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Original Contribution

Hospital-based ocular emergencies: epidemiology, treatment, and visual outcomes☆,☆☆,★

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ABSTRACT

Background: Ocular trauma is recognized as the leading cause of unilateral blindness. However, few studies to date have focused on the clinical features of hospital-based ocular emergencies. Effectiveness of trauma centers in treating ocular emergencies was compared with treatment in traditional community hospital emergency departments. Demographics, causes, and nature of ocular emergencies, as well as visual outcome in community hospitals emergency departments and trauma centers, were also examined.
Methods: Records of 1027 patients with ocular emergencies seen between July 2007 and November 2010 at 3 community hospitals emergency departments and 2 hospitals with level II trauma centers were retrospectively examined. Unpaired *t* test and Pearson χ^2 test were used to determine statistical significance.
Results: The incidence of patients requiring ophthalmic intervention was 77.2 per 100 000 in the community hospitals and 208.9 per 100 000 in the trauma centers. Rates of ocular emergencies were higher in middle-aged, white men. Orbital fractures were found in 86% of all orbital contusion cases in trauma centers, whereas 66.7% of patients with fall injuries and open globe diagnoses resulted in legal blindness.
Conclusions: The middle-aged, white men are more vulnerable to ocular injuries caused mainly by motor vehicle accidents. The ability of trauma centers to provide comparable increases in vision outcomes, despite treating more severe ocular emergencies, demonstrates the effectiveness of trauma centers. Patients diagnosed as having orbital contusions or who have fall injuries deserve careful evaluation because they are more likely to have more severe sight-threatening injuries.

1. Introduction

Ocular emergencies are a significant component of modern hospital-based emergency health care [1]. The Baltimore Eye Survey reported a cumulative lifetime prevalence of eye injury in 14.4% of the general population [2]. Another study showed an annual rate of hospitalization due to ocular trauma of 13.2 per 100 000 individuals [3]. Furthermore, the incidence of ocular emergencies requiring emergency department (ED) presentation in the United States has been estimated at a national average of approximately 3 per 1000 persons a year, with 2.4 million ocular injuries occurring every year in the United States [4]. Nationally, ocular injuries make up 3.3% of all occupational injuries resulting in lost workdays according to National Safety Council, 2002. Ocular trauma is the major cause of unilateral blindness in the United States, affecting 40 000 and 60 000 patients annually [1].

Despite the significance of ocular emergencies in the United States, there has been little literature focused on the nature of ocular emergencies and even less epidemiologic research on the effect of trauma centers (TCs) on treatment outcomes after traumatic ocular injury. Trauma centers have been developed to presumably improve emergency care services, particularly for those emergencies of traumatic nature that can result in high morbidity and mortality. As such, TCs should represent a concentration of severe ocular emergencies and be able to optimize the outcome of treatment. However, an estimated 50% of all injured patients receive treatment at non-TCs due to reasons such as regional availability, geographic considerations, and practicality of treatment [5]. Therefore, there is a need to understand the potential differences in patient populations as well as treatments and outcomes between community hospitals (CHs) with non-TC EDs and those that have certified TCs.

We performed a retrospective study to evaluate the epidemiology and clinical features of hospital-based serious ocular emergencies,

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Table 1
Patient demographics within TCs and CHs based on age, sex, and race

Characteristics	No. of patients (n = 1027)	TCs (n = 785)	CHs (n = 242)
Age (y), n (%)			
<18	189 (11)	77 (9.8)	35 (14)
18-30	214 (21)	176 (22)	38 (16)
31-44	170 (17)	135 (17)	35 (14)
45-64	310 (30)	240 (31)	70 (29)
≥65	220 (21)	156 (20)	64 (26)
Sex, n (%)			
Male	612 (60)	485 (62)	127 (52)
Female	415 (40)	300 (38)	115 (48)
Race, n (%)*			
White	710 (69)	565 (72)	145 (60)
Hispanic	108 (11)	73 (9.2)	35 (14)
African American	87 (8.5)	57 (7.3)	30 (12)

* We were able to obtain information regarding race for 966 patients. There were a number of patients who either refused to provide racial information for personal reasons or were too ill to do so.

critical enough to warrant an ophthalmology consult, from 5 regional hospitals over a 3-year period. Three of these hospitals were traditional CH EDs, and 2 hospitals had well-established level II TCs. In this study, we determined the effectiveness of TCs in treating ocular emergencies as well as delineated differences between the demographics of patient populations, causes and nature of ocular emergencies, treatment, and outcome in CHs and TCs.

2. Methods

Medical records of hospital-based ocular emergencies for 5 hospitals during the period beginning in July 2007 and ending in November 2010 were retrospectively examined. Only hospital-based ocular emergencies that were severe enough to warrant an ophthalmology consult were included. Less severe ocular emergencies that did not necessitate initial direct ophthalmology involvement or required only ophthalmology follow-up were not included in our study.

We reviewed patient demographics, location of emergency, cause of ocular emergency, diagnoses, treatment, and treatment outcome. Patients' ages were grouped according to the following categories: 0 to 17 years (children and adolescents), 18 to 30 years (early adulthood), 31 to 44 years (early middle age), 45 to 64 years (middle age), and 65 years and older (elderly).

Owing to its retrospective nature, the study was exempt from informed consent by our local institutional review board committee. We used SPSS (version 19; SPSS, Chicago, IL) for statistical analysis of data. Unpaired t test and Pearson χ^2 test were used to determine statistical significance, which was considered to be a 2-tailed P value less than .05.

3. Results

During the period from July 2007 to November 2010, the 3 CHs treated a total of 312 215 emergency patients and the 2 TCs treated 375 711 patients. There were 1062 patients with hospital-based ocular emergencies. We excluded 35 patients because of insufficient data in their medical records, resulting in a final sample size of 1027 patients with 2025 ocular emergency diagnoses. Trauma centers accounted for 76.4% of hospital-based ocular emergencies, whereas CHs reported 23.6% of the ocular emergencies. On average, there were 2.1 ocular diagnoses per patient in TCs compared with 1.5 diagnoses in CHs. The incidence of patients requiring ophthalmic intervention was 208.9 per 100 000 in TCs and 77.2 per 100 000 in CHs. Many of the hospital-based ocular emergency patients had multiple injuries or comorbidities.

Table 2
Age distribution based on sex

By percentage (n = 1027)			
Age (y)	Male	Female	All patients
<18	11.8	9.6	10.9
18-30	21.9	19.3	20.9
31-44	19.1	12.8	16.6
45-64	31.3	28.7	30.2
≥65	15.9	29.6	21.4

Table 3
Cause of injury rates within TCs and CHs

By percentage (n = 1027)							
Cause*	MVAs	Fall	Infection	Preexisting condition	Other+	Assault	Trauma unknown source
Overall population	17.4	14.4	14.3	14	11.5	11.1	7.5
TCs	22.8	15.4	9.9	11.3	10.6	13.2	6.9
CHs	0	11.1	28.5	22.7	14.5	4.1	9.5
Sex							
Male	19	13.2	11	11.6	8.5	15.9	8.6
Female	15.1	16.14	19.3	17.6	15.9	4.1	5.8
Age (y)							
<18	10.7	10.7	22.3	6.3	7.1	0	12.5
18-30	28	7.5	10.7	7.5	7.9	21	8.4
31-44	15.9	10.6	13.5	11.8	9.4	15.9	6.5
45-64	20	13.2	13.2	16.5	9.7	11.9	6.5
≥65	8.2	27.7	15.9	22.7	15.9	1.8	5.9

* Seven of the most common causes of ocular emergencies in this study.
+ Including burns, explosion, gunshot, pellet guns.

3.1. Demographics

Demographic data were analyzed according to age, sex, and race (Table 1). In our study population, ocular emergencies were more prevalent in middle-aged, white men. The rates of eye injuries were found to be greater in patients in the age range of 45 to 64 years, followed by those 65 years or older and those within the age range of 18 to 30 years. The mean age in TCs was 41.7 years for men and 49.7 years for women ($P \leq .001$; Table 2). The mean age in CHs was 47.2 years for men and 47.1 years for women ($P = .99$). Furthermore, the TC patient population was significantly more male predominant compared with that of CHs, suggesting that men are involved with more severe eye injuries, requiring specialized trauma intervention. Injury rates were highest among whites in both the TCs and CHs populations.

3.2. Ocular emergencies

Ocular emergencies were analyzed according to the cause, location of injury, diagnoses, treatment type, and visual outcomes based on visual acuity. The most common cause of hospital-based ocular emergencies was motor vehicles accidents (MVAs), which accounted

Table 4
Diagnoses of ocular emergencies within TCs and CHs

By percentage (n = 1027)					
Diagnosis category	Total diagnosis	TC	CH	Male	Female
Contusion	25.0	27.6	13.9	27	21.6
Orbital trauma	18.1	20.6	7.3	19.7	15.3
Posterior segment	15.1	15	16.3	15.2	15.2
Anterior segment	9.7	9	13	10.1	9.2
Neurologic	9.7	8.1	13.6	7.9	12.3
Infections	8	5.4	19.8	5.9	11.8
Adnexal	7.8	8	7.6	7.8	8
Open globe	3.3	2.9	5.4	5.9	2.6
Foreign body	2	2.1	1.4	7.8	2.3
Glaucoma	1.3	1.3	1.6	3.7	1.6