

Hospitalized eye injury in a Chinese urban population: a 7-year retrospective analysis

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Abstract

• **AIM:** To present the epidemiology, cause of injury, ocular status and final visual acuity after management of severe ocular trauma required hospitalization during 7 years in a representative urban Chinese population.

• **METHODS:** A retrospective analysis of the hospital admission files of ocular trauma patients admitted to the Daping hospital from January 2000 to December 2006 was carried out.

• **RESULTS:** A total of 268 patients were open-globe injury and the remaining 294 patients were closed-globe types. The most common causes of ocular injuries were metal (29.4%), explosive (14.6%) and stone (13.9%). And the visual outcomes of most of eye injury patients in this study were poor; half of injured eyes ended with visual acuity worse than 0.1.

• **CONCLUSION:** Therapeutic methods to ocular trauma make a great progress in recent years, but the visual outcomes are poor.

• **KEYWORDS:** eye; injury; Chinese

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INTRODUCTION

Around the world, 55 million persons suffered from eye trauma each year [1]. For ninety percent of all impressions a person receives are carried out by eye [2], this may lead to difficulty of work and daily life and cause a serious health burden. The accumulation of defined epidemiological data and varied approaches to ocular trauma analysis would be helpful to plan health and clinical strategies for prevention and management of the injuries. In 2008, the Chinese population is about 1.37 billion (data from China Population Information and Research Center website)[3], which means nearly one-sixth people of the world lived in China, so the ocular trauma study of it is unique. Daping

hospital is a major hospital in Chongqing city, a city which is one of four Chinese municipality cities with a large population of more than 30 million inhabitants. This study investigates the epidemiology, cause of injury, ocular status and final visual acuity after management at Daping hospital during a period of 7 years. All patients who sustained serious ocular trauma and required hospitalization were included in the study. The purpose of this study is to provide an estimate of these patients in a representative urban Chinese population.

MATERIALS AND METHODS

Subjects This retrospective epidemiological and clinical study reviewed the records of all patients who sustained serious ocular trauma and required hospitalization at Daping hospital between January 2000 and December 2006. Patients referred from other departments within the hospital were also included.

The eye injuries are strictly defined and conform to the recommendations of the United States Eye Injury Registry and the International Society of Ocular Trauma [4]. A total of five hundred and sixty-two patients with 596 eyes (thirty-four bilateral injuries) which sustained serious ocular injury and required hospitalization was included during the study period.

Methods Patients were separated into open-globe and closed-globe groups for comparison. Two hundred and sixty-eight patients had open-globe injury and the other 294 patients belonged to closed-globe types (Table 1). We analyzed age, gender and occupation (classified into two simple categories, work-related and non-work-related groups) between the open-globe and closed-globe injuries. Then the cause of injury by occupation was identified. And the final visual acuity after the management of open-globe

Table 1 The epidemiologic data of patients with ocular injuries

		Open-globe	Closed-globe
Gender	Male	236(88.1)	249(84.7)
	Female	32(11.9)	45(15.3)
Age (yr)	<18	46(17.2)	66(22.4)
	18-50	202(75.4)	187(63.6)
	>50	20(7.5)	41(14.0)
Occupation	Work-related	136(50.8)	107(36.4)
	Non-work-related	132(49.2)	187(63.6)

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and closed-globe, work-related and non-work-related groups were analyzed.

Statistical Analysis Statistical Package for Social Studies (SPSS 13) was used for statistical analysis. Chi-square tests were used to compare proportions. Confidence intervals of 95% were employed. $P < 0.05$ was considered statistically significant.

RESULTS

Gender difference between the two groups was not significant ($\chi^2=1.34$, $P=0.123 > 0.05$). The 18 to 50 year age group not only had significantly higher rates of open-globe ocular injury but also closed-globe type than the other two age groups ($\chi^2=10.20$, $P=0.003 < 0.05$). Open-globe injuries were significantly higher in work-related type of eye trauma compared to the non-work-related type (RR=1.35, 95% CI 1.14-1.61), that means while working, open-globe injuries were more common. Non-work-related type of eye trauma had significantly higher rates of closed-globe ocular injury compared to the work-related type (RR=1.33, 95% CI 1.12-1.58).

The most common causes of ocular injuries were incidents related to metal (165 patients, 29.4% of total ocular injuries), explosive (82 patients, 14.6% of total ocular injuries) and stone (78 patients, 13.9% of total ocular injuries) (Table 2). For work-related type of ocular injury, the first one was also metal (125 patients, 51.4% of total work-related injuries). However, the second one was stone (47 patients, 19.34% of total work-related injuries), and the third one, chemical (31 patients, 12.8% of total work-related injuries). And the definite three most frequent causes of non-work-related injuries belonged to the explosive; nearly all of them were firework (70 patients, 21.9% of total non-work-related injuries), wood (41 patients, 12.8% of total non-work-related injuries) and metal (40 patients, 12.5% of total non-work-related injuries).

After management, the final best corrected visual acuity (BCVA) of open-globe ocular injury was poor compared to closed-globe injury (Figure 1A). Sixty-one eyes (22.3%) of open-globe injuries were executed enucleation versus 10 eyes (3.11%) of closed-globe injuries ($\chi^2=51.77$, $P=0.0001 < 0.05$). The rate of injured eye which had the final BCVA better than 0.1 of closed-globe type (170 eyes, 52.8% of total injured eyes of closed-globe type) was significantly higher than that of open-globe type (50 eyes, 18.2% of total injured eyes of open-globe type) ($\chi^2=75.9$, $P=0.0001 < 0.05$). The final BCVA better than 0.5 also had the significantly higher rates of injured eyes of closed-globe type (82 eyes, 25.5% of total injured eyes of closed-globe type) compared to that of open-globe type (16 eyes, 5.8% of total injured eyes of closed-globe type) ($\chi^2=41.50$, $P=0.0001 < 0.05$).

Causes	n (%)		
	Work-related	Non-work-related	Total
Metal	125(51.4)	40(12.5)	165(29.4)
Explosive	12(4.9)	70(21.9)	82(14.6)
Stone	47(19.3)	31(9.7)	78(13.9)
Wood	4(1.6)	41(12.8)	45(8.0)
Chemical	31(12.8)	3(0.9)	34(6.0)
Traffic	5(2.1)	25(7.8)	30(5.3)
Glass	2(0.8)	23(7.2)	25(4.4)
Plastic	3(1.2)	19(6.0)	22(3.9)
Other	13(5.4)	64(20.1)	77(13.7)
Unknown	1(0.4)	3(0.9)	4(0.7)
Total	243	319	562

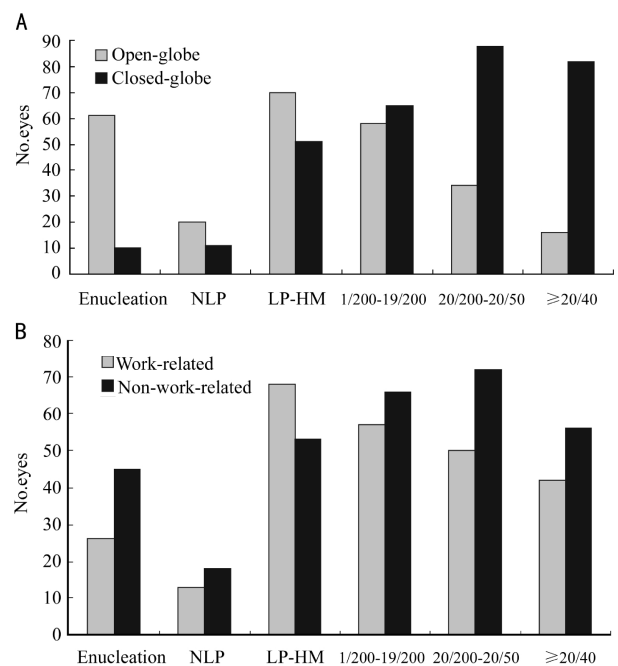


Figure 1 Final best corrected visual acuity of ocular injuries
HM: hand motion, LP: light perception, NLP: no light perception

Between the groups of work-related injury and non-work-related injury, the final BCVA of injured eye had no significant difference ($\chi^2=1.12$, $P=0.1455 > 0.05$) (Figure 1B).

DISCUSSION

Ocular injuries are an important world-wide cause of visual loss, for playing a major role in society, adult males are frequently victimized [1,5]. Similarly, in our research, most of the patients were male, no matter in the open-globe injury group or closed-globe injury group. However, consistent with the previous clinical studies [6,7], in both groups the most victims were all in 18-50 age range. This could be attributed to the policy of work age in China. People younger than 18 are illegal to work, so most of them study in the school. And after 50 years old, few people are not retired. But the work-related injuries are different in the open-globe injury group and closed-globe injury group. More work-related eye trauma in the open-globe injury group versus non-work-

related type. However, there were more non-work-related eye traumas in the closed-globe injury group versus work-related type. The cause of the trauma may explain why.

Similar to other Asian cities researches^[8,9], the leading cause of work-related injury are metal and stone. These objects are often small and hard. When the objects shoot people, the effective action area is small. With hard body the energy it delivered is very large. So the destructiveness is high and it always causes eyeball rupture. However, in the non-work-related injury, the definite most frequent causes are explosive and wood. And most of the explosive are firework. This has a great relationship with Chinese custom. Firework was widely used for celebration or other important things. But these fireworks nearly would not cause open-globe injury, for most of them were made of paper. Even though it could deliver large energy, it is not so hard that can destroy the integrity of eyeball. In our research most of the wood reasons are door and stick. In regard to these wooden products, few of them are small blocks, so a great number of eye injuries caused by wood are contusions.

Although the Chongqing city is on the hill, different to other Chinese cities, the vehicles most people choose are cars. There are many cars instead of bicycles in this city. To our surprise, the traffic accident is not the common reason of eye injury in this city, not similar to the previous studies of ocular trauma in the developed countries^[10,11]. This may be partly because most of the people in China are passengers but not drivers, and partly because large buses are safer than small private cars.

Despite advances in diagnostic and therapeutic methods, the final BCVA of open-globe injuries remains very poor, and enucleation rate (22.26%) is similar to the previous reported series, 22% by Esmaeli *et al*^[12] and 21% by Pieramici *et al*^[13]. For most of the open-globe injuries are severe, no matter the final BCVA is better than 0.5 or 0.1, it has a significantly lower rate than closed-globe injuries. The rupture of eyeball often brings bad final BCVA, in the ocular trauma score (OTS) described by Kuhn and associates^[14]. It is the first negative factor of visual prognosis. Actually, the visual outcomes of most of eye injury patients in this study were poor. In whichever groups, work-related injury and non-work-related injury, or open-globe injury and closed-globe injury, half of injured eyes ended with visual acuity worse than 0.1.

China is one of the largest developing countries in the world. The ocular trauma is a major problem in it during the

process of development. For most of the victims are male, it would not only affect the family support and would cause a serious burden to the society. Even therapeutic methods make a great progress in recent years, in most situations the visual outcomes are poor. So the best way to treat ocular trauma is prevention^[15]. The public should be educated and made more aware of the common causes of eye injury. For instance, firework, flying materials, especially metal and stone. When people play or work with them, the protective device should be worn. And more emphasis should be put on investigating the more comfortable and effective safety devices.

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