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Original Research Article

Study of B-Scan in Ocular Trauma

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Abstract: Ocular trauma is one of the leading causes of blindness in our environment. Serious ocular injury on the other hand gives rise to irreversible structural damage or functional loss.The application of more sophisticated diagnostic methods, new surgical techniques and new rehabilitation procedures, it is possible to achieve vision retention in many traumatized eyes.Ultrasonography permits accurate localization of foreign body as well. In case of dislocated lens, B-scan USG could graphically demonstrate the posterior of lens & associated abnormalities. Dislocation of lens into opaque media is a perfect indication for ultrasound. Standardized B method or B scan (brightness modulation) is the most frequently used method in ophthalmology, which gives which gives a two dimensional presentation of the ultrasound finding of eye and orbit. The B-scan ultrasonography makes a pictorial presentation of the cross-section of eye. It is a simple and quick method of imaging.
Keywords:B-scan, Ultrasonography, Globe, Imaging.

INTRODUCTION

Ocular trauma is one of the leading causes of blindness in our environment [1]. Serious ocular injury on the other hand gives rise to irreversible structural damage or functional loss. For the afflicted individual, this can impose an enduring burden often throughout the most productive years of life [2]. The availability of current epidemiological data is indispensable if we are to identify the prevailing causes and patterns of serious ocular injury and above all to devise effective strategies for their prevention [3]. The application of more sophisticated diagnostic methods, new surgical techniques and new rehabilitation procedures, it is possible to achieve vision retention in many traumatized eyes[4]. The clinical use of ophthalmic ultrasound has increased dramatically over the past twenty years and has presently reached the point where it is universally regarded as an essential means of soft tissue examination of the eye and orbit [5].Ultrasonography permits accurate localization of foreign body as well. In case of dislocated lens, B- scan USG could graphically demonstrate the posterior of lens & associated abnormalities. Dislocation of lens into opaque media is a perfect indication for ultrasound [6]. Standardized B method or B scan (brightness modulation) is the most frequently used method in ophthalmology, which gives a two dimensional presentation of the ultrasound finding of eye and orbit [7].Ultrasound bio microscopy (UBM) allows a detailed imaging of the anterior segment up to 5 mm depth by using high-frequency (50–100 MHz) transducers [8]. The B-scan can image through severely swollen lids, corneal opacities, vitreous opacities, uveitis, and persistent pupillary membrane. In such cases, diagnostic B-scan ultrasound can accurately image the lens, vitreous, retina, choroid, and sclera providing valuable clues as to their status. The B-scan ultrasonography makes a pictorial presentation of the cross-section of eye. It is a simple and quick method of imaging with no known adverse effect like that of CT or MRI.

MATERIAL AND METHODS

This is a study of 100 cases of ocular trauma by B-Scan and was conducted in the Department of Ophthalmology, Gajra Raja Medical College and associated J.A. Hospital, Gwalior in close association with Department of Radiology, Gajra Raja Medical College, Gwalior, from Sept. 2014 to Sept. 2015. High resolution, Grey scale, Real time Image of the eye was done with Network Ultrasonography machine using high frequency (5MHz) electronic probe. The study was done to understand various posterior segment pathologies of the eye due to ocular trauma. A total of 100 cases were included in the study.

The criteria for the selection of cases were.

1. Any case of blunt ocular trauma.
2. Any case of penetrating or perforating ocular trauma with or without intraocular foreign body.

The machine used had following specification:-

Real time- Refers to the non- stored character of the displayed image.Spontaneous movements and after movements can be appreciated on the screen when the patient moves his eye.

Grey scale – Refer to the intensity modulation of echoes scan on the screen. A strong reflection appears white and weak echoes are shades of grey. Depending on their strength. The instrument also has a sensitivity control which permits relative quantification of displayed echoes.

The Probe - 5 MHz probe was used.

Method of Examination

All the patients were thoroughly examined in the hospital including recording visual acuity, torch light examination assisted by slit lamp, direct and indirect ophthalmoscopy and intraocular pressure both digital and with Schiotz tonometer.The patients with open globe injury were sent for B-Scan after repair of the wound with proper aseptic precautions. Examination was done by contact method. The rectangular contact portion of the probe was held perpendicular to the closed lids. The probe was first kept horizontally with the marker directed nasally. The image was visualized on the screen. Then the patient was asked to move his eyes to the left and right keeping the probe static. Then the probe was kept in the vertical meridian with the marker directed towards the brow and telling the patients to move his eyes up and down. Any lesion was detected for size, shape, location, relation to optic disc, mobility, and after movements.

The displayed image was frozen on the screen and printouts were taken on the paper. The printouts were subsequently photographed. The photographs were useful only for documentation. Diagnosis was based on the real time display.

Classifying injuries

Injuries were classified according to the classification of mechanical injuries suggested by the Ocular trauma

Classification group in 1997

The wounds were classified into two broad classes:

(1) Open globe
(2) Closed globe.

OBSERVATION

The table-1 shows the distribution of cases according to sex of the patient 82% of the cases was males & 18% cases were females. The male: female ratio was found to be 4.5: 1.

The table-2 shows that 84% cases were in less than forty years of age group out of which 41 were males and 18 were females. 47% of the cases were between 21- 40 yrs. of age group.

The table-3 shows 44% patients were open globe injury & 56% of cases were of closed globe injury. Ratio between closed globe injury & open globe injury was 1.27:1.

The table-4 shows Among the 44 cases of open globe injuries, 59% cases were of penetrating type & 31.8% cases were of ruptures.

Table1: Distribution of Cases According To Sex of the Patients

Sex	No. of cases	Percentage
MALE	82	82%
FEMALE	18	18%
TOTAL	**100**	**100%**

Table 2: Distribution of cases according to the age and sex of the patients

Age group	Male	Female	Total
0-10	12	5	18
11-20	14	4	18
21-30	25	5	30
31-40	15	4	19
41-50	2	3	5
51-60	5	0	5
61-70	4	0	4
71-80	1	0	1
Total	**82**	**18**	**100**

Table 3: Distribution of cases according to the class of injury

Class of Injury	Number of cases
Closed globe injury	56
Open globed injury	44
Total	**100**

Table4: **Distribution of cases according of type of injuryOpen Globe Injury**

Type	No. of cases	Percentage (%)
Penetrating	26	59.0
Rupture	14	31.8
Intraocular foreign body	2	4.5
Perforating	2	4.5
Total	**44**	**100**

The table-5 shows among the 56 cases of closed globe injuries, maximum were of contusion type i.e. 69.6% & 21.4 % were of superficial foreign body types.

The table-6 shows 6 cases with relative afferent papillary defect were noted, 4 with closed globe injuries and 2 with open injuries.

The table-7 shows domestic nature of injury is most common and found to be 43%. 20% of occupational nature injury is common in open globe injury.

Table-5: Distribution of cases of Closed Globe Injury

Type	No. Of cases	Percentage(%)
Contusion	39	69.6
Superficial foreign body	12	21.4
Lamellar laceration	5	8.9
Total	**56**	**100**

Table-6: **Distribution of cases according to presence of relative afferent pupillary defect**

Class of injury	No. of cases	Percentage (%)
Open	2	33.3
Closed	4	66.6
Total	**6**	**100**

Table7: Distribution of cases according to nature of injury

	Domestic	Occupational	Others	Total
Closed globe injury	43	9	4	56
Open globe injury	18	20	6	44
Total	**61**	**29**	**10**	**100**

Table 8: Distribution of Cases as Per B-Scan Findings

Type Of Injury	Traumatic Cataract	Posterior Dislocated Lens	Sub-luxated lens	Vitreous Haemo-rrhage	FB	PVD	RD	Posterior Scleral Rupture	Endoph-thalmitis	Vitritis	Dis-organized globe	Pthisis Bulbi	Normal
Open globe injury													
Penetrating	12	0	0	5	0	0	1	0	4	0	0	0	5
Perforating	0	0	0	0	0	0	0	0	0	0	0	0	0
Rupture	5	2	0	5	0	1	1	0	0	0	3	1	3
IOFB	0	0	0	0	2	0	0	0	0	0	0	0	0
Closed globe injury													
Contusion	20	1	0	10	0	5	2	0	0	0	0	0	8
EOFB	0	0	0	0	0	0	0	0	0	0	0	0	5
LL	1	0	0	0	0	0	0	0	0	0	0	0	4
Total	**38**	**3**	**0**	**20**	**2**	**6**	**5**	**0**	**4**	**0**	**3**	**1**	**32**

DISCUSSION

Our study of 100 cases of ocular trauma showed a definitive male preponderance (82%) 37. This may be because males are more involved in outdoor activities, Games etc. The male: female ration was found to be 4.5:1.

In our study 84% cases were less than 40 yrs; of Age & belonged to the age group of 21-40 yrs. High predominance of ocular trauma between 21-40 yrs.; may be because of the fact that this is the age of highest activity. 18% of the patients were less than ten yrs. Old, 26% of the patients were less than 15 yrs. of age On the other hand closed globe injury, in our observation was more common (56%) than open globe injuries (44%). The closed globe injuries were 1.27 times more common than open globe injuries on an overall basis. Regarding the type of injuries, in the open globe group, penetrating injury was the most common, followed by rupture (59% & 31.8% respectively). Contusion was found to be the most common type of closed globe injury (69.6%). This is may be because of the fact that in open globe injury there occurs more mechanical devastation, infection, chemical effects of foreign bodies & their thermal energies also may play a role. Prognosis in open globe injuries seemed to be worse. In our study, 61% cases were of domestic injuries & 29% were occupational with a ratio of 2.1:1. Probably the force involved & the nature of objects were responsible for it. Conversely domestic injuries were 4.8 times more common than occupational injuries to cause closed globe injuries.

Relative afferent papillary defect was diagnosed in 6% of cases. We found that 83.3 % the patients with relative afferent papillary detect had grade 4 or worse vision and 33.33 % had grade 5 vision. 66.6 % cases of relative afferent papillary defect were associated with closed globe injuries 33.3 % with open globe injuries, with a ratio of 2:1. Traumatic cataract was the most common finding. In our study Closed globe injury was the most common cause of traumatic cataract (55.2%). In our study 52.6% of contusion injuries had traumatic cataract followed by penetrating injuries (31.5%) among open globe injury. We found posterior dislocated lens in 3% cases. All the cases were due to blunt injuries (66.6% cases in ruptures & 33.3% in contusion.).In our B-Scan study, vitreous haemorrhage was the most common posterior segment finding and it is found to be 20%. We found contusion was the most common cause of vitreous haemorrhage (50%) closely followed by rupture (25%) and penetrating injury. Total 50% cases of vitreous haemorrhages were found in open globe injuries. But blunt forces (including rupture) were responsible for majority of cases vitreous haemorrhage. Retinal detachment had high association with vitreous haemorrhage & in 80% cases of detachments; vitreous haemorrhage was an associated finding. Retinal detachment had high associated with vitreous haemorrhage. Intraocular foreign bodies could be identified in 2% cases. In these two cases the foreign body (a thorn and a piece of pencil lead respectively) was visible in the anterior chamber from outside & B-Scan was not needed to diagnose it. Cornea was the most common site entry in our cases in one case of perforating injuries, due to gunshots, there were entry wounds visible anteriorly. B-Scan showed total disorganization of all intraocular details .We found that 5% of our series had retinal detachment 80% of the detachments were associated with closed globe injuries.

Blunt trauma (including ruptures) was responsible for majority (80%) cases of retinal detachments in our observation. In our series endophthalmitis was found in 15.3 % of the penetrating injuries. Total 3% of cases had disorganization of globe in all cases of rupture where there was expulsion of intraocular contents.

CONCLUSION

Most victims of ocular trauma are young males of less than 40 years of age. Closed globe injuries are more common than open globe injuries in our common day to day life. Occurrence of the different posterior segment pathologies in B-Scan Were: Traumatic Cataract: 38%, Vitreous hemorrhage: 20%, IOFB: 2%, Posterior dislocated lens: 3%, Posterir Viterous Detachment: 6%, Retinal Detachment: 5%, Posttraumatic endophthalmitis: 4%, Disorganised globe: 3%, Phthisis bulbi: 1%.In ocular trauma lens & vitreous are highly susceptible to damage. Traumatic cataract was the most common diagnosis followed by vitreous haemorrhage in ocular trauma in almost all cases of open globe injuries, there is some pathology in the posterior segment. Contusion injuries are the most common cause traumatic cataract. Presence of vitreous hemorrhage after ocular trauma carries higher risk of other serious damages to the posterior segment & a poorer prognosis. Retinal detachment most commonly found in closed globe injury.

Traumatic retinal detachment carried a poor prognosis especially in open globe injuries. Untreated penetrating injury in rural set up with delayed referral carries a high risk of post traumatic endophthalmitis as seen in of our four cases.

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