

Clinical Study of Perforating Injury of the Eye

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ABSTRACT: Ocular injuries constitute the major causes of ocular emergencies in our day to day practice. The causes for perforating injuries are innumerable. The present aim of the study is to evaluate the incidence, etiology and causating agents, complications and the general prognosis of perforating injury of the eye.

KEYWORDS : perforating, eye, ocular.

I.INTRODUCTION

Trauma is considered to be one of the important causes of morbidity and mortality. It has been on the increase now, with the multiplication of vehicles traversing at ever increasing speeds and the growing tendency to violence in our society.

Perforating injuries with retained intraocular foreign bodies further add to the seriousness of such an accident depending upon their size, site and chemical nature of the foreign body.

M. Restoriand Mcleod (1978) reporting 414 cases of perforating injuries states that glass forms one of the most common object causing injuries (19%) and sharp instruments being 13%.

E.M. Eagling (1975) while reporting series of perforating injuries states glass is the most common object (27.5%), other objects were metal 13.01%, knife 9.2% and wood 8.2%.

S.R.Winth Rop in a study of 5671 ocular injuries in Glasgow eye Infirmary found 18.3% were due to domestic activities.

It is interesting to note serious injuries resulting from broken spectacles are rare. Renuky and M.Krishnan (1967) have reported 139 cases of perforating injuries due to spectacle fragmentation out of 1000 perforating injuries. Even frame made out of inflammable material such as cellulose nitrate which has a low ignition temperature and burns rapidly cause severe burns to the eye.

Stephen P (1967) reported a case in which severe eye lid and facial burns resulted in an elderly man when an old pair of cellulose nitrate spectacles were accidentally ignited by a cigarette lighter.

II.MATERIALS AND METHODS

MATERIALS

A total of 75 with perforating injury were subjected for the present study. The study was conducted to evaluate the incidence, causes, complications, management and results of perforating injury of the eye without retained intraocular foreign body.

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Cases with retained intraocular foreign body were not taken for the present study as there was no facility in the hospital to manage those cases. A total of 4 cases of retained intraocular foreign body, after it was diagnosed by x – ray and ultrasound, were referred to Minto Hospital, Bangalore, for further management.

Out of 110 cases of perforating eye injuries during the period of 2 years mentioned above, only 75 cases with a follow-up period of minimum 2 months have been included for the present study. Among the remaining cases, many were lost in follow-up and few did not turnout at all for follow-up.

METHODS

A thorough and detailed history was taken with special reference to the nature and mode of injury, whether the injury was due to any flying sharp objects, whether the patient was using hammer & chisel, whether the patient was treated before coming to the hospital, whether he had normal vision in the eye before sustaining injury, etc. all the details were recorded on proforma case sheets.

III.EXAMINATION

After making a general physical examination for evidence of any other associated injury on any other part of the body, and also recording pulse & blood pressure, examination of both the eyes was conducted under the following headings.

IV.EXTERNAL EXAMINATION

The eye was thoroughly cleaned with sterile cotton swabs and examined with a binocular loupe after gently retracting the lids with lid retractors, taking special care not to apply undue pressure over the globe. In cases where there was severe blepharospasm a facial block by Van Lint's technique was used. A detailed systematic examination of the eye was conducted. All the structures of the anterior segment were thoroughly examined for evidence of any perforation. Papillary reflex was carefully noted.

Examination of functions of the eye

Vision:

Vision was recorded by Snellen's chart. In patients whose vision was less than 6/60 was recorded as CF in meters, depending upon the distance in meters the patient counted the examiner's fingers. Vision less than CF, was recorded as HM when the patient could perceive only light or projection of rays (PR), tested in all quadrants.

Extra Ocular Muscles

All duction and version movements tested for any evidence of injury to the muscles and if any restrictions found were recorded.

Fundoscopy

Wherever possible, a careful examination of fundus was done with direct ophthalmoscope and in certain relevant cases also by indirect ophthalmoscope. Special attention was given for evidence of any I.O.F.B., vitreous haemorrhage, opacities in the vitreous & lens, retinal oedema, retinal detachment, condition of the optic disc and background retina. In most of the cases, funduscopy was not possible as the media was hazy.

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Tension

Intraocular tension in the fellow eye was noted immediately and in few cases tension in the injured eye was recorded by nontouch pulse air tonometer. In certain cases with traumatic cataract where the wound of entry was sealed and AC well formed, tension was recorded by Schiortz tonometer.

Slit Lamp Examination

This was not possible in emergency night admissions who needed immediate surgical intervention. These cases were examined thoroughly by operating loupe. Otherwise a detailed examination was done under slit lamp.

Investigations

X-Ray

X-Ray orbit, both AP and lateral view was taken in relevant cases to rule out any I.O.F.B. or any fracture. Where I.O.F.B. was found, an eye moving lateral X – Ray was taken to confirm whether the foreign body was intra or extraocular. Cases with I.O.F.B., were referred to Bangalore.

Ultrasound

Ultrasonography both A & B scan were done in relevant cases to rule out any I.O.F.B., any lens dislocation and condition of the posterior segment, especially in cases where I.O.L. implantation was done.

Swab for Culture Sensitivity

In relevant cases, conjunctival / corneal swabs were sent for c/s to find out any pathogens.

Routine Urine & Blood Examination

Urine examination for sugar, albumin, micro was done and also blood haemogram.

In those cases sent to Bangalore for further management, a primary repair of the wound was done.

Management

The following cases were selected for conservative medical management.

1. Uncomplicated Corneal Wounds: In those cases where perforation was small or the two lips of the wound were in good apposition without any uveal prolapsed and already well formed anterior chamber, repair of the wound was not done and these cases have been treated medically.
2. Cases who had Already Developed Infection: These cases were taken for surgery after giving medical line of treatment.
3. Cases where inflammatory reaction was severe like a traumatic cataract following pin or thorn prick with severe iridocyclitis: In these cases cataract surgery was undertaken on a later date after treating the inflammation.

Treatment followed was –

General

Inj. Tetanous Toxoid IM

Cap Chloromycetin 250 mg qid x 5 days in adults

Septran syru / tablet bd x 5 days in children depending upon the age.

Cap Doxycycline bd x 5 days in relevant cases

Tab Brufen 400 / 200 mg tid

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Tab Acetazolamide 250 mg / ½ tab tid in relevant cases
Tab Vitamin C 500 mg od
OC Gentamycin Drops – frequency depending upon the severity of infection.
OD Fortified Gentamycin drops – in severe cases.
OC Betnesol N drops
OC Kenalog S oint HS
OC Garamycin oint bd
SC Idizone 0.5 ml +/- Gentamycin 0.5 ml
Inj Revice IM – in cases of hyphaema & vitreous haemorrhage
OC Atropine drops / oint

The eye was protected by pad and bandage and dressing done everyday till the inflammation / infection subsided.

Surgical

Surgical management given was one of the following types:

1. Repair of the wound with AC reformation
2. Repair of the wound with abscission of the uveal tissue and AC reformation.
3. Repair of the wound with reposition of the incarcerated uveal tissue and AC reformation.
4. Repair fo the wound with anterior vitrectomy
5. Repair of the wound with aspiration / extraction of lens
6. Evisceration / frill excision
7. Enucleation
8. Planned cataract extraction + / - IOL implantation on a later period.

Except for the last, in all other cases surgery was undertaken immediately.

Surgery was done under local anaesthesia in adults and general anaesthesia in children and also in few cases of evisceration in adults.

Repair of the wound was done in corneal tear + / - iris prolapsed, corneoscleral tear + / - prolapsed of the uveal tissue. In most of the cases, lens was injured and opaque. In some cases, lens was lacerated with lens matter protruding into the anterior chamber or there was sometimes, total extrusion of the lens.

In all cases, anterior chamber was formed by injecting air after repair of the wound.

V.SURGICAL PROCEDURES

Tears of Eye Lids

Full thickness lid tear was repaired immediately by using both catgut and mersilk sutures. After freshening of edges and getting accurate anatomical alignment and avoidance of any drag at the tear in the vertical axis, inner muscle layer was sutured by 6-0 catgut and skin with 6-0 mersilk.

Tears of conjunctiva

Conjunctiva after thoroughly cleaning with normal saline, irregular tags were trimmed with fine scissors. The wound was closed by either interrupted or continuous 6-0 mersilk or by 8-0 virgin silk.

Tears of Cornea

In all the cases where there were iris prolapsed abscission of the iris was done. In few cases where there were only incarceration of the iris in the wound the iris was reposed. The suturing of the corneal tear was done either by 8-0 virgin silk, 9-0 mono-filament or 10-0 nylon, taking special care to get proper alignment of the surfaces and not to exert any unnecessary pull. In most of the cases, interrupted sutures were used and in remaining cases continuous sutures were

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used. In order to co-apt the wound surfaces, 8-0 virgin silk suture was first inserted into the lower oblique flap. Several 8-0 virgin silk sutures were inserted at equal intervals. After tying, the knots were rotated away from the cornea and the knots of the polyester sutures guided into the needle track. Anterior chamber was reformed with air or sometimes with normal saline. After giving SC Gentamycin + Idisone, antibiotic and mydriatic drops were instilled into the eye and pad & bandage given.

Corneoscleral Wound

In cases of corneoscleral wound with prolapsed of the uveal tissue, abscission of the uveal tissue was done first after exploring the wound properly by undermining the conjunctiva further if necessary. The sclera wound was sutured, taking care that there is no uveal tissue incarceration in the wound. Sclera was sutured by 7-0 vicryl / chromic catgut/8-0 virgin silk. Interrupted sutures were passed through half of the sclera thickness 1 mm from each edge and 2-3 mm apart. Cornea was sutured as mentioned before and finally conjunctiva was sutured either by interrupted or continuous sutures using either 7-0 vicryl / 8-0 virgin silk. Where 8-0 virgin silk was used, the sutures were removed after 5 days post – operatively.

Anterior chamber was reformed either by air or normal saline.

Vitrectomy

In cases where there was vitreous prolapsed through a corneal or corneoscleral wound, vitrectomy was done. An anterior vitrectomy was done by sponge technique. Vitreous was lifted forward with a cotton swab and cut by a Devecker's scissors. Fluid vitreous was aspirated with a wide bore aspiration cannula. This process was continued until all vitreous from the anterior chamber was cleared. The vitreous was cut closed to the iris plane.

Special care was taken before suturing the wound that there was no vitreous incarcerated to the wound.

Evisceration

To ensure surgery on the correct eye, the patient's chart and surgical consent were reviewed before surgery. Under local anaesthesia (retrobulbar) and in few cases under G.A., an eyelid speculum (universal) is placed under the lids. A 360 deg. Peritomy is performed, undermining conjunctive and Tenon's capsule 5 mm posteriorly. A limbal incision is made into the anterior chamber with a blade breaker or a B – P knife and the cornea completely excised at the limbus with corneal scissors.

A cyclodialysis spatula is placed posterior to the iris, separating the ciliary body from the sclera, and the choroid is further separated from sclera. The spatula is exchanged for an evisceration scoop and the entire uveal tissue and other intraocular contents scooped out. Any remaining uveal pigment is removed by forceps or with a Gauze piece. Once haemostasis is obtained, the eye ball is irrigated with an antibiotic solution like Gentamycin. To facilitate closure, small triangles of sclera are excised at the 3 & 9'0 clock wound edges. The sclera is closed with 4-0/6-0 chromic catgut sutures, either interrupted or continuous. The conjunctiva is closed horizontally with interrupted or running 6-0 chromic catgut or 8-0 virgin silk.

Frill Excision

In cases where there was severe infection like panophthalmitis, a frill excision was done. After undermining the conjunctiva and Tenon's capsule and separating the E.O.M. insertions, most part of the sclera was excised leaving behind a small collar of it around the optic nerve.

Enucleation

The procedure was performed under L.A. or G.A. with the normal eye taped shut to prevent error in the surgical site. Like in evisceration, eye speculum is placed and a 360 deg conjunctival peritomy is performed, undermining conjunctiva and Tenon's capsule posteriorly. The four recti muscles are subsequently isolated with muscle hooks and secured at their distal ends with 5-0 mersiline sutures. These muscles are disinserted at the point of their sclera attachment, leaving a small stump of medial and lateral rectus muscle for traction.

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Enucleation scissors are passed down the lateral orbital wall while the traction sutures gently draw the globe forward; the position and size of the optic nerve are carefully assessed by palpation with the scissors tip. The scissors are then opened, with the nerve placed between the blades. The scissors tip is then moved posterior towards the orbital apex to obtain a longer segment of the optic nerve, and cut it. After removing the globe and ensuring haemostasis, an antibiotic solution is irrigated.

The Tenon's capsule is sutured in a purse-string manner with either 5-0 vicryl / chromic catgut suture. Similarly conjuncta is also sutured with either interrupted or continuous 7-0 vicryl / 8-0 virgin silk, horizontally.

VI.RESULTS & DISCUSSION

Different cases are mentioned and discussed of perforating Eye.

Table .1 Showing the Eye affected

Eye affected	No. of cases	Percentage
Right eye	41	54
Left eye	34	46
Both eye	Nil	Nil
Total	75	100

The table.1 shown in 54% of the cases right eyes have been affected, whereas in the remaining 46% of the cases only left eyes were involved. There were no bilateral cases of perforating injury, but there was one case of blast injury where in the fellow eye there were multiple foreign bodies in the conjunctive and cornea, without perforation. In most of the series conducted by others, there is a tendency for the left eye being injured more, especially where industrial injuries predominate. This may be due to the fact that majority of the population are right handed.

In the present series, both right and left eyes are almost equally involved. This may be due to the fact that 44% of the injuries in the present series have occurred in agricultural workers; and the industrial injuries are only 18%.

AETIOLOGICAL PATTERN

Table.2 Showing Aetiological Pattern

Aetiology	Duke-Elder (1972)	Roper Hall (1982)	Present No. of cases	Series %
Domestic	33.0%	30.0%	19	25%
Travel	19.1%	9.8%	4	6%
Sports	13.0%	11.2%	5	7%
Agriculture	--	15.0%	33	44%
Industry	30.5%	34.0%	14	18%

Table.2 shows the aetiology pattern in the different studies conducted. The present study shows that injuries due to agricultural operations account for 44% domestic injuries being second with 25% and the lowest in seen in travel with only 7%.

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Table .3 Showing Agent Causing Injuries

Agent	Khar	Roper Hall	Mathew Krishnan	Present No. of cases	Series %
Thron & twing	28%	34.4%	8.6%	13	17%
Flying sharp object	--	--	--	6	9%
Sharp instruments	--	--	17%	17	23%
Stone	--	--	14.4%	5	7%
Stick	--	--	30%	13	17%
Bull Gore	--	--	15%	8	10%
Others	--	--	--	13	17%

The table.3 shows that the different causating agents responsible for perforating injury. Obviously there are gross differences among the studies conducted in the developed countries and the under developed countries and developing countries like India, since a lot depend on the degree of urbanization and Industrialisation.

In the present study maximum number of injuries are due to sharp instruments which include iron rod, metal wire, needle, etc. Thorns and sticks come second with 17% each. Bull gore injuries were also common with 10%. Study by Mathew Krishnan showed 15% of Bull gore injury. In the present series, there was only a single case of injury with bow and arrow (at the time of 'Mahabaratha' T.V. Serial). There was also on case complete avulsion of the eye ball due to bear bite.

AGE INCIDENCE

Most of the studies conducted the world over show that the maximum number of perforating injuries occur in young adults. This is because they are more active in that age group and hence more vulnerable for perforating injury. Very rarely perforating injuries reported in old people above age of 70 years.

Table.4 Showing Age Incidence

Age in years	Present Cases	Series %
1-10	11	14.6%
11-20	8	10.6%
21-30	22	29.3%
31-40	12	16.0%
41-50	12	16.0%
51-60	10	13.0%

In the present study the youngest patient admitted was a 5 year old boy with bull gore injury and the oldest were few patients of 60 years aged.

In the present study also, incidence of perforating injury in children is quite high (14.6%).

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SEX INCIDENCE

Table.5 Showing Sex Incidence

Sex	Present Cases	Series %
Male	60	80%
Female	15	20%

The present study shows a slight increase in female patients (20%). This is due to the reason that in agricultural sector, female and male workers are almost equally represented; and that in this series, agricultural injuries accounts for 44%.

SITE OF INJURY

Table.6 Showing Site of Injury

Site	Present Cases	Series %
Cornea	53	70%
Sclera	2	4%
Cornea and sclera	20	27%
(Including 7 cases of rupture Globe)		

The maximum incidence of corneal injuries are due to the fact that the cornea is more exposed than other parts and also it is more delicate and hence more vulnerable for perforation, as shown in table.6.

CLINICAL FEATURES AND EFFECTS OF PERFORATING INJURY

Table.7 Showing Clinical Features and Effects of Perforating Injury

Lesion	Mrs. Mathew Krishnan Series	Present Cases	Series %
Uveal prolapsed	78.03%	45	60.0%
Lens	58.00%	35	47.0%
-Opacification	39.30%	20	26.0%
-Rupture	11.56%	13	17.3%
-Subluxation	6.9%	2	3.0%
Hyphaema	22.54%	20	26.0%
Vitreous haemorrhage	--	2	2.6%
Vitreous prolapse	6.3%	10	13.0%
Ruptured globe	20.8%	7	10.0%
Others (including infection)	27.16%	10	13.0%

The table shows a comparative study with that of Mathew Krishna Series (1988). Both the studies show certain similarities. Uveal prolapsed occurred in maximum number of cases followed by lens changes. Hyphaema occurred in almost same percentage of cases. The percentage of rupture globe in the present series is slightly less than that of other series.

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SURGERY UNDERTAKEN

Table.8 Showing Surgery Undertaken

	No. of cases	Percentage
<u>Immediate Surgery *</u>		
Wound repair	9	12.0%
Repair with abscission of uveal tissue	45	60.0%
Repair with lens aspiration / extraction	10	13.0%
Repair with reposition of incarcerated uveal tissue	4	5.3%
Repair with anterior vitrectomy	10	13.0%
Evisceration	9	12.0%
-Frill excision	2	2.6%
Enucleation	7	9.3%
<u>Delayed Surgery</u>		
Cataract extraction	23	30.0
a) With IOL		
- AC	3	4.0%
- PC	3	4.0%
b) Without IOL	17	22.6%

* Many cases overlap.

As shown in the table.8 depending on the nature of injury and the condition of the eye, surgical procedure was undertaken as an immediate step or done after some days as a planned surgery when the eye became white and quiet. In all cases of uveal prolapsed (60%) repair was done immediately with abscission of the uveal tissue. Destructive procedures like evisceration and enucleation were done in a total of 16 cases accounting for 21%. These were mainly badly ruptures globes, cases of endophthalmitis and panophthalmitis. In 7 cases, prosthesis were given. One case developed contracted socket.

Cataract surgery were undertaken in a total of 33 cases accounting for 44%. Out of this, in 13% of cases extraction / aspiration was done immediately and in 30% cases planned extraction was done after few days. In 6 cases (8%), IOL implantation was done of which 3 were AC IOL and 3 PC IOL. All cases of IOL implantation had relatively good final corrected visual acuity (6/60 - 6/9).

DEGREE OF VISUAL IMPAIRMENT

Table.9 Showing Degree of Visual Impairment following Perforating Injury

	No. of Cases	Percentage
Total loss of eye	16	21.0%
Loss of vision	4	5.3%
Vision less than 6/60	24	32.0%
Vision 6/60	12	16.0%
Vision 6/36 – 6/24	12	16.0%
Vision 6/18 – 6/12	4	5.3%
Vision better than 6/12	3	4.0%

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20 patients (26%) lost vision completely. Among them, 16 had lost the eye by undergoing destructive surgery. 24 cases (32%) had vision only less than 6/60. 31 cases (41%) had useful vision (6/60 and better). One young patient with sclera tear without prolapsed of uveal tissue had 6/6 vision, as mentioned in table.9.

LATE COMPLICATIONS AND SEQUELE

Table.10 Showing Late Complications and Sequele of Perforating Injuries

Complications	No. of Cases	Percentage
Epithelial ingrowth / fibrous tissue overgrowth	2	2.6%
Adherent Leucoma	15	20.0%
Anterior Staphyloma	3	4.0%
Retinal detachment	2	2.6%
Secondary glaucoma	6	8.0%
Post-traumatic non-infective uveitis	25	33.0%
Endophthalmitis	6	8.0%
Panophthalmitis	2	2.6%
Atrophic Bulbi	7	9.3%
Phthisis Bulbi	2	2.6%

The table.10 shows the percentage of complications following perforating injuries in the present series. Maximum number of cases (33%) developed post-traumatic non-infective uveitis, a few of these cases (8%) also developed secondary glaucoma. There were infection in 8 cases (10.6%), of these 5 cases had infection on admission and 3 cases developed following surgery. There were 2 cases of fungal endophthalmitis (Aspergillus), pseudomonas was cultured from one case and staph. Aureus from another one: 9.3% of cases went for atrophic bulbi after surgical repair and 2.6% cases developed phthisis bulbi. **There were no cases of sympathetic ophthalmitis in the present series.** There were 2 cases (2.6%) of retinal detachment, of which one underwent sclera bucking later. Retinal detachment Surgery was not done in the other as the eye had already become atrophic.

FINAL VISUAL OUTCOME IN RELATION TO NATURE AND SITE FO INJURY

Table.11 Showing Nature, Site of Injury & Visual Outcome

Site of Injury	No. of cases	Percentage	Visual outcome
Corneal tear	3	4.0	Satisfactory
Corneal tear + iris incarceration	6	8.0	Poor
Corneal tear + iris prolapsed	17	22.6	Satisfactory
Corneal tear + iris prolapsed + cataract	15	20.0	Satisfactory
Corneal tear + cataract	6	8.0	Satisfactory
Corneal tear + prolapse of the intraocular contents	2	2.6	Poor
Corneoscleral tear	2	2.6	Poor
Corneoscleral tear + prolapsed of uveal tissue	7	9.3	Bad
Sclera tear	1	1.3	Very Good
Sclera perforation+tr.cataract	1	1.3	Satisfactory
Tr. Cataract due to sharp object	12	16.0	Good
Infection	5	6.5	Bad
Rupture globe	7	9.3	Bad

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Good=6/36+; Satisfactory = 6/60; poor=less than 6/60; Bad=PL, PR & Less.

In general, eyes with corneoscleral tear with prolapsed of intraocular contents and also cases with rupture globe had bad visual prognosis. Eyes with infection also had bad visual outcome. Cases with traumatic cataract with a needle or thorn prick (barring few infected cases due to thorn prick) had good visual outcome. In these cases who underwent delayed cataract extraction had better vision. All the cases of IOL implantation had relatively good vision. In cases with corneal tear and iris prolapsed, vision was satisfactory. The best visual outcome (6/6) was noticed in a single case of sclera tear (without prolapsed of uveal tissue) due to bangle injury. In many cases of corneal tear and traumatic cataract, visual outcome could not be properly assessed because of the development of lens opacity. Most cases of central corneal tear, visual outcome were poor due to central leucomatous opacity.

OCULAR STRUCTURES INVOLVED

Table 12 showing ocular structures Involved

	Mukherjee, et al.	Present cases	Series %
Lids	31.8%	18	24.0%
Conjunctiva	46.3%	27	36.0%
Cornea	62.3%	53	70.0%
Cornea and sclera	29.2%	20	26.0%
Sclera	8.5%	2	2.6%
Iris	36.5%	38	50.6%
Ciliary body	24.4%	14	18.6%
Lens	56.1%	40	53.3%
Posterior segment damage	34.1%	23	30.6%

The Table 12 shows a comparative study with Mukherjee series (1984). There is a relative similarity between the two studies. In both the series, cornea was involved in most cases, followed by lens and then the conjunctiva. In the present series, corneal tear occurred in 70% of the cases followed by lens in 53.3% of cases, iris 50.6%. posterior segment damage occurred in 30.6% (as against 34.1% in Mukherjee series) and injury to lids and ocular adnexa occurred in 24% cases. Sclera was injured in 29.3% of cases. Involvement of sclera alone occurred in only 2 cases.

CORNEAL INJURY

Table 12 showing extent of Corneal Involvement in 75 cases of perforating injury.

	A.K.Mukherjee, et al (1984)		Present Series	
	Cases	%	Cases	%
2/3 diameter & more	8	10.6%	16	21.3%
Less than 2/3 & more than 1/2	18	24.0%	17	22.7%
1/2 diameter of cornea & less	49	65.4%	40	53.3%

In the present series, in two cases only sclera was involved.

Since cornea is more exposed to trauma, it is more vulnerable for external injury. As such, corneal injury was noticed in the maximum number of cases (70%). Where there was minimal corneal injury, visual prognosis was better. In 21.3% of cases, 2/3 diameter or more of the cornea was involved, and hence the visual prognosis was poor in those cases. In 22.7% of cases, the extent was less than 2/3 but more than 1/2 diameter. In 53.3% of cases, the extent of injury was 1/2 or less than 1/2 diameter. Most of the cases where the injury was due to needle / thorn prick, the prognosis was satisfactory and the cases of needle prick had better prognosis.

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The above table compares the present study with that of A.K.Mukherjee, et al. there is relatively good similarity between the two studies.

The aim of the study is to evaluate the incidence, etiology and causating agents, clinical features and effects, complications, management, degree of visual impairment and the general prognosis of perforating injury.

In all the cases, a minimum period of two months follow-up was done. Out of the total 110 cases of perforating injury during the same period, only 75 cases were included in the present series as the remaining cases were either lost in the follow-up or they never turned-up at all for follow-up.

VII.CONCLUSION

The following conclusions are observed from the present study:

1. The general incidence of perforating injury is relatively high in this area, similar to other rural places in India; but less than that of the western countries.
2. Cases of intraocular foreign body in this area is much less. All the four cases of IOFB, referred to Bangalore, gave history of using hammer and chisel.
3. Right eye and left eye were almost involved, right being slightly more than the left. No case of bilateral involvement was seen.
4. Males were affected four times more than the females.
5. Maximum incidence was noticed among young adults in the age group of 11-30 years (50%) with a peak incidence in the age group of 21-30 years (29.3%).
6. The most single causating agent was thorn.
7. Cornea was involved in the maximum number of cases (70%). There were 13% cases of ruptured globe.
8. Most common clinical presentation was prolapsed of the uveal tissue.
9. Lens was involved in 47% of cases.
10. In 60% of the cases, surgical repair of the wound with abscission of the uveal tissue were undertaken and in 30% cases, cataract extraction was done.
11. Immediate surgical intervention was necessary in 70% of cases, delayed surgery was done in the remaining 30% of cases.
12. 26.3% of eyes became blind either by extensive trauma or by the complications following perforating injury.
13. Bull gore injury is relatively high in this area and all the cases of bull gore injury, invariably lost vision in the injured eye.
14. Whip lash injury has got a relatively poor visual prognosis.
15. 41% cases had useful vision of 6/60 or better.
16. Visual prognosis in children is relatively poor.
17. Corneoscleral tear with or without uveal prolapsed had poor visual prognosis.
18. Patients who underwent IOL implantation had satisfactory visual prognosis.
19. Patients who had prior treatment elsewhere with indigenous medicines before coming to the hospital had poor visual prognosis.
20. Patients who were brought immediately to the hospital had relatively better prognosis.
21. Incised wounds had better visual prognosis than lacerated wounds.
22. The degree of visual impairment is relatively proportional to the severity of the initial injury.
23. Eyes with initial good visual acuity had a far better visual outcome.
24. Specific type of injury is a more important prognostic factor than age itself.

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