

GLAUCOMA FOLLOWING BLUNT TRAUMA : AN EPIDEMIOLOGICAL AND CLINICAL STUDY

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ABSTRACT: AIMS: To study the demographic profile, clinical picture, treatment modalities and long term follow up of patients suffering from glaucoma developing after blunt trauma. **MATERIALS AND METHODS:** This was a prospective study over one year in which 75 eyes, newly diagnosed or referred with post traumatic glaucoma to M & J Institute of Ophthalmology were studied. All cases underwent thorough eye examination. Treatment was individualized and instituted. **RESULTS:** Patients ranged from 1 - 70 years with 32 patients (42.66%) below 30 years of age. 61 patients (81.33%) were males. 66.65% were students, laborers or housewives, with laborers topping the charts in vulnerability. In 46 cases (61.33%), left eye was affected, while in 29 pts. (38.66%) right eye was affected. In 54.66% of cases, trauma was caused by stone, wooden stick or ball. Others included fist, firecracker, iron rod, handle, belt. 16% patients presented with IOP in the normal range, 38 (50.66%) patients had IOP in the range of 21-30 mm Hg, whereas 16 (21.33%) patients had IOP more than 40 mm Hg. Within 1 week of instituting treatment, 41 (54.66%) had IOP \leq 20 mm Hg and only 3 patients had IOP more than 30 mm Hg. However, 70 (93.33%) patients had IOP \leq 20 mm Hg by the end of 6 months and all the patients were in this range after 6 months. On slit lamp examination, corneal edema, traumatic mydriasis and sphincter tears were seen in 32 patients each. 12 patients had hyphema and 19 patients had lens dislocated either into vitreous or into the anterior chamber. Iridodialysis was seen in 5 patients. Other findings included cataract, posterior synechiae, subluxation of lens and tobacco dusting. 57 (76%) patients had vision less than 6/60, however after an interval of more than 6 months, 28 (37%) patients had vision less than 3/60. The number of patients having vision \geq 6/12 rose from 5 at initial presentation to 15 in follow-up more than 6 months. Disc changes could be assessed by ophthalmoscopy in 37 (49.33%) patients at presentation. Of these, 21 (56.75%) patients had a cup-disc ratio of less than 0.5 whereas remaining 12 had a cup-disc ratio of more than or equal to 0.5. 5 patients demonstrated unhealthy neuroretinal rim, nasalized blood vessels, lamellar dot sign, deep cup. 12 had other fundus abnormalities like macular edema (5), vitreous hemorrhage (4), retinal detachment (2), vitritis (1), pre retinal membrane (1). No significant change was found in fundus examination on follow-up. As compared to the initial findings, fundus could be visualized in 62 (82.66%) subjects in follow-up. Gonioscopy could be done only in 38 patients. 26 (68.42%) had open angles and 5 patients had closed angles. 17 (44.73%) had angle recession, and 4 patients of these 17 had angle recession \geq 180°. Other findings included iridodialysis (2 patients), cyclodialysis (1 patient), blood clots in the angle, heavy pigmentation of trabecular meshwork, convex iris and haptic of PCIOL lodged in the angle. UBM could be performed in 71 patients. It detected angle recession in 23 patients, lens subluxation or dislocation in 20 patients, hyphema in 6 patients, iridodialysis in 4 patients. UBM could also detect cyclodialysis, PAS, corneal edema, vitreous in anterior chamber, ciliary body cyst, intumescent/ cataractous lens, anterior rotation of the iris. 16 (21.33%) patients responded to a single drug regimen, 12 patients required

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more than 2 drugs, 7 patients underwent Trabeculectomy with Mitomycin C. Other modalities of management included paracentesis (2 patients), cataract extraction with IOL implantation (8 patients), lensectomy (4 patients), vitrectomy with lensectomy (18 patients), peripheral iridectomy (6 patients); and cataract extraction with IOL implantation with trabeculectomy with Mitomycin C (1 patient). By the end of 6 months, 70 (93.33%) patients had IOP controlled with a single drug therapy, and in the subsequent follow ups, 50 patients (66.66%) were off any glaucoma therapy.

CONCLUSIONS: Young adult, adolescent males were more prone to trauma, probably because of their tendency to stay outdoors. In housewives, domestic injuries constitute a huge number. Most patients tend to attend a local doctor within a day of injury, indicating the severity of injury leading to early onset secondary glaucoma, though some patients deferred treatment and ultimately ended in glaucomatous neuropathy, seriously affecting vision. UBM is a good adjunct to gonioscopy where media haze is present. Patients were treated with various modalities of treatment-medical, laser, surgical. Visual outcomes were found to be better in patients who underwent surgery either in the form of cataract extraction and IOL implantation or antiglaucoma surgery. Moreover the patients treated surgically displayed a consistently stable, normal range IOP. Nevertheless, the visual acuity of none of the patients deteriorated post treatment, whether medical or surgical. However there was no improvement of vision in some despite best efforts due to advanced irreversible disc damage. In traumatic glaucoma, antiglaucoma medication should be used early and surgery should be carried out when medical treatment does not reduce the elevated IOP, or in difficult cases to avoid severe complications. The impact of ocular trauma, in terms of need for medical care, loss of income and cost of rehabilitation services when indicated, clearly makes the strengthening of preventive measures very worthwhile.

KEYWORDS: Blunt trauma, traumatic glaucoma, secondary glaucoma, angle recession, subluxation of lens.

INTRODUCTION: Ocular trauma constitutes a significant portion of the ophthalmic emergencies presenting to an eye hospital. Quite often than not, it is one of the most neglected and ignored history, on the part of the patient. Thus a meticulous history elicitation by the ophthalmologist is mandatory. Ocular trauma can lead to the development of secondary glaucoma and can ultimately culminate into blindness, if left untreated.¹

The word 'glaucoma' originally means 'clouded' in Greek. Glaucoma is defined as a multifactorial anterior optic neuropathy characterized by typical optic nerve head changes and visual field defects for which raised intraocular pressure is the most important risk factor. It is not a single disease entity but a group of diseases that are grouped together as they share many common features – cupping & atrophy of optic nerve head, visual field loss and is frequently related to increase in intraocular pressure (IOP).²

Blunt injury may be sustained either at the work place or during sport activities or it may be a result of street assault. Young men are more prone to such injuries. Blunt injuries to eyes are also encountered in the victims of domestic violence.³

Blunt injury is associated with anteroposterior compression of the globe and simultaneous equatorial globe expansion which induces stress on the angle structures. As any object strikes the eye, the force of the blow transmits hydraulic forces through the aqueous⁴. Consequently, most of the transmitted force is directed along the iris towards the trabecular meshwork, ciliary body, and

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zonules. It can lead to hyphema, iridocyclitis, iris sphincter tears, iridodialysis, cyclodialysis, lens subluxation, angle recession, retinal tear or dialysis, retinal detachment, vitreous hemorrhage or choroidal rupture.⁵

The pressure rise that occurs immediately after non penetrating trauma can be severe. The cause can be injury to the trabecular meshwork or obstruction of the outflow channels by RBCs, leucocytes, pigment, lens particles or inflammatory debris. Other causes of elevated IOP associated with blunt trauma to the eye include shallowing of the anterior chamber due to uveal effusion and vitreous prolapse in anterior chamber. Hyphema is the most common mode of clinical presentation. Tears in the trabecular meshwork typically occur after contusion.⁶

In some cases, IOP is low after trauma and then becomes elevated weeks to months later. The likely explanation for this phenomenon is that both outflow facility and aqueous production are reduced immediately after trauma, and then aqueous production recovers first. An alternative explanation is the closing of a tear in the trabecular meshwork or a traumatic cyclodialysis cleft. The IOP elevation that occurs during this period can be very severe. Glaucoma can also occur years or decades after blunt trauma.⁶

Although the elevated IOP after blunt ocular trauma is transient in most cases, it is important to follow these patients for long as the patients with angle recession may develop angle recession glaucoma later in life. Other clues of past trauma include torn iris processes, an anterior chamber deeper than in the fellow eye and increased visibility and width of the scleral spur. Eyes with underlying tendency to develop open angle glaucoma are more likely to develop increased IOP after blunt trauma. Untraumatized fellow eye should be watched closely for elevated IOP.

Elevated IOP in the early post injury period is best controlled medically, primarily with drugs that reduce aqueous production such as carbonic anhydrase inhibitors, β blockers and α_2 agonists. In case of severe rise in IOP, hyperosmotic agents may be given for immediate control of IOP.

Concomitant disorders such as inflammation, hyphema and lens dislocation should also be managed. Steroids need to be given in cases of inflammation and hyphema. In cases of non-resolving or vision threatening hyphema, anterior chamber paracentesis has to be done. Lens dislocated in the anterior chamber can mechanically obstruct the anterior chamber angle. Removal of the lens, lensectomy, needs to be done in patients with lens dislocation,^{7,8}

In patients with narrow angle or angle closure glaucoma post trauma, laser peripheral iridotomy can be done. Laser trabeculoplasty is not very effective in controlling post traumatic glaucoma, although it could be tried when medical therapy is ineffective, before going to filtering surgery.

When medical and laser therapy have failed, an incisional outflow operation is indicated. The surgeries which can be done include-trabeculectomy without antimetabolite, trabeculectomy with adjunctive antimetabolite or drainage implant surgery. Trabeculectomy with antimetabolite therapy offers maximum benefit.⁹

Cyclodestructive procedures may be done in eyes with limited visual potential.

AIMS OF STUDY:

1. To study the demographic profile of patients suffering from glaucoma developing secondary to blunt trauma.
2. To study the various clinical presentations of traumatic glaucoma.

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3. To study the gonioscopic findings in the patients presenting with traumatic glaucoma, wherever possible.
4. To compare and correlate gonioscopic and ultrabiomicroscopic findings.
5. To study the various treatment modalities offered to the patients.
6. To follow up the patients to study the long term IOP control and change in vision of the patients with treatment.

MATERIALS AND METHODS: This was a prospective study in which 75 eyes of 75 patients, newly diagnosed or referred with post traumatic glaucoma to M & J Institute of ophthalmology during one year were studied.

Detailed history was elicited from all the patients above 15 years of age and from the parents/guardians in patients less than 15 years of age.

Patients having penetrating trauma or no evidence of glaucoma, without any medical or surgical management, were excluded from the study.

All cases underwent a detailed eye examination including visual acuity, slit-lamp biomicroscopy, applanation tonometry (Perkin's hand held applanation tonometer), direct ophthalmoscopy (Heine β 200), indirect ophthalmoscopy (wherever possible), gonioscopy (Goldmann's 2 mirror). Gonioscopy could not be done in cases of media haze (corneal edema, hyphema) and in uncooperative patients. Also, it was deferred in cases of acute trauma.

UBM (OTIscan2000 model - Ophthalmic Technologies Incorporation, Toronto, Canada) was done whenever possible. Probe of 30 MHz was used.

All the patients were counseled in detail about their condition. Treatment (medical/surgical) was individualized in each case and instituted to the patients.

Medical therapy included- Topical antiglaucoma medications: Timolol eyedrops (0.5%) BD, Betaxolol eyedrops (0.5%) BD, Dorzolamide eyedrops (2%) TDS, Brimonidine eyedrops (0.5%) BD, Prostaglandin analogues (Travoprost) 0.004% OD,

Systemic: Tab. Acetazolamide (250 mg QDS - adults), (5-10 mg/ kg QDS - children), Liq. Glycerol (50%) 1-1.5 gm./kg, Inj. Mannitol (20%) 1-2 gm./kg.,

Steroids - Tab. Prednisolone (1mg/kg/day), Dexamethasone eye drops (0.1%), Prednisolone eye drops (1%), Dosage of dexamethasone eye drops and prednisolone eye drops was individualized to each patient, whenever required.

Cycloplegics - in few cases like hyphaema, traumatic uveitis - Atropine eye ointment (1%) TDS, Cyclopentolate eye drops (1%) BD.

Surgical therapy included-Partial thickness trabeculectomy with mitomycin C (0.5 mg/ml), Cataract extraction with or without PC IOL implantation, Nd: Yag LASER Peripheral iridotomy, Paracentesis, Lensectomy with vitrectomy.

The patients were monitored on each follow up (< 1 week, 1 week to <6 months and >6 months upto 1 year) with respect to visual acuity, intra ocular pressure, gonioscopy, fundus changes and treatment instituted. However, the frequency of follow up visits was modified according to the severity of the condition and the response to treatment.

Outcome after the appropriate mode of management was evaluated and analyzed.

OBSERVATION AND DISCUSSION:**AGE INCIDENCE:**

Table 1: In our study, 24% of the patients belonged to 0-20 years age group, 36% were between 21-40 years; 32% were between 41-60 years and 8% were > 60 years. 42.66% cases were < 30 years of age.

Gadia R et al¹⁰ studied the profile of secondary glaucomas for their incidence and to identify risk factors. 2997 patients newly with glaucoma in their tertiary glaucoma center in the year 2005 were included. Age distribution was as follows: 25% were between 0-20 years; 27% were between 21-40 years; 30% were between 41-60 years and 18% were > 60 years. Of all traumatic glaucoma patients, 71% cases were < 30 years of age.

In a study conducted by Y. M. Canavan et al¹¹, three-quarters (77%) were less than 30 years old and nearly half (47%) were under 16.

GENDER INCIDENCE: In our study, 61 out of 75 patients i.e. 81.33% were males.

In a study by Tielsch¹² and colleagues hospital discharge information was used to categorize eye injuries. In their study, the incidence of blunt trauma was more in males as compared to females, 72% occurred in males.

The male female ratio was 2.2 in the study done by Gadia R et al¹⁰ on the profile of secondary glaucomas.

In the study conducted by Y. M. Canavan et al¹¹ anterior segments of 212 eyes (205 patients) were evaluated 1 to 14 years after contusional eye injuries. The study population was all patients with eye injuries requiring admission to the Ophthalmology Unit of the Royal Victoria Hospital, Belfast, during the 10-year period 1967-76 inclusive. There were 175 males (85%) and 30 females (14%).

OCCUPATION:

Table 2: Of the 75 patients studied 66.65% were students, laborers or housewives, with laborers topping the charts in vulnerability. Others included farmers, officers, drivers, prisoner, beggar, policeman, and carpenter.

A study by Thylefors B. et al¹³ reported that lower socioeconomic classes are more associated with ocular trauma. The setting for the occurrence of trauma is most commonly the workplace and, increasingly, road accidents. On the other hand, domestic accidents are probably under-reported. Of particular importance in developing countries is trauma during agricultural work.

Nirmalan PK, et al¹⁴ conducted a population-based cross-sectional study of 5150 persons 40 years or older in a randomly chosen rural population of 3 districts of southern India. They elicited a history of ocular trauma in either eye from 229 (4.5%) persons, including 21 (0.4%) persons with bilateral ocular trauma. The most common setting where the ocular trauma occurred was during agricultural labor (46.9%). Incidence of trauma was higher for laborers and lower for literates.

In the study by Y. M. Canavan et al¹¹, most injuries followed sporting or domestic accidents (58.5%) and predominantly affected children (39.5%). Industrial accidents (9%) and assault (7%) accounted for a relatively small percentage of the total injuries.

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SYSTEMIC HISTORY: Of all the patients, 1 was a known case of diabetes and hypertension and there were other 3 known hypertensive patients.

FAMILY HISTORY: None of the patients had family history of glaucoma.

EYE AFFECTED: In 46 cases i.e. 61.33% left eye was affected, while in 29 pts. (38.66%) right eye was affected.

MODE OF TRAUMA:

Table 3: In 54.66% of cases mode of trauma was by stone or wooden stick or ball.

TIME INTERVAL OF PRIMARY CONSULTATION: Of the 75 patients under study, 62 patients (82.66%) consulted a doctor for their injury within a week, majority of which i.e. 65.33% patients consulted within a day.

Table 4: TIME INTERVAL OF CONSULTATION AT M & J INSTITUTE

Table 5: Of the 75 patients under study, 34 patients (45.33%) consulted our institute within one month of injury and 60 patients (80%) presented to us in a year of injury.

A retrospective study by Ellong A et al¹⁵ of 1343 files of patients with late post-traumatic glaucoma with irido-corneal angle injuries in black Cameroonians was carried out from January 1991 to December 2001 at the Douala General Hospital in Cameroon in Central Africa. 57 had post-traumatic glaucoma. The time from injury to diagnosis ranged from 1 year 4 months to 7 years. The follow-up period ranged from 3 months to 5 years 6 months.

TREATMENT TAKEN BEFORE:

Table 6: 80% of the patients i.e. 60 of the 75 patients under study had taken some or the other form of treatment before consulting us. 3 patients had undergone surgery (trabeculectomy, paracentesis, cataract extraction with PC IOL implantation). 20 (26.66%) patients had taken topical antiglaucoma medication and 11 (14.66%) patients had taken topical as well as oral treatment for glaucoma before they presented to us.

IOP AT PRESENTATION:

Table 7: 16% of the patients presented to us with IOP in the normal range, either because they were already on antiglaucoma therapy before they consulted us, or their IOP remained within normal limits but they had disc changes suggestive of glaucoma. 38 (50.66%) of the patient had IOP in the range of 21-30 mmHg, whereas 16 (21.33%) of the patient had IOP more than 40 mm Hg.

Scheie HG et al¹⁶ reported IOP increases to more than 24 mm Hg in about 32% of ocular trauma patients.

In our study, 33.33% of patients had baseline IOP of > 30 mmHg, whereas in a study by Gadia R et al¹¹, 50% had baseline IOP of > 30 mm Hg.

SLIT LAMP EXAMINATION:

Table 8: On slit lamp examination, corneal edema and pupillary abnormalities in the form of traumatic mydriasis and sphincter tears were seen in 32 patients each. 12 patients had hyphema and 19 patients had lens dislocated either into vitreous or into the anterior chamber. Iridodialysis was seen in 5 patients. Rest of the findings included cataract, posterior synechiae, subluxation of lens and tobacco dusting.

Sihota R et al¹⁷ prospectively reviewed 100 consecutive patients of traumatic glaucoma and found a very high correlation of postconcussional glaucoma with traumatic cataracts, significant injuries to the iris and a displacement of the lens. Two of these four clinical features were present in all cases. The involvement of trabecular meshwork makes the eye more prone to developing glaucoma.

In the study by Y. M. Canavan et al¹¹, iris abnormalities were found in 37% of eyes injured, the most common abnormalities being marginal tears and pupillary defects. Cataract or lens dislocation attributable to trauma occurred in 24% of eyes. Eight eyes had iridodialyses

In a survey on traumatic glaucoma conducted by Schlote T et al¹⁸ angle recession, hyphema-associated and lens-associated mechanisms were the most common causes of traumatic glaucoma after blunt ocular trauma.

VISUAL ACUITY:

Table 9: Visual acuity of the patients was taken on Snellen's chart, whenever the vision was more than or equal to 6/60.

At the time of presentation, 57 (76%) patients had vision less than 6/60, however after an interval of more than 6 months 28 (37%) of the patients had vision less than 3/60. The number of patients having vision \geq 6/12 rose from 5 at initial presentation to 15 in follow-up more than 6 months.

In a study by Gadia R et al¹⁰ fifty per cent of the patients had vision $<$ 6/60.

In the study of Y. M. Canavan et al¹¹ a final visual acuity of 6/6 was achieved in 136 eyes (64%). Twenty-seven eyes had a visual acuity of 6/60 or worse (12%), and in 13 eyes there was no perception of light due to extensive fundus injury or optic nerve damage

Immediate visual loss may suggest retinal detachment, nerve damage etc. Slow damage is more typical of that developing in association with glaucomatous optic atrophy

FUNDUS EXAMINATION:

Table 10: Disc changes could be assessed by ophthalmoscopy in 37 (49.33%) patients at the time of presentation. In the rest, media haze or uncooperative nature of patient made disc evaluation not possible. Of these 37 patients, 21 (56.75%) patients had a cup-disc ratio of less than 0.5 whereas the remaining 12 had a cup-disc ratio of more than or equal to 0.5. 5 patients demonstrated unhealthy neuro retinal rim, nasalization of blood vessels, lamellar dot sign, deep cup and 12 had other fundus abnormalities like macular edema (5 patients), vitreous hemorrhage (4 patients), retinal detachment (2 patients), vitritis (1 patient), pre retinal membrane(1 patient). No significant change was found in fundus examination of the patients in follow-up. As compared to the initial findings fundus could be visualized in 62 (82.66%) subjects in follow-up.

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In a retrospective study by Ellong A et al¹⁵ of 1343 files of patients with late post-traumatic glaucoma, the recorded cup/disc ratio was 0.6 to optic atrophy. It was equal to 1.0 in 61.9% of cases.

IOP ON FOLLOW UP:

Table 11: Within 1 week of instituting the treatment to the patient, 41 (54.66%) had IOP \leq 20 mm of Hg and only 3 patients had IOP of more than 30 mm of Hg. However, 70 (93.33%) patients had IOP \leq 20 mm of Hg by the end of 6 months and all the patients were in this range after 6 months.

In a retrospective study by Ellong A et al¹⁵ of 1343 files of patients with late post-traumatic glaucoma, the intraocular pressure ranged between 22 and 66 mmHg at the first examination and between 12 and 29 mmHg at the last examination.

In a study by Bai HQ et al¹⁹ after follow-up for half a year, the IOP of 3 cases (2.91%) was below 10 mmHg and 92 (89.32%) cases between 10 and 21 mmHg; only 8 cases (7.77%) still had IOP over 21 mmHg. The postoperative IOP of most injured eyes was controlled within the safe range.

OTHER EYE EXAMINATION: Except for 2 patients having other eye phthysical, no other patient was found to have any other abnormality in the other eye except for cataract.

GONIOSCOPY:

Table 12: Gonioscopy was done in 38 patients, but was not possible and hence not done in 37 patients. Of these 38 patients, 26 (68.42%) had open angles on gonioscopy and 5 patients had closed angles. 17 (44.73%) had angle recession, and 4 patients of these 17 had angle recession \geq 180°.

Besides angle recession and peripheral anterior synechia, other findings on gonioscopy included iridodialysis (2 patients), cyclodialysis (1 patient), blood clots in the angle, heavy pigmentation of trabecular meshwork, convex iris and haptic of PCIOL lodged in the angle.

In a retrospective study by Ellong A et al¹⁵ of 1343 files of patients with late post-traumatic glaucoma irido-corneal angle recession was the most common lesion (61.9%) followed by iridodialysis (38.1%) and cyclodialysis (14.3%).

Blanton FM²⁰ concluded from his study that about 6-20% of individuals having angle recession may develop chronic glaucoma with optic nerve head damage. The risk of developing the glaucoma is greatest if 180 degree or more of the trabecular meshwork is involved and usually occurs recession months or year after ocular trauma. In cases of glaucoma remote from acute trauma, gonioscopy is critical.

GONIOSCOPY ON FOLLOW UP:

Table 13: In the first follow-up i.e. <1 week, gonioscopy could be done in 66 patients, 46 (69.69%) of which had open angles, 18 (27.27%) had narrow angles and 2 had closed angles. In the subsequent follow-ups gonioscopy could be done in 68 patients, 48 of which had open angles and none had closed angles.

UBM:

Table 14: It was especially useful in patients with hazy media like hyphema, corneal opacity, where gonioscopy was not possible. UBM could be performed in 71 patients it detected the presence of angle recession in 23 patients, lens subluxation or dislocation in 20 patients, hyphema in 6 patients,

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iridodialysis in 4 patients. UBM could detect cyclodialysis, PAS, corneal edema, vitreous in anterior chamber, ciliary body cyst, intumescent/ cataractous lens, anterior rotation of the iris.

Sihota R et al²¹ prospectively analyzed the clinical and ultrasonographic biomicroscopy (UBM) features in eyes with closed globe injury, at the initial examination, that would predict the occurrence of chronic traumatic glaucoma during a 6-month follow-up. Forty consecutive eyes with closed globe injury and a chronically elevated intraocular pressure (IOP) of at least 21 mm Hg for a minimum of 3 months were diagnosed as having traumatic glaucoma and compared with 52 eyes with closed globe injury and no evidence of glaucoma.

The relative risk of developing traumatic glaucoma was also significantly higher with hyphema, elevated baseline IOP, angle recession of more than 180 degrees, lens displacement, and wider angles on UBM. Clinically, the presence of increased pigmentation at the angle, elevated baseline IOP, hyphema, lens displacement, and angle recession of more than 180 degrees were significantly associated with the occurrence of chronic glaucoma after closed globe injury. On UBM findings, a wider angle and the absence of cyclodialysis were significant predictors for the subsequent development of traumatic glaucoma.

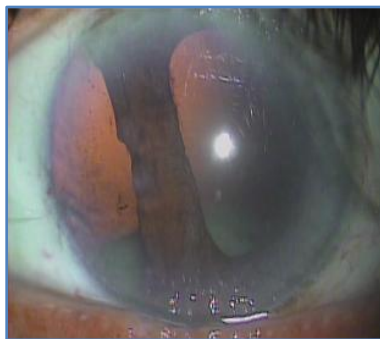


Fig. 1: Iridodialysis with lens dislocated in vitreous

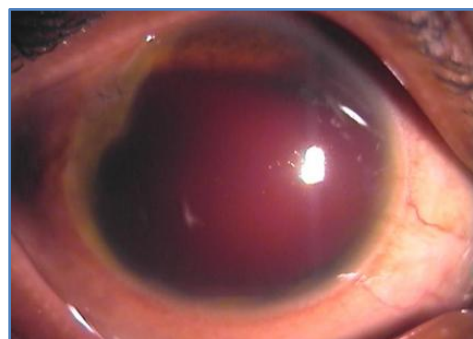


Fig. 2: Hyphema filling almost $\frac{3}{4}$ th of anterior chamber

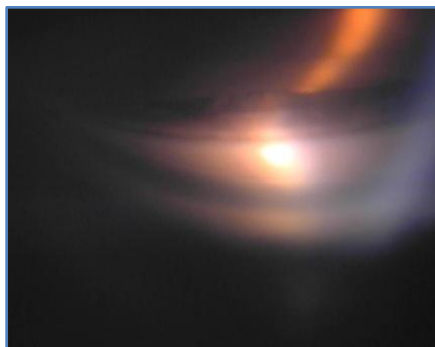


Fig. 3: Angle recession on gonioscopy



Fig. 4: Peripheral anterior synechia

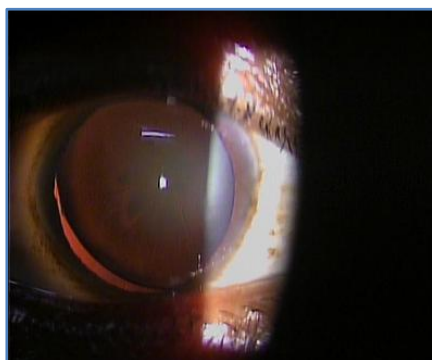


Fig. 5: Superonasal subluxation of lens with rosette cataract

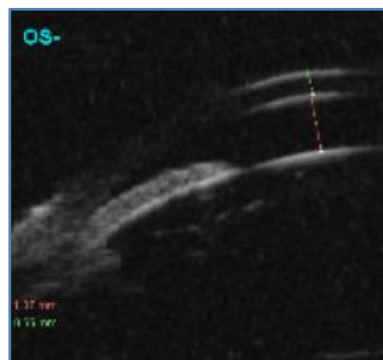


Fig. 6: Closed angle on UBM

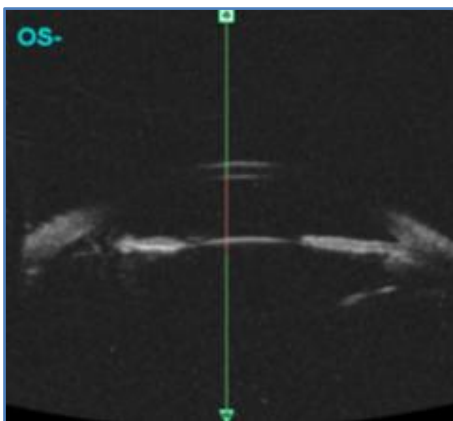


Fig. 7: Iridodialysis on UBM

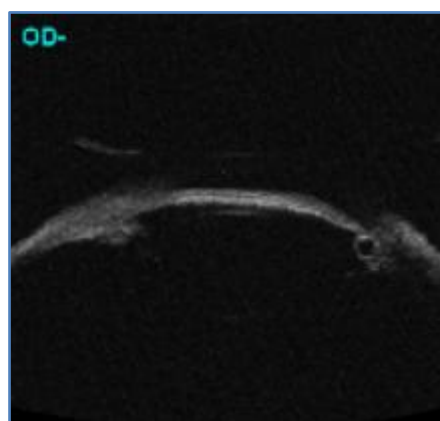


Fig. 8: Ciliary body cyst

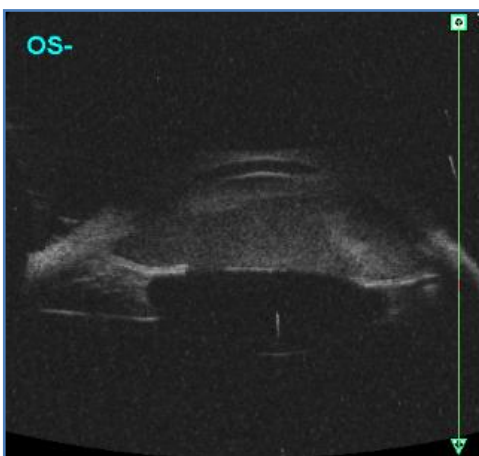


Fig. 9: Hyphaema

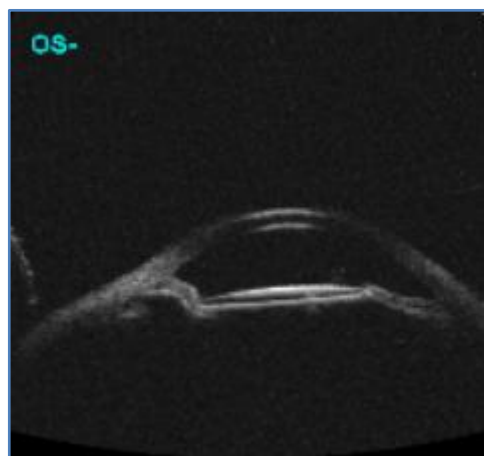


Fig. 10: Peripheral anterior synechiae

TREATMENT & RESPONSE:

Table 15: Various modalities of treatment were offered to the patients. In the first follow up, 16 (21.33%) of the patients responded to a single drug regimen, 12 patients required more than 2 drugs, 7 patients were operated for antiglaucoma surgery (Trabeculectomy with mitomycin C). Other modalities of management included paracentesis which was done in 2 patients; cataract extraction with IOL implantation – in 8 patients, lensectomy in 4 patients, vitrectomy with lensectomy in 18 patients, peripheral iridectomy offered as a treatment in 6 patients; and combined surgery (cataract extraction with IOL implantation with trabeculectomy with mitomycin C) done in 1 patient. By the end of 6 months, 70 (93.33%) patients had IOP controlled with a single drug therapy, and in the subsequent follow ups, 50 patients (66.66%) were off any glaucoma therapy.

In the study by Ellong A et al¹⁵, normalization of the intraocular pressure was achieved with medical treatment in 23.8% and with trabelectomy in 12.3% of the cases. In a survey on traumatic glaucoma conducted by Schlote T et al¹⁸ antiglaucomatous drugs that reduce the secretion of aqueous humor (e. g., beta-blockers) should be preferred. Mitomycin-augmented trabeculectomy is the surgical method of first choice in patients with open angle traumatic glaucoma.

Belcher C. et al²² described a surgical approach that involves paracentesis and gentle anterior chamber washout and minimal surgical trauma while dealing with traumatic hyphema.

Bai HQ et al¹⁹ studied the cause, treatment, and cure of traumatic secondary glaucoma in 103 cases (103 eyes). Most patients achieved a better visual acuity and ideal IOP after positive medical, (Nd:YAG) laser, or surgical treatment. The operations included anterior chamber irrigation, filtering operation combined with mitomycin C, lensectomy, vitrectomy, and combination surgery. After medical, laser, or surgical treatment, the IOP of most patients could be ideally controlled.

Manners T et al²³ did a study to determine the results of trabeculectomy with intraoperative application of mitomycin C in patients with post-traumatic angle recession glaucoma. A retrospective analysis was made of 43 consecutive trabeculectomy procedures in 41 young black/mixed race patients followed for a mean period of 25 months (range 2-66 months).

The intraocular pressure was successfully controlled at last follow up without topical treatment in 77% (33/43 eyes) and the visual acuity was the same or better in 81% (35/43 eyes).

Cumulative probability of success was 85% at 1 year follow up, 81% at 2 years, and 66% at 3 years and thereafter. In medically uncontrolled post-traumatic angle recession glaucoma trabeculectomy with mitomycin C is an effective surgical procedure with an acceptable complication rate. Good intraocular pressure control and preservation of vision can be expected in most patients.

A retrospective analysis of 87 drainage procedures performed on 65 patients over an 8-year period was conducted by Mermoud A et al.²⁴ It compared the results of three different drainage procedures performed for uncontrolled post-traumatic angle recession glaucoma. The results of trabeculectomy (47 procedures), Molteno single-plate implantation (20 procedures), and trabeculectomy combined with antimetabolite (20 procedures) were compared. In the group undergoing trabeculectomy with antimetabolite therapy, the intraocular pressure (IOP) drop was significantly greater than the other two groups.

No statistically significant differences were found between the groups undergoing trabeculectomy without antimetabolite therapy and Molteno implantation. Hence, in medically uncontrolled post-traumatic angle recession glaucoma, trabeculectomy with antimetabolite therapy is the most effective surgical procedure.

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Fukuchi T et al²⁵ tried Nd:YAG laser trabeculopuncture (YLT) on 11 patients with uncontrollable traumatic angle recession glaucoma despite the maximum medical therapy tolerated, such as argon laser trabeculoplasty (ALT). In 6 of 7 eyes treated initially with YLT, the IOP was significantly reduced, so medication was discontinued. Four other cases with uncontrollable IOP after failed ALT were treated with YLT. The IOP of 3 cases was successfully controlled by medication after YLT. These YLT results were then compared with those of ALT in 11 glaucoma patients with traumatic angle recession and it was found that YLT offers significant advantages over ALT for the treatment of glaucoma with traumatic angle recession after blunt trauma and thus merits further study.

Nurmamedov NN et al²⁶ have developed an operation involving artificial drainage system implantation to children with secondary posttraumatic glaucoma. Such surgery was carried out in 18 eyes of 18 children aged 5 to 14 with secondary posttraumatic glaucoma. The patients were discharged from hospital after surgery with ophthalmic tone of 17 to 21 mm Hg. A follow-up of up to 1.5 years has shown that the ocular pressure was normal (17-22 mm Hg) in 13 eyes, slightly higher in 4 (23-26 mm Hg), and high (35 mm Hg) in 1.

CONCLUSIONS:

- Young adult, adolescent males were more prone to trauma, mostly because of their tendency to stay outdoors. In housewives domestic injuries constitute a huge number.
- Most of the patients tend to attend a local doctor within a day of injury, indicating the severity of the injury leading to early onset secondary glaucoma, though some patients deferred treatment and ultimately ended in glaucomatous neuropathy, seriously affecting the vision.
- UBM is a good adjunct to gonioscopy where the media haze is present.
- Patients were treated with various modalities of treatment-medical, laser, surgical. Visual outcomes were found to be better in patients who were offered surgery either in the form of cataract extraction and IOL implantation, or antiglaucoma surgery. Moreover the patients treated surgically displayed a consistently stable, normal range IOP. Nevertheless, the visual acuity of none of the patients deteriorated post treatment, whether medical or surgical. In some patients however there was no improvement of vision despite the best efforts put in..due to the advanced irreversible disc damage.
- In traumatic glaucoma, antiglaucoma medication should be used at the early stage, and surgery should be carried out when medical treatment does not reduce the elevated IOP, or in difficult cases to avoid severe complications.
- The impact of ocular trauma, in terms of need for medical care, loss of income and cost of rehabilitation services when indicated, clearly makes the strengthening of preventive measures very worthwhile.

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Age group(in years)	No of pts.
0-10	06 (08.00%)
11-20	12 (16.00%)
21-30	14 (18.66%)
31-40	13 (17.33%)
41-50	17 (22.66%)
51-60	07 (09.33%)
61 onwards	06 (08.00%)

Table 1: Age incidence

Occupation	No. of pts
Student	16 (21.33%)
Laborer	20 (26.66%)
Housewife	14 (18.66%)
Farmer	05 (06.66%)
Beggar	01 (01.33%)
Driver	03 (04.00%)
Prisoner	01 (01.33%)
Officer	11 (14.66%)
Priest	01 (01.33%)
Policeman	02 (02.66%)
Carpenter	01 (01.33%)

Table 2: Occupation

Mode of trauma	No. of pts
Stone	13 (17.33%)
Wooden stick	15 (20.00%)
Ball	13 (17.33%)
Fire Cracker	08 (10.66%)
Fist	06 (08.00%)
Iron rod	09 (12.00%)
Handle	03 (04.00%)

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Bush	02 (02.66%)
Cooker	01 (01.33%)
Paper Roll	01 (01.33%)
Shoe	01 (01.33%)
Belt	01 (01.33%)
Gunny Bag	01 (01.33%)
Cow's Horn	01 (01.33%)

Table 3: Mode of trauma

Time interval of primary consultation	Number of patients
≤ 1 day	49 (65.33%)
> 1 day - < 1 week	13 (17.33%)
1 week - < 1 month	09 (12.00%)
1 month - < year	00 (00.00%)
1 year - < 10 years	04 (05.33%)
≥ 10 years	00 (00.00%)

Table 4: Time interval of primary consultation

Time interval of Consultation in M & J	Number of patients
< 1 week	03 (04.00%)
1 week - < 1 month	31 (41.33%)
1 month - < 1year	26 (34.66%)
1 year - < 10 years	10 (13.33%)
≥ 10 years	05 (06.66%)

Table 5: Time interval of consultation at M & J Institute

Treatment taken before	Number of patients
Nil	15 (20.00%)
Details not available	26 (34.66%)
Topical	20 (26.66%)
Topical + systemic	11 (14.66%)
Surgical	03 (04.00%)

Table 6: Treatment taken before

IOP at presentation (in mm Hg)	Number of patients
< 20	12 (16.00%)
21-30	38 (50.66%)
31-40	09 (12.00%)
>40	16 (21.33%)

Table 7: IOP at presentation

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SLE FINDINGS	NO OF PATIENT
Immature cataract	19
Traumatic mydriasis / Pupillary abnormality	32
Hyphaema	12
Phacodonesis	08
Pseudophakia	04
Shallow/flat Anterior chamber	10
Tobacco dusting	04
Mature cataract	06
Subconjunctival hemorrhage	05
Anterior chamber reaction	03
Posterior synechia	04
Lens dislocation in vitreous	13
Lens dislocation in Anterior Chamber	06
Iridodialysis	05
Ruptured lens capsule/ Lens Matter in AC	05
Pigment dispersion	07
Corneal edema	32
Vitreous in Anterior Chamber	14

Table 8: Slit lamp examination

VISION	At presentation	Follow-up < 1 wk.	Follow-up 1wk - 6 mnth	Follow-up > 6 mnths
< 3/60	54 (72.00%)	47 (62.66%)	31 (41.33%)	28 (37.33%)
3/60 - < 6/60	03 (04.00%)	08 (10.66%)	08 (10.66%)	08 (10.66%)
6/60 - < 6/24	09 (12.00%)	07 (09.33%)	13 (17.33%)	14 (18.66%)
6/24 - < 6/12	04 (05.33%)	07 (09.33%)	09 (12.00%)	10 (13.33%)
≥ 6/12	05 (06.66%)s	06 (08.00%)	14 (18.66%)	15 (20.00%)

Table 9 : Visual acuity

C/D ratio	No. of pts at presentation	No. of pts on follow-up
<0.5	21 (56.75%)	43 (69.35%)
≥0.5	12 (43.24%)	19 (25.33%)

Table 10: Fundus findings

IOP (mm Hg)	Follow-up < 1 wk.	Follow-up 1wk - 6 mnth	Follow-up > 6 mnths
≤ 20	41 (54.66%)	70 (93.33%)	75 (100.00%)
21-30	31 (41.33%)	05 (06.66%)	00
31-40	03 (04.00%)	00	00

Table 11: IOP on follow up

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GONIOSCOPY	No. of patients
Open angles	26 (68.42%)
Narrow angles	07 (18.42%)
Closed angles	05 (13.15%)
Angle recession < 180°	13
Angle recession ≥ 180°	04
PAS	07

Table 12: Gonioscopy

GONIOSCOPY	Follow-up < 1 wk.	Follow-up 1wk - 6 mnth	Follow-up > 6 mnths
Open angle	46 (69.69%)	48 (70.58%)	48 (70.58%)
Narrow angle	18 (27.27%)	20 (29.41%)	20 (29.41%)
Closed angle	02 (03.03%)	00	00

Table 13: Gonioscopy on follow up

UBM Findings	No. of pts
Closed angle	06
Narrow angle	11
Angle recession	23
Iridodialysis	05
Hyphema	06
Lens subluxation / Dislocation	20

Table 14: UBM

Rx response	Follow-up < 1 wk.	Follow-up 1wk - 6 mnth	Follow-up > 6 mnths
No drug	00	02 (02.66%)	50 (66.66%)
1 drug	16 (21.33%)	70 (93.33%)	22 (29.33%)
2 drugs	06 (08.00%)	02 (02.66%)	02 (02.66%)
>2 drugs	12 (16.00%)	01(01.33%)	01(01.33%)
AGS with MMC	07 (09.33%)	00	00
Lensectomy +/- vitrectomy	22 (29.33%)	00	00
Cataract extraction +/- IOL	09 (12.00%)	00	00

Table 15: Treatment and response

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