

## CASE REPORT

# Accidental asphyxia due to closing of a motor vehicle power window

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Injuries and deaths among children left unattended in motor vehicles are frequent and the rates are increasing. Injuries associated with motor vehicle power windows usually affect children, in particular children under 6 years of age. This case report is about a child who was asphyxiated because of a motor vehicle power window closing. She was rapidly resuscitated and recovered fully. A brief review of the literature, epidemiology, and preventive measures to avoid this type of injury is also presented.

Injuries in stationary vehicles are a poorly recognised type of vehicle injury and receive far less attention than motor vehicle crashes. These injuries are often easily preventable and should be given greater emphasis in education campaigns.<sup>1</sup> We describe a case of asphyxia in a stationary car caused by closing of a motor vehicle power window. Further, we review previously reported cases in the literature and discuss the causes of the accident and the safety measures that could have prevented it happening.

### CASE REPORT

A 34 month old girl was left in the car by her father while he went to a grocery store. The ignition was turned off and the father took the keys with him. The girl was sitting in the front passenger seat and was unrestrained. The vehicle had a remotely activated lock system that automatically closes the windows. Five to ten minutes later, the father found his daughter with her neck stuck between the top of the window and the upper door frame. She was in an unresponsive state and apnoeic. He immediately initiated basic life support and took her to a nearby emergency centre.

On arrival she was comatose, breathing spontaneously, and seizing. Anticonvulsive drugs were administered and continuous monitoring started. She was then transported to our paediatric intensive care unit (PICU). On arrival she was self-ventilating and responsive to pain, with a Glasgow Coma Scale (GCS) score of 7, weak pulses, and poor peripheral perfusion. Cranial and cervical tomography scans were taken and showed mild cerebral oedema, with otherwise normal brain and cervical spine. No further intervention was considered necessary and she was closely observed with hourly neurological observations. After 24 hours she was responsive with a GCS of 15/15. She was discharged after six days with normal findings on neurological examination, head tomography, and electroencephalography.

### DISCUSSION

Strangulation is one of the most important causes of accidental asphyxia in children and in most cases deaths can be prevented by education, supervision, or structural modifications.<sup>2</sup> In 1980, Feldman and Simms,<sup>3</sup> in a study on the epidemiology of strangulation in children, reported the first five cases of strangulation by motor vehicle power

windows. Another three fatal cases (two in 1992<sup>4</sup> and one in 1997<sup>6</sup>) have been reported, and only one non-fatal case, in 1993, has been described.<sup>7</sup> Despite these injuries not being frequently reported, we believe that the actual incidence is higher. In a petition to the US National Highway Traffic Safety Administration (NHTSA) in 2003,<sup>8</sup> a consortium led by the Centre for Automotive Safety, described 33 deaths (mostly from non-scientific sources) associated with power windows since the introduction of the current legislation in 1971. There is no formal reporting system for injuries caused by power windows, however the NHTSA reviewed deaths from 1998 to 2002 and found 10 cases were associated with power windows.<sup>9</sup> In addition, a study in 1997 estimated that at least 400 people per year in the USA experience injuries related to power windows, and that the injuries are more frequent and more severe in children.<sup>10</sup>

If used inappropriately, motor vehicle power windows can be a potential hazard for children. For the purpose of child protection, some current devices have a mechanism to stop the window closing further automatically if it meets obstacle. The car in the case described here did have this mechanism, however, it was not enough to prevent the accident. It is thus likely that the direct pressure of the window on the child's neck was not the main mechanism of injury. Probably the weight of the child, with her neck stuck in a partially closed window, worsened the asphyxia. In 1992, Calvet *et al*<sup>4</sup> described a similar case in which the asphyxia was fatal as the child's neck slipped from a wider part to a narrower part of a motor vehicle window.

In view of this potential hazard, it is reasonable to advocate for a more effective safety mechanism in motor vehicle windows, such as automatic reversal systems. These devices are already present in vehicles produced in some countries. Recently, the NHTSA amended the standard for power windows, requesting that manufacturers of power windows not equipped with automatic reversal system should use switches resistant to accidental actuation.<sup>11</sup> In the same amendment the NHTSA denied two petitions requesting all new vehicles to be equipped with an automatic reversal system or other anti-entrapment feature. This amend has a compliance date of 1 October 2008.

An important point to highlight in our report is that a 34 month old child was left unattended and unrestrained in a car's front seat. There is no doubt that parental counselling is the most important preventive action in prophylaxis of severe accidents in childhood.<sup>12</sup> The American Association of Pediatrics (AAP) recommends appropriate counselling by paediatricians, alerting parents to the many risk behaviours and environments. Paediatricians should stress that children must not be left unattended in motor vehicles. The AAP recommends the appropriate use of currently approved child safety restraints which in our case could have avoided the accident. Special seats and seat belts for children are devices that should never be overlooked by parents, since they are easy to apply and can prevent several types of injury.<sup>13</sup>

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