



### D17 Death and Disability Due to Delayed Airbag Deployment

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After attending this presentation, attendees will learn of mechanisms of injury from late airbag deployment, which was the proximate cause of disability and death in this accident. The value of a multidisciplinary approach is emphasized in elucidating the split-second concatenation of several design, structural, and operational failures required to produce this copiously illustrated calamity.

This presentation will impact the forensic community by demonstrating the value of assembly of multidisciplinary groups of forensic scientists in the analysis of complex events.

To avoid a vehicle entering the highway from a side road, a 1997 Infiniti Q45 four-door Sedan swerved into the oncoming lane. This caused an offset head-on collision with a 1996 2-door Chrysler Sebring. All occupants in both vehicles were belted and the frontal airbags deployed. Of the six occupants of the Infiniti, only the driver was injured with a broken leg and big toe. The driver of the Sebring was dead at the scene and his daughter, age 9, in the front passenger seat sustained a depressed skull fracture and brain damage.

Why this enormous disparity in severity of injury to the two sedans? The working hypothesis was delayed airbag deployment in the Sebring.

An array of experts — automotive engineers, a blood splatter specialist, a forensic pathologist, a forensic radiologist, and other medical specialists — were assembled to analyze and reconstruct the accident and its sequelae.

The driver's compartment, markedly reduced by intrusion of the engine compartment and left front wheel well, entrapped him between the seat back, the airbag, and the steering wheel. The driver was not autopsied after the accident, but on exhumation, had compression injuries of the chest with multiple postero-lateral left rib fractures, lacerations of the lung and diaphragm, and hemothoraces. These injuries were attributed to the explosive force of the late deploying airbag crushing him against the unyielding seat back. The intrusions also caused multiple fractures of the lower extremities.

The child was unconscious in the front seat, which was in maximal forward position. After airlift to a trauma center, she was found to have seatbelt abrasions of her right neck and shoulder and her left hip, abrasions and contusions of her legs, and a left-sided laceration of the scalp. A CT revealed a depressed left parietal skull fracture and contusions and edema of the brain.

Unraveling the mechanism of the head injury required understanding a complicated series of failures of safety features in the Sebring. A paralegal noticed that the scar on the girl's head matched the configuration of the airbag door's corner. The pathologist superimposed an exemplar door in the scan to confirm the pattern.

The radiologist obtained a 3-D reconstruction of the calvaria from the original CT data. This showed a long, narrow depressed fracture suggesting impact on or from a dull rounded edge such as the airbag door which, on review of photos, had a bent corner facing the passenger's right. A luminol test showed blood on that corner of the door.

But how was the head juxtaposed to the door? The engineers remembered that failures of the latching system on the front seat rails of the Sebring had prompted a recall. This failure was confirmed in the involved vehicle. At impact the vehicle was twisted to the left, but the momentum of the child was directly forward, rotated her upper body clockwise and downward. A Canadian Transport test film had shown a delayed opening of both airbag doors of the Sebring. Thus, at an unfortunate millisecond in time, her accelerated left parietal area collided with the explosive force of the opening airbag door.

Follow-up medical evaluations predict permanent lower extremity disabilities and limited mental capacity at the 8-year-old level. A civil suit was filed for wrongful death, personal injury, and product liability.

This case emphasizes the value of assembly of multidisciplinary groups of forensic scientists in the analysis of complex events.

#### **Accident Investigation, Airbag, Safety System Failure**