

CASE REPORT

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An Unusual Fatal Case of Accidental Asphyxia in a Child

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ABSTRACT: The death of a three-year-old child by asphyctic mechanism is described. The child was accidentally suspended by the neck from a half-opened car window. This report details the form in which the accident occurred. The influence of the type of window and the autopsy findings.

KEYWORDS: pathology and biology, forensic pathology, childhood accidents, asphyxia, strangulation

In western countries, the leading causes of mortality during childhood are accidents, the most frequent being traffic accidents, intoxications, burns, and mechanical asphyxias. The incidence of accidental deaths in children shows an heterogeneous distribution throughout the year, with a higher incidence coinciding with holidays and when children are playing [1,2].

Head injury is the most important cause of death between ages 1 and 15 [3]. Burns and asphyxia follow in order of frequency in children under five [4]. Many of these accidents occur at home and are produced by household furniture and constructional elements of the house [5].

One of the most frequent causes of accidental asphyxia in children is strangulation. Feldman and Simms [6] reviewed the causal mechanisms in a series of 233 cases. They observed some constant patterns: the largest group included strangulation caused by playpens, cribs, highchairs, clothing, etc. They can be prevented by improving product safety regulations. A second group, which involves a variable proportion of cases and includes rope strangulation, can only be prevented by directly counselling parents so that they take more precautions [7].

We present the case of a child strangulation that could be included in this second group.

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Case Report

On a winter evening in 1991, a three-year-old boy was found by his parents hanging by the neck out of an half open window of the family car (Fig. 1). Fifteen minutes earlier, the mother had seen the child playing in the street area in front of their house, where the car was parked.

According to the mother, the child was unconscious and breathing had stopped. A doctor unsuccessfully tried resuscitation. However, the child was taken to a hospital 18 km away. During the journey, the mother tried to administer mouth to mouth artificial respiration and reported that the child vomited several times.

Thirty minutes after the accident, he was admitted to the hospital, where after repeated efforts and pharmacological shock treatment, resuscitation was achieved. However, his neurological condition was deep coma with bilateral mydriasis and complete lack of motor responses.

After initial resuscitation, the child was intubated and supported on a ventilator, and was admitted to the Intensive Care Unit, presenting distal cyanosis, weak pulses in the extremities, hypotension, hypernatremia and respiratory acidosis. Chest X-rays indicated acute pulmonary edema and possible aspiration pneumonia. Five hours after admission, the above situation persisted with a weak slight improvement in the arterial oxygen level, but tachycardia appeared (208 b.p.m.). Cardiac arrest and death occurred 12 h after admission to the hospital.

Autopsy Findings

Autopsy was performed 28 h after death, the corpse having remained at room temperature (20°).

External examination revealed a well-nourished male, who was well-developed for his age and measured 92 cms in height.

The body was in process of putrefaction. Green discoloration was very extensive over the face, abdomen and lower extremities. Superficial venous system was marked on the skin. A scattering of petechial hemorrhages was present on the conjunctival surfaces of the eyes and on the eyelids. On either side of the neck there was a transversal linear hematoma that infiltrated the underlying muscle tissue.

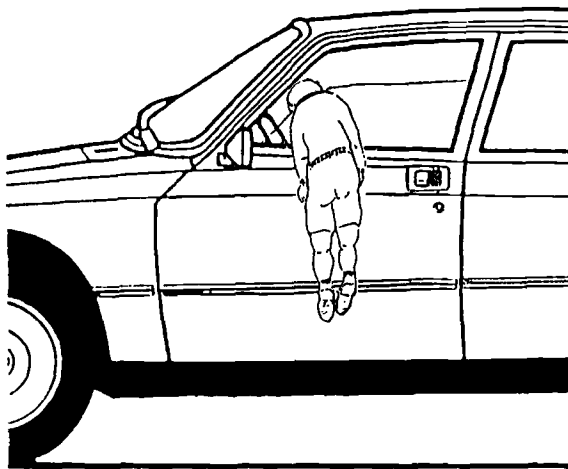


FIG. 1—Position of the child when he was found.

Craneal cavity: the brain presented edema, and fine punctate hemorrhages appeared after cutting the cerebral parenchyma. Green spots were observed in several brain areas.

Thoracic cavity: The lungs were edematous and dark blood flowed on dissection. No food particles were present in the lumen of the trachea or bronchi. The cardiac cavities presented dark blood and clots.

Abdominal cavity: apart from a generalized non-specific congestion of the viscera, no other significant findings were identified.

The cause of death was certified as asphyxia by strangulation, secondary to accidental constriction of the neck.

Discussion

Irreversible anoxic cerebral lesions could be expected because of the length of time that elapsed from the accident until cardiac resuscitation was achieved (about 40 min). In spite of the relative short time between death and the autopsy (28 h), the advanced stage of putrefaction presented by the body was surprising. In our opinion, the responsible factors could have been that it was a child, the mechanism causing death was asphyxia, and the body had spent 10 h in an enclosed space at 20° [8].

The main autopsy finding was the presence on either side of the neck of a transversal hematoma consistent in form and location with the zone of compression exerted by the window from which the child was suspended. The fact that the hematomas infiltrated the underlying muscle tissue is a sign of a vital reaction.

Other autopsy findings such as the conjunctival and palpebral petechiae, edema and punctate cerebral hemorrhages, presence of dark blood in the cardiac cavities and pulmonary vessels, congestion of the abdominal viscera, etc., together with the advanced stage of putrefaction in comparison with the time elapsing following death, confirmed the hypothesis of asphyxia by hanging as the mechanism causing death [9].

No food particles were found in the trachea or bronchi, which excluded the possibility of aspiration pneumonia. This complication was suspected on admission to the hospital because the child had vomited during the journey, and the chest x-rays. This complication is common in childhood injuries [2].

Measurements of the vehicle were made at the scene of the accident to find out if the child could have climbed up to the car window by himself:

—height of the ornamental strip moulding = 52 cms.

—distance from ground to the upper edge of the glass of the half open window = 119 cms.

There was no pavement or curb at the point where the accident occurred. Given the height of the child (92 cm), he must have climbed up on to the moulding, gaining leverage from the wing mirror and the edge of the window itself. He could then have put his head through the wider part of the opening. He might have slipped with the result that his head would have slid to the much narrower front part of the window, thus becoming suspended (Figs. 1 and 2).

Because of the shape of the window (Fig. 3), the relationship between the distance from the upper edge of the glass to the upper window frame (x) and the distance between the frame and the anterior edge of the glass (z) is 2,06. It explains how the child could put his head through the wider part, and after slipping to the narrow part, became trapped with constriction of the neck causing asphyxia.

Conclusions

It is worth mentioning that in those car models in which the driver's window has two modules (one fixed, triangular, and the other a movable rectangular glass) it is much

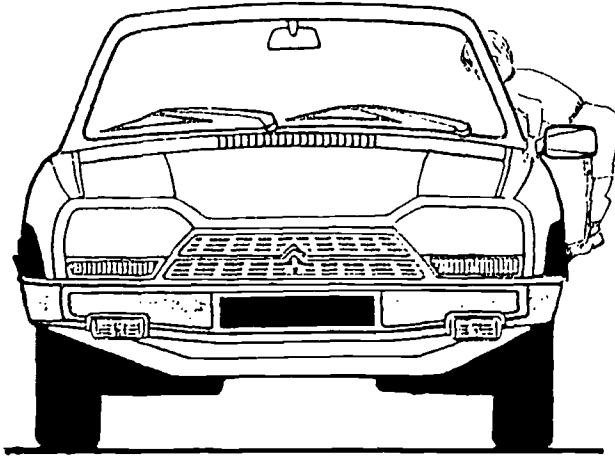
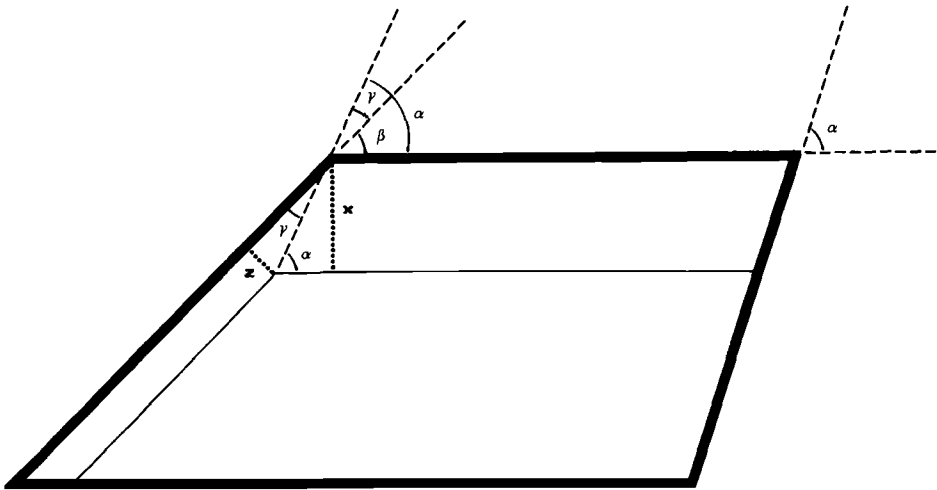


FIG. 2—Probable mechanism used by the child to climb up: he must have put his feet on to the moulding gaining leverage from the wing mirror and the edge of the window itself.



$\alpha = 69^\circ$	$\text{sen } \alpha = \frac{x}{h}$	$\frac{x}{z} = \frac{\text{sen } \alpha}{\text{sen } \gamma} = \frac{\text{sen } 69^\circ}{\text{sen } 27^\circ} = 2.06$
$\beta = 42^\circ$	$\text{sen } \gamma = \frac{z}{h}$	
$\gamma = \alpha - \beta = 27^\circ$		

FIG. 3—Relationship between the distance from the upper edge of the glass to the upper window frame (x) and the distance between the frame and the anterior edge of the glass (z).

more difficult for a similar case to occur. In this respect, therefore, they can be considered to be of safer design. The same is true of cars with no strip moulding running down the sides.

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