

## A Study Of Ultrasound Findings In Cases Of Blunt Ocular Trauma

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### ABSTRACT

**BACKGROUND:** To study the ultrasound finding in cases of blunt ocular trauma in Jamnagar district, Gujarat, India. **OBJECTIVE:-**To study the ultrasound findings of lens, anterior chamber, posterior chamber in cases of blunt ocular trauma in patients of Jamnagar district. **SETTINGS:** - Various patients of Jamnagar district which strictly includes cases of blunt ocular trauma of all age group. **MATERIALS AND METHODS:-**Total of 80 eyes of 78 patients were studied who visited Ophthalmology department of Guru Gobindsingh Govt. hospital, Jamnagar, Gujarat. All patients undergone ultrasound A and B Scan examinations and were followed up regularly. **RESULTS:-**Early examination was made possible with help of ultrasound which was otherwise not possible because of corneal oedema, hyphaema, excessive lead edema, etc. The condition and position of lens like cataract, subluxation, dislocation were better studied with the help of USG. Posterior chamber findings like Retinal detachment, Retinal haemorrhage, Vitreous detachment, Vitreous haemorrhage, Choroidal detachment and haemorrhage were early recognised with the help of Ultrasonography and also been useful in follow-up examination. **CONCLUSION:** - Most common mode of injury was blunt trauma by ball; left eye was most commonly affected. Young male patients were most commonly affected. Most common structure affected was crystalline lens. Most cases were associated with varying amount of hyphaema. Major posterior segment findings are retinal detachment and vitreous haemorrhage.

**Key word:** Blunt trauma, Ultra Sound, Hyphaema, Cataract, Lens Dislocation, Subluxation, Cataract, Retinal Detachments, Vitreous Haemorrhage

### INTRODUCTION

Ocular trauma is a common, but preventable entity. Severe ocular trauma is associated with a variety of blinding complications. Minor ocular trauma has been reported to cause sub clinical angle recession, trabecular damage and other anterior segment problems. Acute and long term effects of severe ocular trauma are devastating. It has been suggested that even minor blunt trauma may increase the risk of subsequent cataract formation, based on early studies that show faster progression of lens changes in eyes with a history of trauma than in fellow eyes of the same individual. Eye injury is a leading cause of monocular blindness in the United States. Among all causes of

blindness and visual impairment, eye injury is among the most preventable. It has been noted that 90% of eye injuries are preventable with the appropriate use of protective eyewear. Ocular trauma in children is mainly accidental & has an age specific pattern. The causes of ocular injuries are diverse & tend to vary in different geographical areas and also related to the socio-economic status of the study population. In the Indian scenario main causes are wooden stick injuries & iron rods, pencils, pens scales, broken glass bangles, tea cup toys like tops, bat, ball, bows and arrows, sports, sharp edged objects and furniture at home and at work places. Blunt impact on the eye distorts the globe, causing a rapid rise in intraocular pressure, equatorial stretching, and posterior displacement of the iris-lens diaphragm resulting in tearing of structures near the angle and anterior chamber leading to bleeding. Bleeding may also occur from direct rupture of iris vessels. Hyphaema can occur in isolation, but is often associated with signs of contusion at

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other sites within the eye (corneal abrasion, papillary sphincter rupture, iridodialysis, traumatic cataract or glaucoma secondary to angle recession). Traumatic hyphaema may initially mask signs of significant posterior segment trauma of the eye (retinal commotio, tears, dialysis and detachment). The high incidence of hyphaema reflects the predominantly blunt nature of sports trauma. Sudden compression followed by sudden decompression causes major damage. It has been found that anteroposterior (AP) compression decrease AP diameter by 41%. Equatorial expansion increases the equatorial diameter by 128%. Direct impact on the angle may cause angle recession. Deformation of globe can lead to Choroidal rupture.

### ULTRASONOGRAPHY

Ultrasound is a non-invasive and non-ionizing imaging modality that provides information, not obtainable by clinical examination alone, the first diagnostic application of ultrasound in ophthalmology was by Mundit and Huges (1956). Coleman and colleagues defined techniques for accurate measurement of eye length, anterior chamber length & lens - thickness (1992). Routine ocular scanning is performed using 10 MHz probe Ultrasound consists of high frequency sound waves over 3000 cycles per second. Ultrasound propagates within a medium in longitudinal manner as alternate condensation and rarefactions. These pressure variations are termed oscillations. Each of these has a positive and negative amplitude phase. A complete cycle includes both phases.

**Velocity:** It is the speed of sound propagation.

**Frequency:** It is the number of cycles per second. The unit is hertz.

**Wavelength:** It is the distance between two particles in the same phase of oscillation. It is called lambda.

**Resolution:** It is defined as the smallest distance between two targets necessary to register them as two separate entities.

**Attenuation:** It is the decrease in the level of energy as ultrasound beam propagates within ocular and orbital tissues.

**Basic technology:** The ultrasound unit is composed of four basic elements: the pulser, the receiver, the display unit and the transducer. The pulser produces electric pulses at a rate of 1000 pulses per second. Each pulse will excite the electrodes of the piezoelectric crystal of the transducer generating sound waves. The returning echoes are received by the transducer and transformed into electric signals. These signals are processed in the receiver and demodulator and then displayed on the screen of the display unit.

### AIMS AND OBJECTIVES:

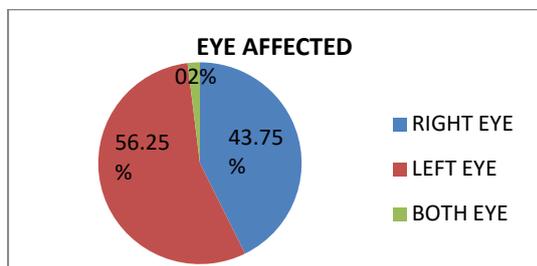
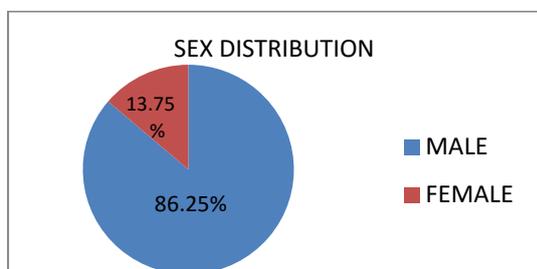
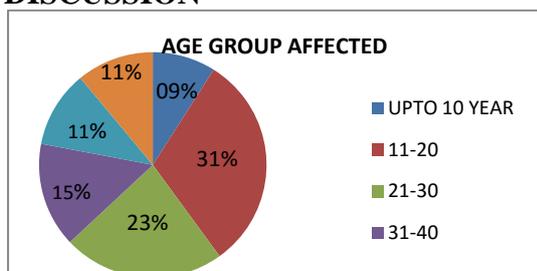
1. To evaluate anterior and posterior segment of traumatized eye with ultrasound examination (USG A scan, USG B scan) in presence of opaque media like corneal edema, hyphaema, cataractous lens and non dilating pupil.
2. Evaluation of posterior and anterior capsule of the lens in patients with blunt ocular trauma.
3. Detection of occult subluxation of lens in patients with blunt ocular trauma.
4. Evaluation of zonular disruption in subluxation of lens on Slit lamp examination in patients with blunt ocular trauma.

### MATERIALS AND METHODS

A total of 80 eyes of 78 patients were included in this prospective study done at Ophthalmology department, Guru Gobindsinh Hospital, Jamnagar. Patients with history of ocular trauma with blunt object were included in the study. Perforating injuries of the globe were excluded. A through history with respect to the mode of injury, duration of trauma and severity of trauma were assessed. Visual acuity of the patients was recorded for distance using Snellen chart for distance. Detailed torch light and slit lamp examination was done. Fundus examination was done using both direct and indirect ophthalmoscopy using 90D, 20D lenses, wherever possible. Intraocular pressure was recorded in patients wherever possible. All of these patients were subjected to ultrasound A Scan and B scan

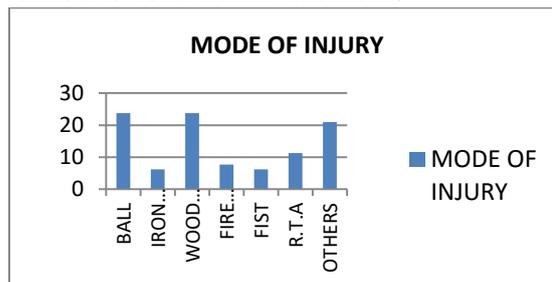
examination. Ultrasound B scans was done in sitting position by contact mode . Gonioscopy was done in patients who presented to us after more than 1 month of duration of trauma. Patients with acute onset of trauma were subjected to USG A Scan and B scan at their first visit. X-Ray skull, CT scan, MRI were done in patients with suspected optic nerve injury. Patients were put on appropriate treatment and kept under regular follow up.

**DISCUSSION**

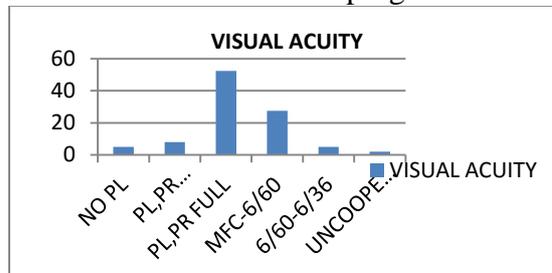


In our study we found that the maximum incidence of blunt ocular trauma was found in the age group of 11-30 years about 50.75% cases. This could be attributed to sport related injuries especially cricket ball injuries, which is played very religiously in every street of India. This not only makes players at risk of injury, but also even people passing by the road. Beyond this age group overall incidence of blunt ocular trauma remained more or less same in all age groups. Failure to take proper precautions while playing and involvement of young age people in assaults and road traffic accidents etc account for majority of blunt trauma patients. In developed countries it has been found that the incidence of sports

related injuries is decreasing while an incidence of road traffic accidents related injuries is increasing. 86.25% of patients were male as compared to females (13.75%). This high incidence in males could be attributed to more sports played by boys and their involvement in road traffic accidents, fighting and more outdoor activities as compared to females. We found that left eye was affected in 56.75% patients and in 43.75% right eye was affected. Unfortunately two patients had involvement of both eyes, which was related to road traffic accidents.

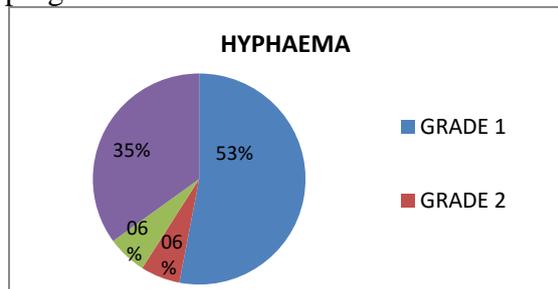


Mode of injury is an important factor in determining visual prognosis. We found that in young age patients sport related injuries constituted major cause . Cricket ball injury was the mode of injury in these patients, accounting for 23.75%, Wooden stick injuries for 23.75% and road traffic accidents for 11.25% of patients . Probably the incidence related to road traffic accident is under estimated in our study as we excluded patients with poly trauma and poor general condition. Fire crackers during festival season become the common mode of both perforating and penetrating injuries especially in young children, making the festival season a big psychological trauma to the families. Speed with which the object strikes the eye also determines the visual prognosis.

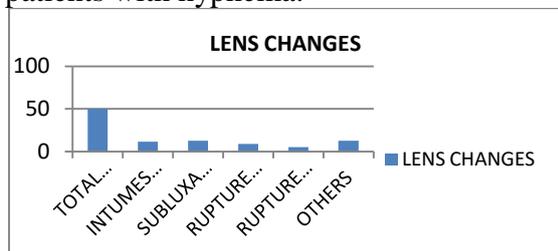


We found that major portion of patients presented with vision of perception of light and projection of rays (52.5%). Majority of them had traumatic cataract and two patient presented with no

perception of light, Optic nerve injury was found in patients with no perception of light . Patients who presented to us early had good visual acuity at presentation. These patients generally have good prognosis.

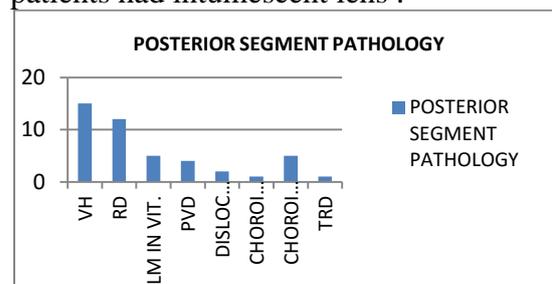


Hypheema was found in 17(21.25%) patients, out of which 6(35.29%) patients had total hypheema and Grade 1 hypheema involving less than one third of AC was found in 9 patients (52.94%). Patients with total hypheema had increased intra ocular pressure. The incidence of angle recession in hypheema patients was as high as 23.52% (4 out of 17). This highlights the importance of ultrasound in patients with hypheema as this is the only modality to have a look into anterior chamber angle in presence of opaque media. Iridodialysis and cyclodialysis were found in two patients with hypheema.



Out of these 50% patients had total cataract and rest had minor cataractous changes. Out of 80 patients, 10(12.5%) patients had subluxation of lens. Slit lamp examination could pick up gross subluxation of lens and dislocation of lens into anterior chamber, Ultrasound could pick up occult subluxation and could visualize zonules in them. Extent of zonular dialysis could be well appreciated with UBM. This is important to pick up any zonular dialysis in advance before surgery so that accordingly , Management can be done and major problems during surgery can be avoided. Rupture of anterior capsule was found in 7 (8.75%) patients and posterior capsule rapture was

found in 4 (5%) patients. Around 8 (10%) patients had intumescent lens .



Major findings on ultrasound were vitreous hemorrhage in 15 (18.75%) patients and retinal detachment in 12 (15 %) patients . Though almost all had rhegmatogenous retinal detachment one patient had tractional retinal detachment secondary to vitreous haemorrhage.

**SUMMARY & CONCLUSION**

In my study of 80 patients with blunt ocular trauma, I came up with the following coclusion.

1. The maximum incidence of blunt ocular trauma was found in the age group of 11-30 years, accounting for 50.75%
2. 86.25% of patients were male as compared to females (13.75%).
3. Left eye was affected in 56.75% patients and in 43.75% right eye was affected.
4. In young patients sport related injuries and wooden stick injuries constituted the major cause. Each of which accounted for 23.75%.
5. Majority of patients presented with vision of less than or equal to perception of light and projection of rays (52.5%).
6. Collection of blood in anterior chamber (hypheema) was found in 17 ( 21.25%) patients.
7. Hypheema with angle recession was found in 04 (5%) patients out of 80 patients
8. Hypheema with iridodialysis and cyclodialysis were found in 2 patients each.
9. Lens was the one of the most common eye structure that was affected.38 ( 47.5%) patients had evidence of trauma to lens. Out of these 50% patients had total cataract and rest had minor cataractous changes. 10 (12.5%) patients had subluxation of lens .

10. Angle recession was found in twenty one( 26.25%) patients. Ciliary body oedema and effusion were found in 11 (13.75%) patients.
11. Major findings on ultrasound B scan were vitreous haemorrhage in 15 (18.75%) patients and retinal detachment in 12 (15%) patients.

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