58(4):321.
73. Qi Y, Zhang YF, Zhu Y, Wan MG, Du SS, Yue ZZ. Prognostic Factors for Visual Outcome in Traumatic Cataract Patients. Teoh SCB, editor. J Ophthalmol. 2016;2016:1748583.
74. Wagh V, Tidake P. Clinical Study and Profile of Ocular Trauma: Findings From a Rural Hospital in Central India. Cureus. 14(7):e26915.
75. Pai SG, Kamath SJ, D'Souza S, Dudeja L. A clinical study of blunt ocular trauma in a tertiary care centre. Online J Health Allied Sci. 2013 Oct 16;12(2):10.
76. Urban eye trauma. A one-year prospective study - PubMed [Internet]. [cited 2024 Jun 20]. Available from: https://pubmed.ncbi.nlm.nih.gov/8510896/

ANNEXURE

ANNEXURE-1

CASE PROFORMA

Group:	Case no:
Name:	Date:
Age:	IP no:
Sex:	DOA:
Occupation:	DOS:
Address:	

Chief complaints:

History of Presenting illness:

Past history:

DM / HTN / BA / Epilepsy

Family history:

Personal history:

Appetite – Sleep – Bowel –

Diet – Habits – Bladder –

GPE:

Pallor / Edema /Icterus / Cyanosis / Clubbing / Lymphadenopathy

Vital signs:

a. Pulse – c) RR –

b. BP – d) Temp –

Systemic examination:

a. CVS – c. RS –

b. PA – d. CNS –

OCULAR EXAMINATION

TESTS	RE	LE
1. HEAD POSTURE 2. OCULAR POSTURE 3. FACIAL SYMMETRY		
4. EXTRAOCULAR MOVEMENTS a) Ductions a) Versions		
5. VISUAL ACUITY: a) Distant b) Near c) Color vision		
6. ANTERIOR SEGMENT: Lids &Adnexa Conjunctiva Cornea Anterior Chamber Iris Pupil Lens		

7. FUNDUS (IDO/+90D)		
8. IOP		
9. **Investigations** a. X-RAY ORBIT b. B-SCAN c. CT AND MRI ORBIT		
10. B SCAN		
11. Complications		

15.POST MANAGEMENT VISUAL ACUITY		1 week	1month
Distant Vision			
Near Vision Color vision			

12. ANTERIOR SEGMENT: Lids &Adnexa Conjunctiva Cornea Anterior Chamber Iris Pupil Lens	1 week	1month
13. FUNDUS (IDO/+90		
14. IOP		
15. Glaucoma		
16. COMPLICATIONS		

ANNEXURE-II

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION ANDRESEARCH, TAMAKA, KOLAR - 563101.

INFORMED CONSENT FORM

Case no:

IP no:

TITLE: VISUAL OUTCOME AND PROGNOSTIC FACTORS IN MECHANICAL INJURY OF ANTERIOR SEGMENT OF EYE

I, the undersigned, agree to participate in this study and authorize the collection and disclosure of personal information as outlined in this consent form.

I understand the purpose of this study, the risks and benefits of the technique and the confidential nature of the information that will be collected and disclosed during the study. The information collected will be used only for research.

I have been informed about the risks such as corneal edema, keratitis, redness of eye. I have had the opportunity to ask questions regarding the various aspects of this study and my questions have been answered to my satisfaction.

I do not hold the treating surgeon and hospital staff responsible for any untoward incident that can occur after the surgery.

I understand that I remain free to withdraw the participation from this study at any time and this will not change the future care.

Participation in this study does not involve any extra cost to me.

Name	Signature	Date	Time
Patient:			
Witness:			
Primary Investigator/ Doctor:			

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION ANDRESEARCH, TAMAKA, KOLAR - 563101.

ತಿಳಿವಳಿಕೆಯ ಸಮ್ಮತಿ ನಮೂನೆ

ಕೇಸ್ ಸಂಖ್ಯೆ:

ಐಪಿ ಸಂಖ್ಯೆ:

ಶೀರ್ಷಿಕೆ: ಕಣ್ಣಿನ ಮುಂಭಾಗದ ಭಾಗದ ಯಾಂತ್ರಿಕ ಗಾಯದಲ್ಲಿ ದೃಷ್ಟಿ ಫಲಿತಾಂಶ ಮತ್ತು ರೋಗನಿರ್ಣಯದ ಅಂಶಗಳು

ನಾನು, ಅಂಗೀಕರಿಸಿದ, ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ಮತ್ತು ಈ ಸಮ್ಮತಿಯ ರೂಪದಲ್ಲಿ ವಿವರಿಸಿರುವಂತೆ ವೈಯಕ್ತಿಕ ಮಾಹಿತಿಯ ಸಂಗ್ರಹ ಮತ್ತು ಬಹಿರಂಗಪಡಿಸುವಿಕೆಯನ್ನು ಅನುಮೋದಿಸಲು ಒಪ್ಪುತ್ತೇನೆ.

ಈ ಅಧ್ಯಯನದ ಉದ್ದೇಶ, ತಂತ್ರದ ಅಪಾಯಗಳು ಮತ್ತು ಪ್ರಯೋಜನಗಳನ್ನು ಮತ್ತು ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಸಂಗ್ರಹಿಸಲ್ಪಟ್ಟಿರುವ ಮತ್ತು ಬಹಿರಂಗಪಡಿಸುವ ಮಾಹಿತಿಯ ಗೌಪ್ಯತೆಗೆ ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ. ಸಂಗ್ರಹಿಸಿದ ಮಾಹಿತಿಯನ್ನು ಸಂಶೋಧನೆಗೆ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ.

ಕಾರ್ನಿಯಲ್ ಎಡಿಮಾ, ಕಣ್ಣುಗಳ ಕೆಂಪು, ಕೆರಟೈಟಿಸ್ ಮುಂತಾದ ಅಪಾಯಗಳ ಬಗ್ಗೆ ರೋಗಿಯನ್ನು ವಿವರಿಸಲಾಗಿದೆ. ಈ ಅಧ್ಯಯನದ ವಿವಿಧ ಅಂಶಗಳನ್ನು ಕುರಿತು ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲು ನನಗೆ ಅವಕಾಶವಿದೆ ಮತ್ತು ನನ್ನ ತೃಪ್ತಿಗೆ ನನ್ನ ಪ್ರಶ್ನೆಗಳಿಗೆ ಉತ್ತರ ನೀಡಲಾಗಿದೆ.

ಶಸ್ತ್ರಚಿಕಿತ್ಸೆಯ ನಂತರ ಸಂಭವಿಸಬಹುದಾದ ಯಾವುದೇ ಅಹಿತಕರ ಘಟನೆಗೆ ನಾನು ಚಿಕಿತ್ಸೆಯ ಶಸ್ತ್ರಚಿಕಿತ್ಸಕ ಮತ್ತು ಆಸ್ಪತ್ರೆಯ ಸಿಬ್ಬಂದಿಯನ್ನು ಹೊಣೆಗಾರರನ್ನಾಗಿ ಮಾಡುವುದಿಲ್ಲ.

ಈ ಅಧ್ಯಯನದಿಂದ ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ನಾನು ಹಿಂಪಡೆಯಲು ಮುಕ್ತವಾಗಿರುತ್ತೇನೆ ಮತ್ತು ಇದು ಭವಿಷ್ಯದ ಕಾಳಜಿಯನ್ನು ಬದಲಿಸುವುದಿಲ್ಲ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ ನನಗೆ ಯಾವುದೇ ಹೆಚ್ಚುವರಿ ವೆಚ್ಚ ಒಳಗೊಳ್ಳುವುದಿಲ್ಲ.

ಹೆಸರು	ಸಹಿ/ಹೆಬ್ಬೆಟ್ಟಿನ ಗುರುತು	ದಿನಾಂಕ	ಸಮಯ
ರೋಗಿಯ ಹೆಸರು			
ಸಾಕ್ಷಿಗಳ ಹೆಸರು			
ಪ್ರಾಥಮಿಕ ಸಂಶೋಧಕರು/ ವೈದ್ಯರು			

ANNEXURE-III

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR - 563101.

PATIENT INFORMATION SHEET

TITLE: "“VISUAL OUTCOME AND PROGNOSTIC FACTORS IN MECHANICAL INJURY OF ANTERIOR SEGMENT OF EYE”

This information is to help you understand the purpose of the study "**VISUAL OUTCOME AND PROGNOSTIC FACTORS IN MECHANICAL INJURY OF ANTERIOR SEGMENT OF EYE**"
You are invited to take part voluntarily in this research study, it is important that you read and understand purpose, procedure, benefits and discomforts of the study.
To find the visual outcome and prognosis in mechanical injury of anterior segment of eye.
There are no risks associated with the various investigations to be done which includes slit lamp examination, fundoscopy, CT and MRI orbit if needed

Participation in this research study may not change the final outcome of your eye condition. However, patients in the future may benefit as a result of knowledge gained from this study. You will not be charged extra for any of the procedures performed during the research study. Your taking part in this study is entirely voluntary.

You may refuse to take part in the study or you may stop your participation in the study at any time, without any penalty or loss of any benefits to which you were otherwise entitled before taking part in this study.

Your taking part in this study is entirely voluntary. You may refuse to take part in the study or you may stop your participation in the study at any time, without a penalty or loss of any benefits to which you were otherwise entitled before taking part in this study.

CONFIDENTIALITY

Your medical information will be kept confidential by the study doctor and staff and will not be made publicly available. Your original records may be reviewed by your doctor or ethics review board.
For further information/ clarification please contact Dr.B.O..Hanumanthappa, SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, TAMAKA, KOLAR - 563101.Contact no: 8179499387 ,9985523975 to Dr DivijaK.

<u>ಶ್ರೀ ದೇವರಾಜ್ ಅರಸ್ ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನಾ ಸಂಸ್ಥೆ,</u>

<u>ಟಮಕ, ಕೋಲಾರ - 563101.</u>

ರೋಗಿಯ ಮಾಹಿತಿ ಪತ್ರ

Here is the translation of the provided text to Kannada:

ಶೀರ್ಷಿಕೆ: ''ಕಣ್ಣಿನ ಮುಂಭಾಗದ ಯಂತ್ರಗತ ಗಾಯದಲ್ಲಿ ದೃಷ್ಟಿಯ ಹೊರಗೊಮ್ಮಲು ಮತ್ತು ಭವಿಷ್ಯ ಕಾರಣಗಳು''

ಈ ಮಾಹಿತಿ ನಿಮಗೆ ''ಕಣ್ಣಿನ ಮುಂಭಾಗದ ಯಂತ್ರಗತ ಗಾಯದಲ್ಲಿ ದೃಷ್ಟಿಯ ಹೊರಗೊಮ್ಮಲು ಮತ್ತು ಭವಿಷ್ಯ ಕಾರಣಗಳು'' ಎಂಬ ಅಧ್ಯಯನದ ಉದ್ದೇಶವನ್ನು ಅರ್ಥಮಾಡುವಲ್ಲಿ ನಿಮಗೆ ಸಹಾಯ ಮಾಡಲು ಇದೆ. ನೀವು ಈ ಗಬ್ಬದ ಅಧ್ಯಯನದಲ್ಲಿ ಸ್ವಂತಾವಲ್ಲಿ ಭಾಗವಹಿಸಲು ಆಹ್ವಾನಿತರಾಗಿದ್ದೀರಿ; ಇದು ಅಧ್ಯಯನದ ಉದ್ದೇಶ, ವಿಧಾನ, ಪ್ರಯೋಜನಗಳು ಮತ್ತು ಅಸಹನೆಗಳನ್ನು ಓದಿ ಮತ್ತು ಅರಿಯುವುದು ಅತ್ಯಂತ ಮುಖ್ಯವಾಗಿದೆ.

ಕಣ್ಣಿನ ಮುಂಭಾಗದ ಯಂತ್ರಗತ ಗಾಯದಲ್ಲಿ ದೃಷ್ಟಿಯ ಹೊರಗೊಮ್ಮಲು ಮತ್ತು ಭವಿಷ್ಯ ಕಾರಣಗಳನ್ನು ಕಂಡುಹಿಡಿಯಲು ನಡೆಸಲಿರುವ ವಿವಿಧ ಅನ್ವಯಗಳೊಂದಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಯಾವುದೇ ಅಪಾಯಗಳಿಲ್ಲ.

ಈ ಗಬ್ಬದ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಕಣ್ಣಿನ ಸ್ಥಿತಿಯ ಅಂತಿಮ ಫಲಿತಾಂಶವನ್ನು ಬದಲಾಯಿಸಬಹುದಾಗಿದ್ದರೂ ಭವಿಷ್ಯದಲ್ಲಿ ಈ ಅಧ್ಯಯನದಿಂದ ಪ್ರಾಪ್ತವಾದ ಜ್ಞಾನದಿಂದ ರೋಗಿಗಳು ಪ್ರಯೋಜನ ಪಡೆಯಬಹುದು. ಈ ಅಧ್ಯಯನದ ನಡುವಣ ಯಾವುದೇ ಅನ್ವಯಗಳ ಪ್ರಯೋಜನ ಮತ್ತು ವೇಚಿಕೆ ಇವು ನಿಮ್ಮ ಗಾತ್ರವನ್ನು ಹೆಚ್ಚಿಸಲಾರದು. ನೀವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಂತಾವಲ್ಲಿಯೇ ಇದೆ. ನೀವು ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳದೆ ಇದ್ದರೆ ಅಥವಾ ನೀವು ನಿಮ್ಮ ಪಾಲುದಾರಿತ್ವದಲ್ಲಿ ಸ್ಥಿರವಾಗಿ

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನಿಮ್ಮ ಪಾಲ್ಗೊಳ್ಳುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ. ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಲು ನೀವು ನಿರಾಕರಿಸಬಹುದು ಅಥವಾ ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದಕ್ಕೆ ಮುಂಚಿತವಾಗಿ ನೀವು ಯಾವುದೇ ಅರ್ಹತೆಯಿಂದ ಯಾವುದೇ ದಂಡ ಅಥವಾ

ನಷ್ಟವಿಲ್ಲದೆಯೇ ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ನೀವು ಭಾಗವಹಿಸುವಿಕೆಯನ್ನು ನಿಲ್ಲಿಸಬಹುದು.

ಗೌಪ್ಯತೆ

ನಿಮ್ಮ ವೈದ್ಯಕೀಯ ಮಾಹಿತಿಯನ್ನು ಅಧ್ಯಯನದ ವೈದ್ಯರು ಮತ್ತು ಸಿಬ್ಬಂದಿ ಗೌಪ್ಯವಾಗಿಡಲಾಗುವುದು ಮತ್ತು ಸಾರ್ವಜನಿಕವಾಗಿ ಲಭ್ಯವಿರುವುದಿಲ್ಲ. ನಿಮ್ಮ ಮೂಲ ದಾಖಲೆಗಳನ್ನು ನಿಮ್ಮ ವೈದ್ಯರು ಅಥವಾ ನೈತಿಕ ವಿಮರ್ಶೆ ಮಂಡಳಿ ಪರಿಶೀಲಿಸಬಹುದು. ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಸಂಪರ್ಕಿಸಿ

ಡಾ. ದಿವಿಜಾ

ಎಸ್ ಡಿ ಯು ಎಮ್ ಸಿ.

ಟಮಕ, ಕೋಲಾರ

,9985523975

ANNEXURE-IV

Photograph 1: Slit lamp examination

Photograph 2: Fundus examination with 90D

Photograph 3 : Foreign body removal

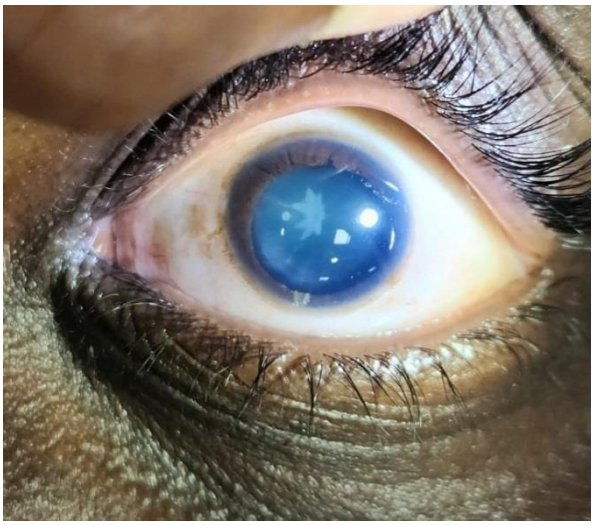
Photograph 4 :

(a) Upper eye lid laceration **(b) sutured laceration**

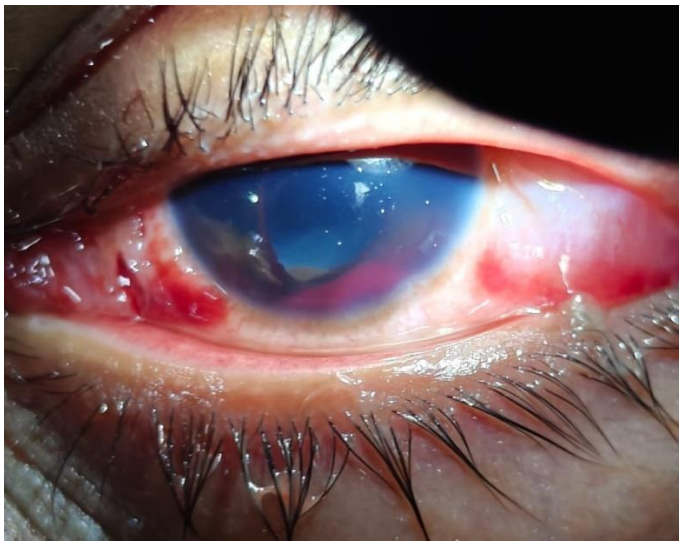
Photograph 5 : Sub conjuctival hemorrhage with chemosis

Photograph 6 :

(a) Traumatic cataract after blunt trauma **(b) post-surgery : sics with pciol**

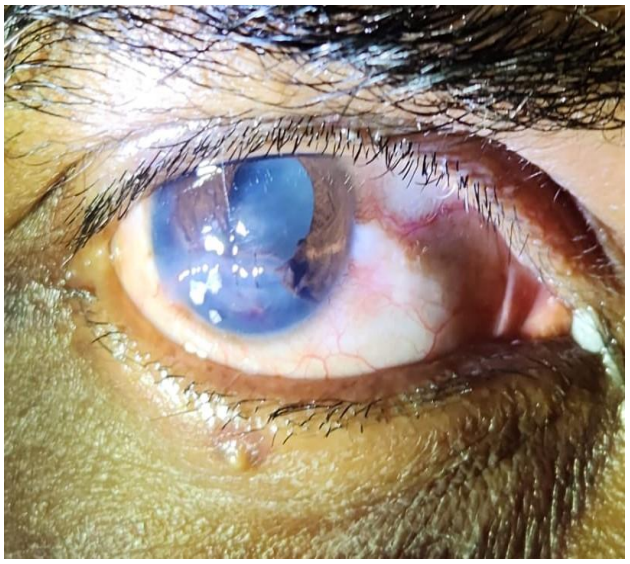


Photograph 7 : Traumatic hyphema with sch



Photograph 8 :

(a) Corneal tear with iris prolapse excision **(b) Corneal tear repair with iris**



KEY TO MASTER CHART

M- Male

F-Female

RE – Right eye

LE- Left eye

RTA – Road traffic accident

HM – Hand movements

CF – Counting fingers

SCH – Sub conjuctival hemorrhage

IOP – Intra ocular pressure

FB – Foreign body

Name	AGE	SEX	Eye	MODE OF TRAUMA	VA at presentation	vision at 1 wk	vision at 1 month	complications	Management	iop	Wound involving pupillary axis		immunocompromised	timeof presentation		glaucoma	drug compliance
Yashwanth	12	m	le	with stick	HM+VE	6/60	6/12	traumatic cataract	sics with pciol	normal	no		no	in 24 hours		no	better
Neha	8	F	LE	BY stick	cf - cf	6/12	6/9	Traumatic cataract	Sics with pciol	high	no		no	in 24 hours		yes	better
chethan	10	m	le	fire craker injury	6/36	6/12	6/9	corneal f.b with epi defects	f.b removal	normal	no		no	in 24 hours		no	better
gokul	11	m	re	rta	HM+VE	6/60	6/60	traumatic hyphema	conservative	normal	no		no	in 24 hours		no	poor
NITHIN	13	M	RE	RTA	cf - cf	6/36(p)	6/12	hyphema with corneal tear	conservative	normal	no		no	in 24 hours		no	better
SREEJA	11	F	LE	stone	CF4	6/60	6/18	corneal f.b with epi defects	conservative	high	no		no	24 to 48 hours		no	better
ANAND	1O	m	BE	firecraker	6/60	6/18	6/9	corneal f.b with epi defects	conservative	normal	no		no	in 24 hours		no	better
bhavya	14	F	RE	Cricket ball	CF4	6/60	6/60	hyphema with corneal edema	conservative	normal	yes		yes	in 24 hours		yes	poor
latyha	12	f	re	nail	cf5	6/36(p)	6/9	corneoscleral tear	tear repair	normal	no		no	in 24 hours		no	better
sreenu	13	m	le	wooden piece	6/36	6/24	6/12	corneal f.b	f.b removal	normal	no		no	in 24 hours		no	better
hemanth	14	m	le	RTA	6/24	6/12	6/12	hyphema with sch	conservative	normal	no		no	>48hours		no	better
pooja	13	f	re	knife	cf 5m	6/24	6/24	hyphema with corneal tear	conservative	normal	no		no	24 to 48 hours		no	better
kethan	11	m	le	RTA	6/36	6/12	6/9	re-full thickness U.E.lid laceration p.o.edema and	re-orbital floor reconstruction and	normal	no		no	in 24 hours		no	better
Manjunath	27	M	re	RTA	6/24	6/18(p)	6/12	lid laceration with bicanalicular tear	lid repair	normal	no		no	in 24 hours		no	better
karthik	21	M	LE	Knife	6/24	6/12	6/12	hyphema with sch	conservative	high	no		no	in 24 hours		no	better
akshitha	18	f	le	ball	cf 4m	6/60	6/18	hyphema with corneal	conservative	normal	no		no	>48hours		no	poor
Naveen	22	M	BE	RTA	Cf 3M	6/36(p)	6/9(P)	re-full thickness U.E.lid laceration p.o.edema and	re-orbital floor reconstruction and	normal	no		yes	in 24 hours		no	poor
sudhakar	24	M	le	stone	6/36	6/12(p)	6/12	corneal opacity	conservative	normal	no		no	24 to 48 hours		no	better
KASI	17	M	BE	glass rod	6/24	6/12	6/9(P)	full thickness lid laceration	lid repair	normal	no		no	in 24 hours		no	better
KAMALA	22	f	le	firecraker	cf 5m	6/36(p)	6/9(P)	corneal f.b with epi defects	f.b removal	normal	no		no	in 24 hours		no	better
ravi	19	m	le	iron rod	HM+VE	cf 4m	6/60	Traumatic cataract	Sics with pciol	normal	yes		no	in 24 hours		no	better
ramana	18	m	le	wooden piece	cf - cf	6/18	6/12	corneoscleral tear	tear repair	normal	no		yes	in 24 hours		no	better

Name	AGE	SEX	Eye	MODE OF TRAUMA	VA at presentation	vision at 1 wk	vision at 1 month	complications	Management	iop	Wound involving pupillary axis	immunocompromised	timeof presentation	glaucoma	drug compliance
sriram	19	m	le	BY stick	cf3	6/60	6/12	corneal tear with traumatic catract	tear repair with sics	high	no	no	in 24 hours	no	better
bala	22	M	le	RTA	6/36(p)	6/18	6/9	full thickness lid laceration	lid repair	normal	no	no	in 24 hours	no	better
trisha	21	F	le	RTA	6/24	6/18	6/9(P)	SCH with Chemosis	conservative	normal	no	no	in 24 hours	no	better
likita	19	F	BE	RTA	cf 5m	6/60	6/18	hyphema with corneal opacity	conservative	normal	no	no	24 to 48 hours	no	poor
ankita	20	F	le	RTA	Cf 3M	6/36(p)	6/9(P)	full thickness lid laceration	lid repair	normal	no	no	in 24 hours	no	better
basha	22	M	RE	Cricket ball	cf 2m	cf 5m	6/12	Hyphema with SCH	yes	normal	no	no	in 24 hours	no	better
Aditi	24	f	RE	glass rod	cf - cf	6/60	6/12	corneal tear with hyphema	tear repair	normal	no	no	in 24 hours	no	better
mounika	25	F	RE	with stick	HM+VE	6/24	6/9	Traumatic cataract	Sics with pciol	normal	no	no	in 24 hours	no	better
nikitha	23	F	RE	RTA	cf 5m	6/60	6/6	SCH with Chemosis	conservative	normal	no	no	in 24 hours	no	better
narayana	24	M	RE	wooden piece	cf 1	6/36(p)	6/12	Traumatic iritis	conservative	high	no	yes	in 24 hours	no	better
radha	24	F	RE	glass rod	cf 5m	6/24	6/12	corneal tear with hyphema	tear repair	normal	no	no	in 24 hours	no	better
rafi	21	M	RE	Knife	HM+VE	cf 5m	6/18	Corneal Tear	tear repair	normal	no	no	in 24 hours	no	better
raghu	21	M	RE	firecraker	cf3	6/36(p)	6/12	corneal f.b with epi defects	f.b removal	normal	no	no	in 24 hours	no	better
rahul	23	M	LE	stone	cf 2m	cf 5m	6/36(p)	hyphema with corneal opacity	conservative	normal	no	yes	in 24 hours	no	poor
rajappa	45	M	LE	with stick	cf3	6/60	6/12	corneal opacity	conservative	normal	no	no	24 to 48 hours	no	better
muniyappa	48	M	LE	wooden piece	cf - cf	cf 5m	cf 5m	Corneal Tear	tear repair	normal	yes	no	in 24 hours	no	poor
srinivas	52	M	LE	wooden piece	HM+VE	6/60	6/24	Traumatic cataract	Sics with pciol	normal	no	yes	in 24 hours	no	better
ramegowda	49	M	BE	RTA	6/24	6/18	6/9(P)	full thickness lid laceration	lid repair	normal	no	no	24 to 48 hours	no	better
anjappa	65	M	LE	stone	cf3	6/36(p)	6/6	hyphema with corneal opacity	conservative	normal	no	no	in 24 hours	no	better
muniyappa	62	M	LE	RTA	6/60	6/36(p)	6/9(P)	full thickness lid laceration	lid repair	normal	no	no	in 24 hours	no	better

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achari	39	M	LE	RTA	6/24	6/9(P)	6/6	SCH with Chemosis	conservative	normal	no	no	24 to 48 hours		no	better
anand	35	M	LE	iron rod	cf 5m	6/24	6/9(P)	Hyphema with SCH	conservative	normal	no	no	in 24 hours		no	better
chandpasha	48	M	LE	with stick	cf 2m	6/60	6/24	Traumatic cataract	Sics with pciol	normal	no	no	in 24 hours		no	better
baychappa	55	M	RE	stone	cf 4m	6/36(p)	6/9(P)	hyphema with corneal opacity	conservative	normal	no	no	in 24 hours		no	better
venkateswarulu	56	M	RE	firecraker	6/60	6/36(p)	6/36(p)	corneal f.b with epi defects	f.b removal	normal	yes	yes	24 to 48 hours		no	better
ramesh	32	M	RE	Cricket ball	cf 2m	6/60	6/18	cornoscleral tear	repair	high	yes	no	in 24 hours		yes	better
erappa	52	M	RE	glass rod	cf - cf	cf 5m	6/60	corneal opacity	conservative	normal	yes	no	24 to 48 hours		no	poor
rajesh	55	M	BE	firecraker	6/24	6/9(P)	6/6	corneal f.b with epi defects	f.b removal	normal	no	no	in 24 hours		no	better
firojkhan	43	M	RE	with stick	6/60	6/18	6/6	SCH with Chemosis	conservative	normal	no	no	in 24 hours		no	better
jagan	40	M	RE	RTA	cf3	6/60	6/12	full thickness lid laceration	lid repair	normal	no	no	in 24 hours		no	better
ahmedpasha	56	M	RE	iron rod	cf - cf	cf 5m	6/60	Traumatic cataract	Sics with pciol	high	no	no	in 24 hours		yes	better
kiran	30	M	RE	firecraker	cf 2m	6/36(p)	6/24	corneal f.b with epi defects	f.b removal	normal	no	yes	>48hours		no	better
jayappa	37	M	RE	glass rod	HM+VE	cf3	6/18	hyphema	conservative	normal	no	no	in 24 hours		no	better
eshwarappa	49	M	RE	wooden piece	cf 4m	6/24	6/9(P)	corneal opacity	conservative	normal	no	no	in 24 hours		no	better
nanjappa	53	M	RE	RTA	cf - cf	6/24	6/12	SCH with Chemosis	conservative	normal	no	no	in 24 hours		no	better
sarojqmma	48	F	BE	nail	cf 2m	cf 4m	6/36(p)	Traumatic iritis	conservative	high	no	no	>48hours		no	better
seethamma	50	F	LE	Cricket ball	cf 4m	6/60	6/60	Hyphema with SCH	conservative	normal	no	no	in 24 hours		no	poor
archana	38	F	LE	firecraker	6/24	6/18	6/12	corneal f.b with epi defects	f.b removal	normal	no	no	24 to 48 hours		no	better
chanchala	40	F	LE	RTA	cf 4m	6/60	6/18	full thickness U.E.lid laceration p.o.edema and	lid repair	normal	no	yes	in 24 hours		no	better
tholasamma	52	F	LE	iron rod	cf - cf	cf3	6/60	traumatic hyphema	conservative	normal	yes	no	in 24 hours		no	better
devi	33	F	LE	rta	6/60	6/24	6/6	SCH with Chemosis	conservative	normal	no	no	in 24 hours		no	better
neeraja	39	F	LE	nail	6/36(p)	6/18	6/9(P)	Traumatic iritis	conservative	normal	no	no	>48hours		no	better

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rukmini	48	F	LE	wooden piece	cf 4m	cf 5m		6/60	Traumatic iritis	conservative	high	no		yes	in 24 hours		no	poor
ramadevi	32	F	RE	nail	6/60	6/18		6/12	conjuctival tear	conservative	normal	no		no	in 24 hours		no	better
gajamma	50	F	RE	Cricket ball	cf 2m	cf 5m		6/24	Hyphema with SCH	conservative	normal	no		yes	in 24 hours		no	better
kalavathi	53	F	RE	iron rod	cf - cf	6/36(p)		6/12	conjuctival tear	conservative	normal	no		no	24 to 48 hours		no	better
veda	29	F	RE	nail	HM+VE	cf 4m		6/36(p)	Corneoscleral Tear	tear repair	normal	yes		no	in 24 hours		no	better
byramma	46	F	RE	Knife	cf 1m	cf3		6/24	cornoscleral tear	tear repair	normal	no		yes	>48hours		no	better
parvathamma	48	F	RE	wooden piece	6/60	6/24		6/9(P)	corneal opacity	conservative	normal	no		no	in 24 hours		no	better
jayalakshmi	36	F	RE	iron rod	cf3	6/36(p)		6/12	Hyphema with SCH	conservative	high	no		no	24 to 48 hours		yes	poor