

Pediatric Traumatic Brain Injury Due to Gunshot Wounds at a General Hospital in Cali, Colombia

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Introduction

Traumatic Brain injury (TBI) due to gunshot-wounds (GSW) is a critical situation. The aim of this study is to characterize TBI in pediatric population, since there are few reports that describe it, especially in Colombia, where there is a high incidence.

Methods

An Observational, cross-sectional study was conducted by retrospectively collecting clinical data related to pediatric patients, ages between 1 and 18 years-old, that presented TBI due to gunshot-wounds, who consulted to the ER in Fundación Valle del Lili, Cali, Colombia between January-2003 and December-2015. A descriptive statistical analysis was performed for all considered variables, and Kaplan-Meier-analysis was used to estimate the survival function for the study population. STATA-12.0-software was used to perform the statistical analysis.

Results

A total of 33 patients were included for the analysis (Figure 1). Mean age was 13,5 years old (SD±4,9), were 75,7% accounted for male patients. Most of injuries were due to assault (interpersonal violence) 30,3% followed by accidental lesions (27,7%). Most patients with TBI arrived at the ER by ground ambulance (72.7%) within 2 hours (IQR 1-4,5) of the trauma. At admission to the ER the Injury Severity Score (ISS) had a median of

33 (IQR 22-75) and the GCS was 3-8: 57,5%, 9-12: 6,1% and 36,4% for those who had 13-15. Initial CT-scan was performed, and Marshall-score showed that 57,57% of the patients had a score of =III, that was associated with poor prognosis. Mortality was 42,4%, all of them associated directly to TBI, with 37,5% (n=12) of the deaths occurring during the first 24-hour period. Those who were discharged were reassessed with the GOSE that showed: 1: 42,4%, 3-4 18,18%, 5-6: 9,09%, and 7-8: 30,3%.

A comparison among those patients that survived and those who died was carried (Figure 2). A Kaplan-Meier-analysis was done to estimate survival over time (Figure 3).

Discussion

Historically, Colombia has a high incidence of violence; some of the factors that contribute to this situation are common violence and assault. The pediatric population is not an exception to this situation. In Cali, Colombia, male teenagers are the most common affected group as has been demonstrated by literature and government statistics. In the pediatric population, published mortality rates from intracranial GSWs range from 20% to 60%. The mortality rate of our cohort fell within this range (47.9%). 81% of the survivors showed only minor disability or better at the last follow-up (GOSE Score 4 or 5). This rate is comparable with the results from the St. Louis study in which 88% of survivors had a GOSE score of 4 or 5.2.

In Colombia there is a lack of adequate pre-hospital infrastructure, trained medical personnel and primary care facilities. This paper aims to encourage the creation of integrated networks specialized in the prehospital care of pediatric patients with TBI due to GSW, giving that the early attention and adequate transportation of this patients by an specialized team increases survival and reduces mortality.

Conclusions

An alarming number of children were treated for TBI due to gunshot wounds due to violence. Most of patients admitted to the ER had severe injuries with poor prognosis, and one of the reasons for this was the lack of adequate primary care and pre-hospitality attention to reduce mortality and improve survival rate.

References

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Figure 1.

TABLE 1. CHARACTERISTICS OF PEDIATRIC TRAUMATIC BRAIN INJURY DUE TO GUNSHOT-

N=33		Pre-hospital data	
Admission data		Prehospital endotracheal intubation	
Age in years	13,5 (SD 4,9)	Yes	9 (27.3%)
Gender		No	24 (72.7%)
Female	8 (24.3%)	CT scan findings at admission	
Male	25 (75.7%)	MARSHALL classification	
Intentionality		I	6 (18.2%)
Accidental	9 (27.7%)	II	8 (24.2%)
Self-inflicted	2 (6.06%)	III	10 (30.3%)
Assault (interpersonal violence)	10 (30.3%)	IV	7 (21.2%)
Missing data	12 (35.9%)	VII	2 (6%)
Mode of transport to hospital		Bullet trajectory	
Ground Ambulance	24 (72.7%)	Penetrating injury	
Police patrol car	1 (3%)	33 (100%)	
Private car	2 (6.1%)	Outcome data	
Air ambulance	1 (3%)	Glasgow Outcome Scale extended at discharge (GOSE)	
Missing data	5 (15.2%)	1	
Hospital arrival time	2 hours (IQR 1-4.5)	3-4	
ISS at admission	33 (IQR 22-75)	5-6	
Glasgow score at admission		7-8	
<8	19 (57.5%)	Death	
9 - 12	2 (6.1%)	Death in the first 24 hours	
13 - 15	12 (36.4%)	Death in the first 30 days	
		12 (37.5%)	
		14 (43.75%)	

Descriptive statistics results

Figure 2.

TABLE 2. CHARACTERISTICS AMONG PEDIATRIC CRANIOENCEPHALIC TRAUMA PATIENTS WHO SURVIVED AND THOSE WHO DIED

Admission data	Survived		Died		Total, n=33	CT scan findings	Survived		Died		Total, n=33
	n	%	n	%			n	%	n	%	
Age**	15 (10.17)	15.5 (13.17)	15 (13.17)	15 (13.17)		MARSHALL classification, n(%)					
<10 years, n(%)	6 (31.6)	1 (7.1)	7 (21.2)	7 (21.2)		I-III	15 (79)	9 (64.2)	24 (72.7)		
11-18 years, n(%)	13 (68.4)	13 (92.9)	26 (78.8)	26 (78.8)		IV-VII	4 (21)	5 (35.7)	9 (27.3)		
Hospital arrival time (hours)**	2 (0.85-5.3)	2 (1.4)	2 (1.4)	2 (1.4)		Surgical data					
Glasgow score at admission, n(%)						Survived		Died			
3-8	11 (57.9)	8 (57.1)	19 (57.6)	19 (57.6)		Cranioectomy, n(%)					
9-12	1 (5.3)	1 (7.1)	2 (6.1)	2 (6.1)		Yes	4 (21.1)	2 (14.3)	6 (18.2)		
13-15	7 (36.8)	5 (35.7)	12 (36.4)	12 (36.4)		No	15 (78.9)	12 (85.7)	27 (81.8)		
Pupillary examination, n(%)						Esoflectomy, n(%)					
Isochoria	12 (63.2)	9 (64.3)	21 (63.6)	21 (63.6)		Yes	17 (89.5)	12 (85.7)	29 (87.9)		
Anisocoria	3 (15.8)	1 (7.1)	4 (12.1)	4 (12.1)		No	2 (10.5)	2 (14.3)	4 (12.1)		
Bilateral mydriasis	3 (15.8)	4 (28.6)	7 (21.2)	7 (21.2)		Hospital stay and outcome data					
Missing data	1 (5.3)	0 (0)	1 (3)	1 (3)		Survived		Died			
Pupillary light reflex, n(%)						Survived		Died			
One eye response	7 (36.8)	5 (35.7)	12 (36.4)	12 (36.4)		Hospital length of stay in days**					
Both eyes response	2 (10.5)	2 (14.3)	4 (12.1)	4 (12.1)		8 (1-12)	3.5 (1-8)	7 (1-9)	7 (1-9)		
No response	9 (47.4)	7 (50)	16 (48.5)	16 (48.5)		ICU requirement, n(%)					
Missing data	1 (5.3)	0 (0)	1 (3)	1 (3)		Yes	3 (15.8)	1 (7.1)	4 (12.1)		
Heart rate*	104.5 ± 30.8	95.3 ± 33.4	100 ± 33.7	100 ± 33.7		No	15 (78.9)	12 (85.7)	20 (60.6)		
Mean arterial pressure (MAP)**	77.5 (66-100)	84 (67-94)	83 (67-94)	83 (67-94)		ICU length of stay (days)**					
						APACHE II*					
						Mechanical ventilation					
						Mechanical ventilation days*					
						Antibiotic prophylaxis, n(%)					
						5.3 ± 3		1.7 ± 1.3		3.3 ± 2.8	
						10 (52.6)		8 (57.1)		18 (54.5)	

Comparison between groups

Figure 3.

