



### H45 Child Abuse and Head Trauma: A Retrospective Analysis for Diagnosis

*Monica D'Amato, MD\*, SC Medicina Legale - AOU Città Salute e Scienza, C So Bramante 98, Torino 10121, ITALY; Francesco Lupariello, MD\*, Corso Galileo Galilei 22, Torino, ITALY; Serena Maria Curti, MD, Sezione Medicina Legale DSSPP - Univ. TO, C So Galileo Galilei N 22, Torino 10121, ITALY; Lucia Tattoli, PhD, Sezione di Medicina Legale, University of Turin - Corso Galileo Galilei, 22, Torino 10126, ITALY; Davide Santovito, MD, Department of Public Health and Pediatric Sciences, Corso Galileo Galilei 22, Turin 10126, ITALY; and Giancarlo Di Vella, MD, PhD, University of Torino, Dept Public Health Sciences, Sezione di Medicina Legale, Corso Galileo Galilei 22, Torino 10126, ITALY*

After attending this presentation, attendees will understand the importance of considering head trauma in child abuse, one of the most dangerous findings since obscure and life-threatening lesions may be overlooked, leading to accelerated morbidity and even death.

This presentation will impact the forensic science community by showing the importance of a careful diagnosis, not only to provide adequate care, but also to ensure complete and accurate reporting of the event to the prosecutor's office.

At this time in Italy, there is no specific nationally approved protocol that has been adopted for investigating head trauma associated with child abuse. This study was initiated to establish whether or not certain anamnestic, clinical, or instrumental factors can be strongly associated with the diagnosis of abusive head trauma in children. In the event of child abuse, the most important aspect is to ensure an early and correct diagnosis.<sup>1</sup> In fact, according to the literature, a diagnostic delay is responsible for an increase in the death rate. Nevertheless, the lesions observed during the medical examination are rarely a certain sign of abuse because of their lack of specificity.<sup>2</sup> Also, a precise diagnosis is more difficult in children because of their limited verbal skills and often a lack of cooperation during the examination.

A retrospective analysis was conducted on cases of pediatric head trauma observed in one year (2011) in the emergency room of the Pediatric Hospital (Ospedale Infantile Regina Margherita) in Turin, Italy. The study sample included 658 selected children less than 40 months of age. Among all the variables registered, the analysis was focused on gender (A), age (B), length of time elapsed between the trauma and the access to the emergency department (C), congruity of the parents' story about how the trauma happened (D), previous contacts with the unit (Bambi) of the same hospital, which is dedicated to the evaluation of suspected abused children (E),  $\geq 2$  visits to the Emergency Room (ER) for other trauma (F), vomit (G), loss of consciousness (H), and other lesions such as bruises, abrasions, cranial or facial fractures (I). The sample included 361 males (55%) and 297 females (45%). Most of these children (46%) were between 0 and 12 months, with a peak between 6 and 12 months of age. The male children were generally younger than females, although there was no statistical significance in this association ( $p = 0.679$ ). Seven logistic regressions were conducted to estimate the probability of the F-variable as a function of the B, C, D, E, G, H, and I variables. Statistical significance emerged from the logistic regression between the F-variable and B-variable: children with  $\geq 2$  admissions to the ER for other trauma were significantly ( $p = 0.007$ ) older than children with  $< 2$  accesses. The same relationship was observed between the F-variable and E-variable ( $p = 0.001$ ) and between the F-variable and H-variable ( $p = 0.002$ ). Most of the children with  $\geq 2$  admissions to the ER for other trauma had already visited the Bambi unit, dedicated to the evaluation of suspected abused or mistreated children



(E) and presented on arrival at the ER with unconsciousness (H). A multiple logistic regression was conducted between the F-variable and B, E, and H variables. After this, the odds-ratio was estimated: F-variable (OR = 33.5) and I-variable (OR = 4.6). This study demonstrates a statistical correlation between multiple admissions ( $\geq 2$ ) to ER's for trauma and age, previous admissions dedicated to the evaluation of suspected abused children, and unconsciousness. This presentation should serve as a stimulus to heighten the awareness of the importance of systematically collecting clinical data about head injuries in suspected or confirmed cases of child abuse.<sup>2,3</sup> The analyses of multiple data points and clinical findings associated with head trauma serves to accelerate and improve clinical interventions. Furthermore, this study illustrates the utility of a unit dedicated to the evaluation of suspected abused children for the diagnosis of child abusive head trauma.

### Reference(s):

1. Fujiwara T., Okuyama M., Miyasaka M. Characteristics that distinguish abusive from non abusive head trauma among young children who underwent head computed tomography in Japan. *Pediatrics*. 2008 Oct;122(4):e841-7.
2. Maguire S., Pickerd N., Farewell D., Mann M., Tempest V., Kemp A.M. et al. Which clinical features distinguish inflicted from non-inflicted brain injury? A systematic review. *Arch Dis Child*. 2009 Nov;94(11):860-7.
3. Cory C.Z., Jones M.D., James D.S., Leadbeatter S., Nokes L.D. The potential and limitations of utilising head impact injury models to assess the likelihood of significant head injury in infants after a fall. *Forensic Sci Int*. 2001 Dec 1;123(2-3):89-106.

---

### Child Abuse, Diagnostic Findings, Head Trauma