PREDICTORS OF POOR OUTCOME OF PEDIATRIC GUNSHOT HEAD INJURY: A BRAZILIAN SINGLE CENTER EXPERIENCE

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ABSTRACT:

Background: This article aims to evaluate the predictive factors of morbidity and mortality in pediatrics patients who suffered gunshot wounds to the head. We reviewed a series of 43 patients admitted to the Hospital da Restauração, Recife, Brazil, between 2010 to 2019.

Methods: Data from 43 patients who underwent surgical treatment in our institution. The following parameters were considered in the data analysis: the initial Glasgow Coma Scale (GCS), age, sex, bullet entry site, bullet trajectory, computed tomography (CT) scans at admission, complications, midline crossing, and Glasgow Score Scale at discharge (GOS). Pearson's Chi-square test or the Fisher's exact test were used. The data was entered in the EXCEL worksheet and the program used to obtain the statistical calculations was IBM SPSS in version 23.

Results: The male gender corresponded 90,7% of the cases (N=39) and the mean age was 16,5 years (60,5%). The frontal region was the most common entry site (41.9%), following by parietal wall (27.9%), and occipital region (20.9%). Penetrating trajectory was showed in 48.8%, perforating/transfixing in 39.5% and tangential in 11.6%. CT scan showed sinking as the most common alteration (74.4%), following by cerebral contusion (44.2%), and cerebral hemorrhage (34.9%). According to GOS 23.3% were classified as an unfavorable outcome (GOS: 2 to 3) and 53.5% as a favorable outcome (GOS: 4 and 5). The mortality rate was 23.3%. In our study there was a significant association between the low GCS scores on admission and low GOS (1 to 3) (p 0.001). The patients who presented wound crossing the midline also had a significant association with low GOS (p 0.014) in our clinical experience.

Discussion and Conclusions: This study focused on pediatric gunshot penetrating traumatic brain injuries in a single center in Brazil. Furthermore, this study also reviews insights into this topic mainly about factor predictive of outcome. We conclude that low GCS scores at admission and children with a wound that crosses the midline are predictive factors of high mortality and morbidity, in our clinical experience.

Table 1 – Evaluation of clinical data

Variant	Total Group
TOTAL: n (%)	**43 (100,0)**
Bullet entry Site: n (%) (1)	
Frontal	18 (41,9)
Parietal	12 (27,9)
Occipital	9 (20,9)
Face	4 (9,3)
Temporal	6 (14,0)
Bullet trajectory: n (%)	
Penetrating	21 (48,8)
Perforating / Transfixing	17 (39,5)
Tangential	5 (11,6)
CT scan: n (%) (1)	
Sinking skull	32 (74,4)
Brain Contusion	19 (44,2)
Subarachnoid hemorrhage	15 (34,9)
Subdural hematoma	2 (4,7)
Intraparenchimal hematoma	4 (9,3)
Unknow	3 (7,0)
Complications: n (%)(1)	
Infection	8 (18,6)
Motor Impairment	3 (7,0)
Epilepsy	1 (2,3)
None	32 (74,4)
Midline Crossing: n (%)	
Yes	9 (20,9)
No	20 (46,5)
Unknown	14 (32,6)
Glasgow Coma Scale (GCS) on admission: n (%)	
3 a 8	21 (48,8)
9 a 15	22 (51,1)
Glasgow Outcome Scale (GOS) at discharge: n (%)	
Death	10 (23,3)
Unfavorable / Vegetative	10 (23,3)
Favorable	23 (53,5)

(1) Considering that the same patient could have been affected by more than one situation, the basis for calculating the percentages, not the total, is recorded.

Table 2 – GOS analyze according to age group, bullet trajectory, computed tomography, crossing with the midline and GCS at admission

Variant	GOS at discharge (Outcome)								P Value	OR (CI a 95%)
	Death		Unfavorable (2 to 3)		Favorable (4 to 5)		Total			
	n	%	n	%	n	%	N	%		
Age									p(1) = 0,750	
8 to 15	3	21,4	4	40	7	50	14	100		1,23 (0,34 a 4,42)
>16	7	24,1	6	60	16	55,2	29	100		1
Total Group	**10**	**23,2**	**10**	**23,2**	**23**	**53,5**	**43**	**100**		
Bullet Trajectory									p(2) = 0,522	
Penetrating	10	47,6	0	0	11	52,4	21	100		**
Perforating/Transfixing	2	11,7	7	41,1	8	47,1	17	100		**
Tangential	1	20	0	0	4	80	5	100		**
Total Group	**13**	**32,5**	**20**	**46,5**	**23**	**53,5**	**43**	**100**		
CT scan										
Sinking skull									p(2) = 1,000	
Yes	7	21,8	7	21,8	18	56,3	32	100		1
No	1	12,5	3	37,5	4	50	8	100		1,29 (0,27 a 6,07)
Total Group	**8**	**20**	**9**	**22,5**	**22**	**55**	**40**	**100**		
Cerebral contusion									p(1) = 0,726	
Yes	3	15,7	5	29,3	11	57,9	19	100		1
No	3	14,3	7	33,3	11	52,4	21	100		1,25 (0,36 a 4,36)
Total Group	**6**	**15**	**12**	**30**	**22**	**55**	**40**	**100**		
Cerebral hemorrhage									p(1) = 0,622	
Yes	1	6,6	5	33,3	9	60	15	100		1
No	3	12	9	36	13	52	25	100		1,38 (0,38 a 5,07)
Total Group	**4**	**10**	**14**	**35**	**22**	**55**	**40**	**100**		
Midline crossing									p(2) = 0,014*	
Yes	3	33,3	4	44,4	2	22,2	9	100		10,50 (1,62 a 68,07)
No	3	15	2	10	15	75	20	100		1