ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

CLINICO-EPIDEMIOLOGIC PROFILE OF PATIENTS PRESENTING WITH PERIOCULAR AND/OR ORBITAL TRAUMA TO A TERTIARY CARE CENTRE

Talvir Sidhu[1*], Mohit Goyal[2]

[1]Assistant Professor, Department of Ophthalmology, Government medical college, Patiala, Punjab -147001

[2]Senior Resident, Department of Ophthalmology, Government medical college, Patiala, Punjab -147001

***Corresponding author:**

Dr Talvir Sidhu, Assistant Professor, Department of Ophthalmology, Government medical college, Patiala, Punjab -147001

Email: talviraiims@gmail.com

ORCID ID: https://orcid.org/0000-0003-4281-3213

Abstract

Objectives: To study the overall clinic-epidemiologic profile of orbital and/or periocular injuries and their important causes in various age groups in patients presenting to a tertiary care centre.

Study design and Methods: Prospective observational study. Consecutive patients of all age groups with periorbital or orbital trauma both blunt and penetrating were included. Minor cuts and abrasions not requiring primary repair, thermal and chemical injuries and patients not willing for consent were excluded. A detailed history regarding the mode, type, place of injury was taken. Visual acuity and detailed ocular examination was done to look for associated ocular injuries.

Results: Out of 118 patients, 86% were males. Significant difference was found except in children ≤5 years where no predominance was found. Most common place of injury in children <18years was at home (61%), and in all children ≤5 years, the place of injury was at home. In patients above 18years most common place of injury was outdoors (46%). Most common mode of injury in <18 years was road traffic accidents, followed by falls. Most common in <5 year children was blouse hook injury in 39%, fall in 28%, dog bite in 17%. 5-18 years- RTA in 42%, wooden stick in 21%, fall in 17%. <5 years- most common type of injury was canalicular injury in 67% (most commonly due to blouse hook fastener), lid laceration in 22%. 5-18 years- most common injury was traumatic optic neuropathy in 33%, fracture orbit in 29%, lid laceration in 20%. >18 years- lid laceration was most common injury in 30%, fracture orbit in 29%, traumatic optic neuropathy in 22%. Associated ocular injury- Seen in 11% cases.

Conclusions: Majority of patients who get periocular or orbital injuries were males except in patients less than 5 years. Canalicular injury by blouse hook was most common in children less than 5 years of age. Blouse hook injury is found to be a major avoidable cause of injury in less than 5-year-old children, followed by falls and dog-bite injury. Blouse hook injury is peculiar to Indian scenario. Most of the injuries in children occur at home. Road traffic accidents are a major cause of trauma in adolescents and adults. Traumatic optic neuropathy was common in adolescents whereas lid laceration and fracture orbit were most common in adults.

Keywords: periocular, orbital injuries, RTA, children

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

1. Introduction

Trauma continues to be a major threat to public health. Orbit and adnexal trauma occur in a significant number of patients presenting to eye emergency, worldwide. Orbital and peri-orbital trauma not only results in cosmetic disfigurement, but also it is a cause of significant morbidity, psychological impact, cost to health care, missed work days and challenge to medical practitioners. Due to poor regulation of traffic rules, negligence over use of protective devices during transport and in work area, more population is exposed to trauma prone situations in developing nations. Also young, working-class male population is particularly at risk. Trauma to the eye, eyelids, orbit and facial bones can occur due to many causes- blunt or penetrating. Motor vehicle accidents are the cause in many patients. Penetrating trauma to the periocular structures can be due to bullet wounds, stab wounds, arrow wounds and many other sharp and blunt objects.

Various studies have investigated the incidence of eye injuries related to trauma, mostly focusing upon the injury to the globe. Not many studies have been conducted to look for the profile of orbital/peri-orbital trauma, which forms a major part of eye related injuries. The current studies available on orbital/peri-orbital trauma are mostly retrospective or focus on specific entities such as fractures or eyelid lacerations. One of the studies investigated the late onset complications of periorbital trauma in children in India [16]. These limitations prompted us to undertake this study.

This aims to study the overall clinic-epidemiologic profile of orbital and/or periorbital injuries and important causes of periorbital/orbital injuries in various age groups to Dr. Rajendra Prasad Centre.

2. Methods

In a prospective observational study, consecutive patients of all age groups, presenting to Dr. Rajendra Prasad Centre for Ophthalmic Sciences (a tertiary eye care centre), with periorbital or orbital trauma both blunt and penetrating injury requiring primary repair over 6 months were analysed. Patients having minor cuts and abrasions not requiring primary repair, thermal and chemical injuries were excluded.

A detailed demographic history and history about the type, mode, source and place of injury was noted. Any history of previous treatment obtained, time period between injury and presentation, cause of delay was documented. Associated symptoms like loss of consciousness, vision loss, epistaxis, diplopia, trismus was also documented. Visual acuity of patients was taken using a retro-illuminated Snellen visual acuity chart at six metres. In patients with vision less than 1/60, finger counting, hand movements and perception of light along with projection of rays was assessed. Vital signs were measured like pulse rate, blood pressure, respiratory rate, temperature. A detailed examination of the eyelid and adnexa was carried out to look for any abnormalities. Extraocular motility and relative position of eyes was checked. Exophthalmometry and diplopia charting was done in relevant cases. Detailed examination of each eye was done using slit lamp examination for anterior segment, lens status, intraocular pressure (wherever possible) and dilated fundoscopy was done cases with 90D lens. A clinical photograph was taken after consent.

The study was conducted after approval from Institutional Ethics Committee (Ref. No. IESC/T-304/02.08.2013) and adheres to the tenets of Declaration of Helsinki. Data were collected after written informed consent from parents.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

3. Results

A total of 118 patients were enrolled into the study. 102 patients were males and 16 patients were females. A group analysis was performed on patients less than 18 and more than 18 years. Further a sub-group analysis was also performed on children less than 5 years and 5 to 18 years. There were 75(63.6%) patients in the age group more than 18 years, out of which 68 were males and 7 were females. There was a total of 43(36.4%) patients in age group less than 18 years, out of which 34 were males and 9 were females. In the subgroup analysis, there were 19(16.1%) children aged less 5 years, out of which 11 were males and 8 were females. There were 24(20.3%) patients aged 5 to 18 years, out of which 22 were males and 2 were females.

The mode of injury was varied among various age groups. (Table 1) Monocular injury was seen in 114 cases out of 118, binocular injury was noted in 4 cases. All cases of binocular injury were more than 18 years of age. All children less than 5 years of age got injured at home while patients above 5 years of age mostly got injured outdoors. (Table 1) It was observed that blunt injury occurred in 109 patients and rest 9 had penetrating injury. Eyelid laceration (Figure 1) was the most common in 32 patients, followed by fracture orbit in 30 patients, traumatic optic neuropathy in 25 patients, canalicular injury in 24 patients, 3rd cranial nerve palsy in 3 patients, orbital hematoma in 2 patients and orbital foreign body in 2 patients. (Table 2, Figure 2) All cases of eyelid laceration and canalicular injury were repaired in emergency setting. 10 cases out of 30 of orbital fractures were offered floor repair in elective setting.

Table 1: Demographics, mode and place of Injury in patients with periocular/ orbital trauma.

	≤ 5 years (19 cases)	**6 to 18 years (24 cases)**	**>18 years (75 cases)**
Mean Age	**2.5± 1.3**	**14±3.7**	**30.7 ±10.5**
Male: Female	**11:8**	**22:2**	**68:7**
Type of Injury	**≤ 5 years (19 cases)**	**6 to 18 years (24 cases)**	**>18 years (75 cases)**
Blunt	16(84.2%)	23(95.8%)	71(94.7%)
Penetrating	3(15.8%)	1(4.2%)	4(5.3%)
Mode of Injury	**≤ 5 years (19 cases)**	**6 to 18 years (24 cases)**	**>18 years (75 cases)**
Assault			5(6.7%)
Ball			3(4%)
Blade			1(1.3%)
Blouse-hook	7(36.8%)		
Brick		1(4.1%)	
Dog bite	3(15.8%)		
Door handle		1(4.1%)	
Fall	6(31.6%)	4(16.7%)	11(14.7%)
Fist		2(8.3%)	1(1.3%)
Horn		1(4.1%)	1(1.3%)
Glass	1(5.2%)		1(1.3%)
Iron rod	1(5.2%)		4(5.3%)
Road traffic accident		10(41.7%)	42(56%)
Wire	1(5.2%)		1(1.3%)
Wooden stick		5(20.8%)	5(6.7%)
Place of injury	**≤ 5 years**	**6 to 18 years**	**>18 years**

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

	(19 cases)	(24 cases)	(75 cases)
Ground		3(4%)	6(8%)
Home	19(100%)	8(33.3%)	15(20%)
Outdoor		11(45.8%)	46(61.3%)
Work		2(8.3%)	8(10.7%)

Figure 1: Eyelid lacerations with canalicular involvement due to blouse hook and fall.

In 30 orbital fractures, floor fracture was seen in 13 (14.3%) cases, medial wall in 9 (30%) cases, and lateral wall in 5 (16%) cases and roof in 3 (10%) cases. Enophthalmos was seen in 22 cases. 18 (60%) cases had orbital rim irregularity. 11 patients of orbital fracture had traumatic optic neuropathy also. Associated facial fractures were seen in 4 cases. Associated bleeding brain was seen in two, optic canal fracture with extradural haemorrhage was seen in one person and occipital lobe bleed in one person.

25 patients had isolated traumatic optic neuropathy. 5 cases had a history of use of pulse steroids; visual recovery was seen in 1 case. 3 cases of post traumatic third cranial nerve palsy were medically managed.

Table 2: Disease frequency and associated causes of Periocular/orbital trauma.

Diagnosis	**Overall 118 cases**	**≤ 5 years (19 cases)**	**6 to 18 years (24 cases)**	**>18 years (75 cases)**
Canalicular injury	**24(20.3%)**	**13(68.4%)**	**2(8.3%)**	**9(12%)**
		Blouse Hook- 7 Fall- 2 Dog bite- 2 Wire-1 Iron rod-1	Wooden stick-1 Door handle-1	RTA- 3 Wooden Stick-2 Fall-2 Assault-1 Ball-1
Lid lacerations	**32(27.1%)**	**4(21%)**	**5(20.8%)**	**23(30.7%)**
		Fall-2	Wooden stick-3	**RTA-10**

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

		Dog bite-1 Glass-1	RTA-1 Horn-1	Fall-4 Iron rod -2 Assault-2 Wooden Stick-2 Blade-1 Fist-1 Glass-1
Fracture orbit	**30(25.4%)**	**1(5.2%)**	**7(29.2%)**	**22(29.3%)**
		Fall-1	RTA-3 Fall-2 Fist-1 Wooden stick-1	**RTA-17** Fall-2 Iron Rod-2 Horn-1
Traumatic Optic neuropathy	**25(21.9%)**		**8(33.3%)**	**18(22.6%)**
			RTA-5 Fall-1 Fist-1 Brick-1	**RTA-11** Fall-2 Ball-2 Assault-2 Wooden Stick-1
3rd cranial nerve palsy	**3(2.5%)**		**1(4.2%)**	**2(2.6%)**
			Fall-1	RTA-1 Fall-1
Orbital hematoma	**2(1.7%)**	**1(5.2%)**	**1(4.3%)**	
		Fall-1	RTA-1	
Orbital foreign body	**2(1.7%)**			**1(2.6%)**
				Wire-1

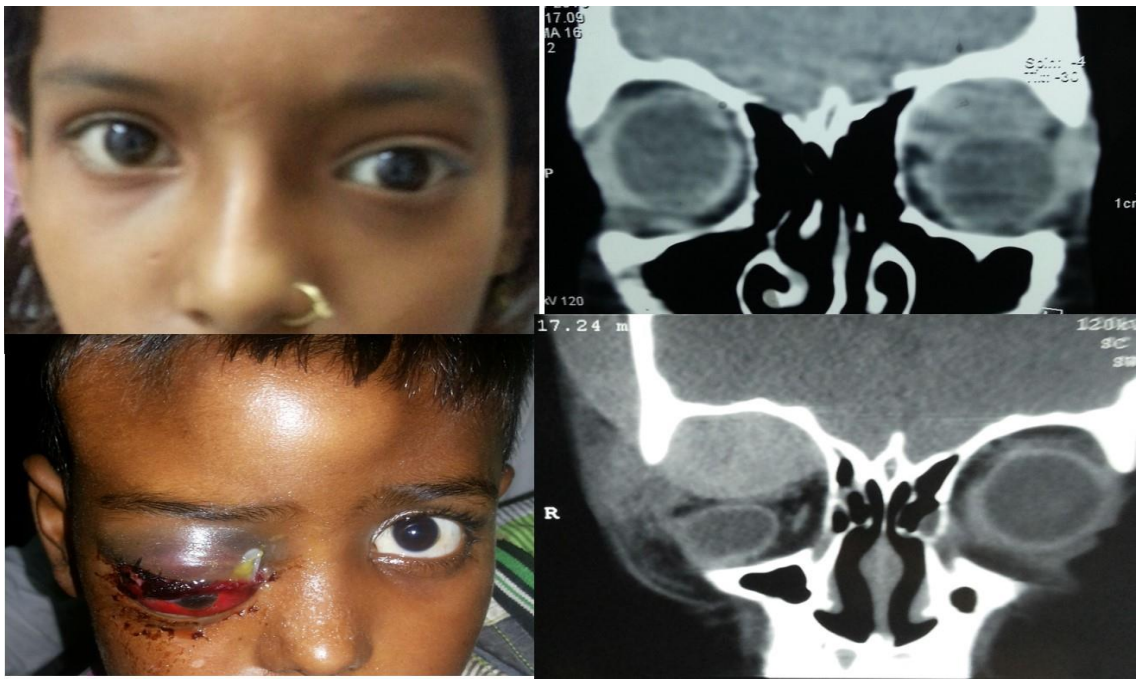

Figure 2: Orbital hematoma in children above- 9 years; below 5 years of age.

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

Table 3: Mean visual acuity- LogMar according to diagnosis

Diagnosis	**Mean visual acuity- LogMar**
Fracture orbit	0.757±0.31
Canalicular injury	0.106 ± 0.09
Lid laceration	0.604 ± 0.23
Traumatic optic neuropathy	2.22 ±0.72

Visual Acuity

56(47.4%) patients had visual acuity better than or equal to 6/18 in the injured eye at presentation. 8(6.7%) patients had visual acuity from 6/24 to 6/60. 20(17%) patients had visual acuity from 6/60 to perception of light. Another 20(17%) patients had no perception of light in injured eye. Mean visual acuity associated with various diseases is given in Table 3.

Associated Injuries

13/30 patients of orbital fractures, 3/3 cases of cranial nerve palsy had extraocular motility restriction. 14/30 cases of orbital fracture and 12/32 cases of eyelid laceration had ecchymosis. Periorbital sensory deficit was present in 7/30 cases of fracture orbit. Traumatic cataract was present in one case and hyphema was present in 2 cases.

On fundoscopy, optic nerve head pallor was present in 28 cases, choroidal rupture in 3 cases, vitreous haemorrhage in 6 cases and retinal detachment in 4 cases. 1 person had associated scleral perforation and 2 had globe rupture.

It was observed that a total of 42 patients suffered loss of consciousness of variable degree following the injury. 32 patients had loss of consciousness due to road traffic accident, followed by fall in 5 patients, assault in 2 patients. Out of 42, 2 were under 5 year age, 10 were 5 to 18 years and 30 were above 18 years of age. Further it was also noted that 14 patients had traumatic optic neuropathy, 9 had traumatic optic neuropathy associated with orbital fracture, 8 had isolated orbital fracture, 10 had lid laceration and 1 had 3rd cranial nerve palsy.

4. Discussion

Periorbital/orbital trauma is a potential preventable cause of ocular morbidity. The present study was conducted at a tertiary care centre located in an urban setting in India. Our results support the previous studies that have been conducted on orbital/periocular trauma.

Periocular/orbital trauma is frequently seen in all age groups. Majority of patients belong to 15-45 years age group. Mean age at presentation in our study was 23.3 years; median age was 23 years. Vats S et al reported mean age of trauma as 24.8 years in Delhi based slum population.[1] Alvi et al. studied the facial fractures and concomitant injuries in trauma patients, also reported the mean age at presentation as 35.4 years.[2] There were 19(16%) children aged less than 5 years. Therefore, the working-class population is more affected by trauma due to various possible reasons such as exposure during travelling, at work place and risk-taking behaviour. Males were predominantly affected in 86.4%. Alvi et al. also reported male predominance of 87.4% in their study.[2] Male predominance is due to more risk taking behaviour and exposure to trauma prone situations. The male: female ratio dramatically reduces in children less than 5 years to 1.35:1, as male and female population under 5 years is almost equally exposed to trauma at home and outside.

Blunt injury was seen in more than 90% of periocular[3] or orbital trauma in our study in all age groups. Vats et al. also reported blunt trauma as the most common cause of eye injury in

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

41% patients.[1] This rise in percentage of blunt trauma in our study is likely due to exclusion of thermal and chemical burn injuries. Guly et al. studied ocular injuries in major trauma patients and found blunt trauma to be responsible in 96% cases.[4] Herzum et al. studied patients given surgical treatment for eyelid injuries and found that 77.7% had blunt trauma.[5] Also sharp objects usually cause open globe injuries without traumatizing the adnexa.

In children less than 5 years, blouse hook injury was the most common cause of injury followed by falls and dog bite injuries. Blouse hook injury is peculiar to Indian scenario. It affects breast feeding infants. Naik et al. reported blouse hook injury in 5 breast feeding children. Falls and dog bite injuries are also fairly common in children.[6] Children have been reported to ingest or inhale in ingestion or inhalation of such foreign bodies.[7] Pushker et al. reported fall and assault to be major cause of periorbital deformities in children less than 10 years.[8] Other causes of injury have also been identified such as assault, stone, brick, wire, rod, wooden stick, horn, door handle etc. Savar et al compaired canalicular involvement in eyelid lacerations by dog bite and other causes. He found that dog bites cause canalicular injury in 66% in the dog bite group and 37% in the control group ($p<0.01$).[9]

Most common place of injury was outdoors in patients above 5 years of age, while home injury was most common in age below 5 years. Pushker et al. reported home or playground or school as most common place of injury in children less than 10 years.[8] Work related injury was found only in 8.4% of cases. Playground injury was found in 7.6% of cases only. Vats et al. reported the majority of ocular trauma occurs at home or work place.[1] This difference could exist between ocular and periorbital trauma.

Road traffic accident was found to be the major cause of injury overall followed by fall in patients above 5 years of age. Vats et al. also reported accidents to be the major cause of injury in 86% cases.[1] Guly et al. reports majority of injuries in 57.3% occur due to RTA.[4] An increased prevalence of two wheel drive in India and poor use of protective devices can also be accounted for the above. Poon et al. found 16% of the major trauma cohort had ocular or orbital trauma.[10] Analysis of the major trauma cohort showed that motor vehicle drivers, orbital and base of skull fractures, eyelid lacerations, and superficial eye injuries were strongly associated with vision-threatening injury.

Sonali Nagpure et al. studied orbital floor fractures and found most common cause was road traffic accidents 53% followed by assault and non-violent trauma 21%, sport injuries and injuries related work place 13% each. Rosado et a reviewed orbital fractures and found motor vehicle accidents (29.6%) were most common cause, followed by falls (27.4%).[11] The epidemiological data regarding aetiological factors of orbital floor fracture basically comprises of RTA which is a potentially preventable cause. Thus by proper preventive measures and road safety precautions the incidence and morbidity associated with orbital floor fracture can be significantly reduced. In our study, floor fracture was most common, followed by medial wall, roof fracture was least common. Hwang et al. reported the floor fractures as most common isolated orbital fracture.[12] Rosado et al. retrospectively reviewed the orbital fractures and found that most frequent sequelae were infraorbital nerve hypoesthesia (24.5%), enophthalmos (3.8%), and diplopia (2.2%).[11]

This is important, as optic nerve injuries carry a poor visual prognosis; one third of patients in the International Optic Nerve Trauma Study had a final visual acuity of hand movements or worse in the affected eye [33]. Visual acuity of better than 6/24 was associated with eyelid and canalicular lacerations.

We observed that in patients above 5 years of age, the pattern of injury was similar; only children less than 5 years had a different pattern and causes of trauma. Patients above 5 years of age had eyelid lacerations and fracture orbit were common, followed by TON and canalicular injury; whereas in patients less than 5 years, canalicular injury was most common form of periorbital trauma, followed by eyelid laceration. TON was not reported in our series

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 6, 2023

in children less than 5 years. Various studies on TON have reported it in children above 5 years[13]; only 3 out of 50 children were less than 5 years in a series from All India Institute of Medical Sciences.[14] A less incidence could be one reason and association with severe head trauma and primary presentation to neurosurgery department could be another.

The major strengths of the study were a large sample size, involvement of all age group patients; enrolment of subsequent patients which gave us some insight into the actual trend of periorbital trauma. The shortcoming of the study was the incomparability of the groups due to different number of patients in different age groups.

In conclusion, our study has demonstrated that periorbital/orbital trauma is fairly common in all age groups.

5. References

1. Vats S, Murthy GVS, Chandra M, et al. Epidemiological study of ocular trauma in an urban slum population in Delhi, India. Indian J Ophthalmol 2008;56:313–316.
2. Alvi A, Doherty T, Lewen G. Facial fractures and concomitant injuries in trauma patients. The Laryngoscope 2003;113:102–106.
3. Sihota R, Rao A, Gupta V, et al. Progression in primary angle closure eyes. J Glaucoma 2010;19:632–636.
4. Guly CM, Guly HR, Bouamra O, et al. Ocular injuries in patients with major trauma. Emerg Med J EMJ 2006;23:915–917.
5. Herzum H, Holle P, Hintschich C. [Eyelid injuries: epidemiological aspects]. Ophthalmol Z Dtsch Ophthalmol Ges 2001;98:1079–1082.
6. Naik MN, Kelapure A, Rath S, Honavar SG. Management of canalicular lacerations: epidemiological aspects and experience with Mini-Monoka monocanalicular stent. Am J Ophthalmol 2008;145:375–380.
7. Kumar D, Kumar S, Sahni JK. True glottic foreign body in an infant. Indian J Otolaryngol Head Neck Surg Off Publ Assoc Otolaryngol India 2003;55:32–33.
8. Pushker N, Bajaj MS, Sharma V, Balasubramanya R. Profile of trauma-related residual periorbital deformities in Indian children. Int Ophthalmol 2004;25:239–242.
9. Savar A, Kirszrot J, Rubin PAD. Canalicular involvement in dog bite related eyelid lacerations. Ophthal Plast Reconstr Surg 2008;24:296–298.
10. Poon A, McCluskey PJ, Hill DA. Eye injuries in patients with major trauma. J Trauma 1999;46:494–499.
11. Rosado P, de Vicente JC. Retrospective analysis of 314 orbital fractures. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;113:168–171.
12. Hwang K, You SH, Sohn IA. Analysis of orbital bone fractures: a 12-year study of 391 patients. J Craniofac Surg 2009;20:1218–1223.
13. Lee V, Ford RL, Xing W, et al. Surveillance of traumatic optic neuropathy in the UK. Eye Lond Engl 2010;24:240–250.
14. Mahapatra AK, Tandon DA. Traumatic optic neuropathy in children: a prospective study. Pediatr Neurosurg 1993;19:34–39.