Paediatric traumatic brain injury compared with adults and elderly. A CENTER-TBI analysis on intracranial pressure treatment and outcomes

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Introduction: Traumatic brain injury (TBI) is a leading cause of disability and death in childhood, in which injury patterns vary by age. This study aims to describe the characteristics and the differences in critical care management and outcomes among paediatrics and adults.

Methods: We included in the analysis CENTER-TBI patients admitted to the ICU or ward. Patients with <18yrs were compared with adults (18-65yrs) and elderly (>65yrs). Clinical variables were expressed by mean (standard deviation) or frequency (%). Clinical data considered for the analysis: ICP monitoring, Therapy Intensity Level (TIL), and outcomes at ICU discharge/6-month.

Results: Among 3661 TBI patients, 227 were paediatrics (12% < 5yrs, 29% 5-12yrs, 59% 13-17yrs), 2437 were adults and 997 were elderly. Twenty-two percent of paediatrics and elderly and 31% of adults had severe TBI (GCS<9). Invasive ICP monitoring was more frequently used in adults and adolescents (≈45%). Mean ICP values during the ICU stay were ≈13-14mmHg in all patients. Among patients with intracranial hypertension (ICP>22mmHg), a TIL>10 was recorded more often in paediatrics and adults than elderly (52% vs 33%). Mortality and poor neurological outcome were low in paediatrics (3%, 10%) and higher in the elderly (31%, 49%). Good recovery was more represented in paediatrics (64%, p<0.001, even though adjusted for severity OR=1.82 (1.29-2.60) p<0.001). Table 1 summarise data from ICP monitoring and outcomes.

Conclusion: Need for invasive ICP monitoring was higher in adults and adolescents reflecting TBI severity and the need for a more aggressive approach. We found no differences in mean ICP values during ICU stay and outcomes among age groups in paediatrics. Though there were no differences in severity at ICU discharge in all groups, paediatrics showed better outcomes at 6 months.

Table 1 – Data from ICP monitoring and outcomes

	Overall population				Paediatric patients			
	Paediatrics (< 18 years)	**Adults** (18-65 years)	**Elderly** (> 65 years)	**p**	**Children** (0-4 years)	(5-12 years)	**Adolescents** (13-17 years)	**p**
n	**227**	**2437**	**997**		**27**	**65**	**135**	
ICP monitoring, *n* (%)	52 (38.8)	689 (46.3)	183 (34.2)	<0.001	3 (18.8)	12 (33.3)	37 (45.1)	0.103
ICP monitoring duration (days)	6.00 [3.00, 12.25]	6.00 [3.00, 11.00]	5.00 [3.00, 9.00]	0.120	3.00 [3.00, 8.50]	8.00 [4.00, 12.00]	6.00 [2.00, 12.25]	0.915
Mean daily ICP during ICU stay, mean (SD)	12.82 (10.47)	12.98 (8.93)	15.27 (15.43)	0.035	11.30 (1.98)	12.70 (4.64)	13.00 (12.37)	0.965
Number of patients who experienced intracranial hypertension (ICP > 22 mmHg), *n*	31	398	97		2	9	20	
TIL > 10 performed in patents with intracranial hypertension, *n* (%)	16 (51.6)	214 (53.8)	32 (33.0)	0.001	1 (50.0)	6 (66.7)	9 (45.0)	0.557
GCS < 9 at ICU discharge, *n* (%)	111 (98.2)	1122 (99.0)	333 (97.9)	0.254	10 (100.0)	33 (97.1)	68 (98.6)	0.783
ICU mortality, *n* (%)	6 (2.9)	134 (6.5)	111 (12.9)	<0.001	1 (4.8)	1 (1.6)	4 (3.3)	0.712
Unfavorable GOS-E (< 4) at 6 months, *n* (%)	20 (9.8)	500 (24.4)	420 (48.7)	<0.001	2 (9.5)	5 (8.1)	13 (10.7)	0.854
Mortality at 6 months, *n* (%)	6 (2.9)	193 (9.4)	265 (30.7)	<0.001	1 (4.8)	1 (1.6)	4 (3.3)	0.712
Good recovery (GOS-E 7-8), *n* (%)	131 (63.9)	976 (47.6)	355 (41.2)	<0.001	14 (66.7)	34 (54.8)	83 (68.0)	0.204