Original Research Article

A 3-year study of impact of cricket ball injuries on the eyes

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Abstract

Background: The aim of this study was to describe the type and severity of eye injuries due to cricket or tennis ball seen at a tertiary care hospital. **Material and methods:** A prospective case study of 76 patients of cricket ball injury to eye who presented to a tertiary eye care center in Eastern India between January 2013 and April 2016 were analyzed for their presenting vision, ocular damage, treatment adapted and final outcome Seventy six eyes of 76 patients were studied. Presenting vision, age, gender, time since injury, general and ocular examination, intraocular pressure, indirect ophthalmoscopy, B scan and X ray/computed tomography scan findings were noted. Patients were followed up at least for 6 months. **Results:** Seventy six eyes of 76 patients were evaluated. 74 patients were male. Majority (80.2%) were <25 years. Median presenting visual acuity (VA) was 6/36 and median final VA was 6/18. Most of them have sphincter tear (26.3%), retinal detachment (23.6%), angle recession (18.4%), choroidal rupture (17.1%) and Berlin's edema (15.7%). 69.7% patients needed medical management and 30.2% were managed surgically. **Conclusion:** Cricket is our national craze but cricket ball injury can lead to grievous ocular injury and can become "Terminator" for the eyes**.** But timely intervention ensures good visual outcome in most of the cases.

Key Words: cricket ball,visual outcome ,terminator

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INTRODUCTION

Cricket is a very popular sport in south Asian countries, including India. Because of the limited number of playgrounds, the game is increasingly being played on streets and sidewalks. Sports trauma remains a significant cause of ocular morbidity worldwide. Cricket related ocular injuries have a poor prognosis with most of the cases being closed globe injuries. Youngsters often play cricket with rubber ball, tennis ball, instead of actual hard cricket ball.[1] The personal impact of ocular injury is difficult to define although the lifestyle of the affected individual may be permanently altered.[2,3] However, there has been limited published analysis of the spectrum of eye injuries due to cricket ball. The aims of study is to describe the type and severity of cricket ball related eye injuries and highlight the importance of protective measures in this form of cricket.

MATERIALS AND METHODS

The institutional ethical committee's approval was obtained, and informed consent was taken from all patients.

The study was conducted at a tertiary care eye hospital, Cuttack in Eastern India.76 patients with cricket ball injury to the eye from January 2013 to April 2016 were included. Patients were between 7 and 38 years of age, except one who was 75 years old. All of them were male except two (females). All patients presented with the complaints of decreased vision, following cricket ball injury with or without other complaints such as redness, pain and watering. Each eye was taken as a single case. Data regarding the injuries were collected, including age, sex, address, presenting vision, time of presentation,

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duration of decreased vision, treatment (medical or surgical), follow ups, complications, and final outcome. Visual acuity was recorded by Snellen's chart. A detailed history was taken. Examination of the anterior segment was performed by slit lamp and intraocular pressure was recorded by applanation tonometer. Posterior segment was examined in slit lamp with +90D lens and with indirect ophthalmoscope with indentation wherever applicable.Slit lamp photograph, fundus photograph, optical coherence tomography (OCT), B scan, and X ray/computed tomography scan were done as per the need. Gonioscopy was done in all eyes without hyphema and exudates in anterior chamber. Patients with medical management were followed up at weekly interval for 1 month and then monthly interval for 6 months. Surgically managed patients were seen on the postoperative day 1, day 7, day 15, and day 30 and monthly interval afterward for 6 months. The presenting vision is categorized into poor vision (VA <6/60), moderate vision (VA ≥6/60– ≤6/18), and good vision (VA >6/18). Data was analyzed using sPss software version 19.0 for Windows. Frequencies and percentages were calculated for categorical variables such as sex. The median was computed for numerical variables such as age and intraocular pressure. Tables were used to present the results.

RESULTS

This study included 76 eyes of 76 patients between 7 and 38 years of age except one 75 years old male who was bystander accidently hit by ball. Except two all patients were male. The mean ± standard deviation of age was 22.1 ± 8.8 years and the median age was of 21 years. In our study blurring of vision was the most common symptom and was experienced by almost all patients with variable severity. Less common symptoms included ocular pain, redness, and floaters. Vision threatening findings were retinal detachment (23.6%), followed by angle recession (18.4%), choroidal rupture (17.1%), vitreous hemorrhage (15.8%), lens related injury (15.8%), and Berlin's edema (15.8%). Subconjunctival hemorrhage was the most frequent finding (81.5%), followed by sphincter tear (26.3%) Six cases of lens subluxation/dislocation seen. The mean IOP at presentation was 16.59 mmHg and in final follow up was 11.13 mmHg. Twelve cases in our study had glaucoma which included 10 patients of angle recession and 2 patients of hyphema [Table 1]. At first visit, 32 patients (44.7%) had poor vision, 8 patients (9.2%) had moderate vision, and 25 patients (32.8%) had good vision. Out of these 32 presented with poor vision, 19 (29.2%) remained as such, 9(28.1%) improved to moderate and 4(12.5%) to good vision. 8 presented with moderate vision, of which three (37.5%) improved to good vision. All 25 cases that presented with good vision were maintained as such. 11 patients were lost to follow up and the data of 65 patients are presented in Table 2. It revealed a significant association of presenting VA with final VA ($P = 0.000$) [Table 2]. Presenting vision has a significant positive correlation with final VA with a correlation coefficient of 0.556 ($P \leq 0.001$). The regression of final VA has significant intercept (constant) of 0.335 ($P < 0.00100$) and significant slope (B) of 1.253 ($P < 0.001$), indicating that good initial vision will have better final VA. Out of 76 cases, 16 presented to us within 48 hr, 17 presented between 2 and 7 days period following injury, 17 presented 7 days to 1 month period following injury, while 26 presented after 1 month of cricket ball injury. 11 cases presented after 1 year of injury. The median time of presentation with IQR was 11.5 days (3–105.5 days). We found no significant difference in final visual outcome in the group presented in first 48 hr and between 2 days and 1 week period. However, there is a significant difference in final visual outcome in the group presented between 2 days and 1 week period and after 1 month of cricket ball injury. Vision got improved in 56.2% of cases who presented within 48 hr while vision got improved in 58.8% of cases who presented between 2 days and 1 week period. Similarly, cases presented within 1st week to 1 month had visual improvement in 47.0% of cases, while cases presented after 1 month had visual improvement in only 38.4% of cases. Hence, time of presentation following trauma can have bearing on final visual outcome, but statistical correlation is not significant ($P = 0.297$). In our study posterior segment involvement leads to poor vision at presentation. These include choroidal rupture, vitreous hemorrhage, retinal detachment, Berlin's edema, and retinal tear mainly. In our study, we found that 32 out of 76 cases had presenting vision of < 6/60, among which 25 had posterior segment involvement. Injury in the posterior segment had 60.8% poor vision at the presentation, while injury in the anterior segment had 18.8% presenting poor vision ($P = 0.010$). Anterior segment injury had 73.3% good final VA, while posterior segment injury had 36.6% good final VA. Thus, anterior segment injury has better prognosis than posterior segment [Table 3]. Because of lack of awareness, none of the patients were wearing any ocular protection at the time of injury. Majority of the cases (69.74%) needed medical management only. The conservative management included topical antibiotic, steroids, cycloplegics, antiglaucoma, and anti-inflammatory agents. Systemic medications included oral steroids, analgesics, antibiotics (ciprofloxacin/injection cefotaxime), and oral acetazolamide. Out of 76, 23 (30.26%) cases required surgical intervention. Among surgically treated cases, vision got improved in 15 cases,

in 3 cases, vision remained the same, and in 5 cases were lost to follow up.

Table 1: Clinical features of cricket ball injury

CLINICAL FEATURES	TOTAL PATIENTS -76(Percentages)
Sphincter tear	20(26.3)
Choroidal rupture	13(17.1)
Retinal detachment	19(25)
Vitreous haemorrhage	13(17.1)
Angle recession glaucoma	15(19.7)
Hyphema	12(15.8)
Retinal tear	7(9.2)
Berlin's edema	12(15.8)
Lens related injury	12(15.8)

Table 2: Correlation of presenting vision and final visual acuity

PRESENTING VISUAL ACUITY	FINAL VISUAL ACUITY			
--	Poor vision n(%)	Moderate vision, n(%)	Good vision, n(%)	Total , n(%)
Poor vision	19(59.4)	9(28.1)	4(12.5)	32(100)
Moderate vision	0	5(62.5)	3(37.5)	8(100)
Good vision	0	0	25(100)	25(100)
Total	19(29.2)	14(21.5)	32(49.2)	65(100)

Table 3: Correlation of Segment involvement with initial and final visual acuity

--	SEGMENT INVOLVEMENT		
	Posterior segment , n(%)	Anterior segment, n(%)	Total , n(%)
PRESENTING VISUAL ACUITY			
Poor vision	31(60.8)	3(18.8)	34(50.7)
Moderate vision	7(13.7)	3(18.8)	10(14.9)
Good vision	13(25.5)	10(62.5)	23(34.3)
Total	51(100)	16(100)	67(100)
FINAL VISUAL ACUITY			
Poor vision	16 (39)	2(13.3)	18(32.1)
Moderate vision	10(24.4)	2(13.3)	12(21.4)
Good vision	15(36.6)	11(73.3)	26(46.4)
Total	**41(100)**	**15(100)**	**56(100)**

DISCUSSION

Ocular trauma due to sports-related injuries is considered to be a significant cause of vision morbidity.[4,5] Ocular injuries due to cricket ball is more common in south asian countries where street cricket is common . Ocular injury because of a ball is mostly a closed globe injury.[6] it occurs because of the high speed at which the ball is traveling, having a direct impact on the globe resulting in coup and countercoup injuries. An unwrapped soft tennis ball is compressible and rebounds slowly, which distributes its kinetic energy upon impact. It has been proven experimentally in various animal models that the higher the momentum of impacting objects, the more severe and posterior the damage to the eyeball.[7,8] Kuhn *et al.*[9] in the year 2006 analyzed that involvement of the posterior segment was a factor indicating poor outcome in ocular injury. Mostly, vitreous hemorrhage, retinal detachment, choroidal rupture, and endophthalmitis were found to increase the risk of blindness. In our study, posterior segment involvement leads to poor vision (<6/60) at presentation. These include choroidal rupture, vitreous hemorrhage, retinal detachment, Berlin's edema, and retinal tear mainly. In our study, we found that 32 out of 76 cases had presenting vision of < 6/60, of which 25 had posterior segment involvement. A retrospective study by Horn *et al.*[10,11] on soccer ball related retinal injuries, in which four patients had traumatic macular holes, two eyes had retinal detachment associated with retinal dialysis, two had retinal tears associated with hemorrhage, one had a choroidal rupture, and one had only vitreous hemorrhage and Berlin's edema. Sadiq *et al.*[12] in 2017 found that retina was the most commonly involved ocular structure. In our

study, out of 76 cases, majority of cases had diminution of vision in association with subconjunctival hemorrhage, lid edema, uveitis, conjunctival congestion, and chemosis. The most common finding leading to diminution of vision was retinal detachment, followed by choroidal rupture, vitreous hemorrhage, Berlin's edema and hyphema. Adequate eye protection and safety measures reduces the risk of significant eye injuries by 90%.[13] Use of head gear or helmets and polycarbonate visor to the helmet enhances safety. As most street cricketers purchase a cricket kit from sports shops, it should be mandatory to add a visor or helmet to the kit. Playing in open grounds as opposed to streets should be encouraged, which will help reduce the injuries to bystanders and mere passers-by. Early detection and management of retinal breaks is essential to prevent retinal detachment. Hence, every patient of ball-related trauma must have a complete eye examination, including gonioscopy and examination of the peripheral retina, closely followed by the necessary treatment. Creating awareness regarding the risk of cricket ball ocular injuries and their prevention and prompt management may lead to better visual outcomes. As India is a passionate cricketing nation, entirely eliminating cricket/tennis balls from street cricket might not be possible. However, creating awareness regarding the risk of cricket/tennis ball ocular injuries and their prevention and prompt management may lead to better visual outcomes. Our major concern is preventing ocular trauma, reporting the rising incidence of cricket ball associated ocular injuries, and thus supporting the need to create awareness about the use of protective eyewear while playing cricket.

CONCLUSION

Cricket, being craze of the nation, increased incidence of cricket ball injury is seen nowadays. Final visual outcome in our study mainly depended upon presenting vision, time of presentation since injury, presenting clinical finding, and type of intervention prognosticate and formulate definite management plans. Posterior segment involvement leads to poor vision at presentation and poor final visual outcome. Poor visual outcome was mainly due to delayed presentation. Early intervention and judicious treatment is the call of the day. More emphasis should be given on the preventive aspect like use of protective eye wear and helmet with visor. Thus, emphasizing the need to educate society and to improve health care system to provide better facilities and a better transport system to reduce the duration between injury and treatment.

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