



Case review

The medico-legal aspects of road traffic deaths in children under 5 years of age



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ABSTRACT

The family tragedy that results from a child who dies in a road traffic accident may be exacerbated by judicial consequences for the adult/parent driving the vehicle, carrying the child, or responsible for properly immobilising the child in the safety device that was used. The author presents two court cases of the road traffic accident deaths of two children under the age of five years. The two cases are presented using a methodological approach, which integrates competencies in other fields into the medico-legal aspects. An analysis of the two cases provides the opportunity to discuss the driver's responsibility to properly use child safety seat and to analyse and evaluate the efficacy and limits of child restraint systems. In the two cases, the responsibility for the application of a child safety device was excluded. It was confirmed that child protective devices are not always sufficient to avoid lesions or death in road accidents that occur with significant speed or other specific dynamics.

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1. Introduction

In Italy, in 2011, there were 2,084 deaths in children under 5 years of age, and the mortality rate per 1000 live births was 3.9, lower than that observed in Europe and the United States.^{1,2} Deaths that occur during the first year of life are the largest percentage of the total number of deaths that occur during the first 5 years of life. In Italy, during the first year of life, a decrease from 28 to 24 cases (1.4 percent of the total causes of death within the first year of life) in the number of traumatic and poisoning causes of death was observed from 2006 to 2011.

In Italy in 2013, 16 children (9 males and 7 females) were killed and more than 2500 (1459 males and 1313 females) under 5 years of age were injured in road accidents. Of those who died, 9 of the 16 children were transported by motor vehicles below 1500 cc.²

The tragedy families face as a result of a child's traumatic death in a traffic accident may be exacerbated by judicial consequences for the adult/parent driving the vehicle, carrying the child, and/or responsible for properly immobilising the child using a safety device. An assessment of these criminal liabilities requires integrating a technical evaluation of the traffic accident dynamics into the

medico-legal assessment. The medico-legal assessment presents peculiar features compared to the evaluation of the adult.³

The two court cases described below use a forensic approach typical in cases involving the deaths of children transported in cars and give the opportunity to discuss the driver's responsibility to properly use child safety seat and to analyse and evaluate the efficacy and limits of child restraint systems.

2. Description of the cases

The two cases described below were analysed using the following methodological approach: 1. collection and examination of the documented data, including a reconstruction of the road accident; 2. direct evaluation of the child restraint system; 3. collection and analysis of the clinical data, if available; 4. pre-autopsy radiological investigation; 5. autopsy⁴; 6. histopathological material revision with an expert in paediatric histopathology; and 7. integrated assessment of the data from previous phases for the identification of the cause of death and evaluation of the driver's responsibility to properly use child safety seat.

2.1. Case 1

In 2014, a 1300 cc car driven by a foreign 34-year-old female resident of Italy drove off the roadway, descended onto the road

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support, and stopped in a ditch near the road. The difference in height between the road and the level of the ditch was approximately 3 m. A 4-month-old child in a child restraint system was being transported in the passenger seat of the vehicle. Rescuers arrived at the target after a few minutes and found the child in cardio-respiratory arrest inside the car. No brachial or carotid activity was found, and the electrocardiogram showed asystole. The administered resuscitative measures were unable to resume cardio-respiratory activity. The child was pronounced dead an hour after the start of resuscitation.

The driver of the vehicle, the mother of the child, was investigated for manslaughter. A reconstruction of the dynamics of the accident showed that the car was moving below the speed limit. An autopsy of the child was requested. The child weighted 4.6 kilos. External examination of the child's body showed no signs of external trauma except abnormal motility in the neck. Malformations or other natural pathological factors were excluded. The autopsy showed a fracture of the first cervical vertebra with a histopathological haemorrhage and oedema of the marrow, oedema of the brain stem. A lesion in the brainstem due to the fracture of the first cervical vertebra was identified as the cause of death. These lesions were caused by the hyperflexion distraction trauma exerted on the neck of the child. The child was regularly restrained. The lack of manufacturing defect excluded any product liability. The mother's liability in relation to restraining the child was excluded but not in relation to the dynamics of the accident. The woman two months after the road accident tried to commit suicide but she was saved by the husband.

2.2. Case 2

In 2014, a three and a half-year-old child transported in a car seat in the back seat of a 1500 cc car was the victim of a car accident. The car was driven by the father of the child and its front end collided with another car. Rescuers reanimated the child without the resumption of cardio-respiratory activity for an hour and 50 min. The driver of the vehicle was investigated for manslaughter.

The impact shown by the reconstruction of the dynamics occurred at a speed of approximately 65 km/h. An autopsy of the child was requested. The child weighted 9.8 kilos. A total body CT scan performed before the autopsy showed the complete detachment of the first cervical vertebra from the second (Photo 1). A necroscopic examination showed diffuse external abrasions, specifically in the left lateral region of the neck (Photo 2). The section highlighted a complete separation between C1 and C2 and the interruption of the spinal cord. Histology showed hemorrhagic features and oedema of brainstem and the spinal cord. The cause of death was identified as cardio-respiratory arrest due to the lesion of the brain stem due to the complete separation between C1 and C2. The injuries were the result of hyperflexion distraction trauma to the neck of the child. The child was regularly restrained. The lack of manufacturing defect excluded any product liability. The father's liability was identified based on the dynamics of the accident. No information about the capacity of the family to cope with the tragedy occurred is available.

3. Discussion

The two presented court cases, rare from an epidemiological point of view, unusual in relation to the dynamics (case 1) and the characteristics of the lesions (both cases), show it is necessary to use a specific forensic methodological approach in the analysis of similar cases. The methodological approach put in evidence, with relation to specific phases, some issues which must be considered



Photo 1. Total body CT scan.

by a medical examiner in cases of road traffic death in children and are not necessarily examined in every paediatric autopsy.

Both accidents involve a relatively low engine car, which is consistent with the epidemiological prevalence of child traffic deaths in vehicles with engines lower than 1500 cc² in Italy. In some cases, especially with dated cars, the data reflects a correlation among the power, energy absorption capacity, and characteristics of the protective structures of a vehicle. The factors that influence the safety of a vehicle's passengers during a collision are innumerable (e.g., the speed of the vehicle on impact, the characteristics of its energy-absorbing structures, whether it receive frontal or side impacts, mismatches between the heights of the colliding vehicles, etc.) and are often independent from the power of the transporting vehicle.⁵

In case 1, the death was a baby male child of foreigners. The nationality, despite being indifferent in this case, was found to be an epidemiological factor that may influence the rate of infant mortality and traumatic deaths, as shown below. Since 2006, the mortality rate of Italian children has been consistently lower than



Photo 2. Abrasion in the left lateral region of the neck.

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