



## Pathology/Biology Section - 2016

---

### H85 A Retrospective Review of All-Terrain Vehicle (ATV)-Related Fatalities in Puerto Rico

*Javier G. Serrano, MD\**, PO Box 361538, San Juan, PR 00936-1538; and *Carlos F. Chavez-Arias, MD*, PO Box 361538, San Juan, PR 00936

---

The goal of this presentation is to describe ATV-related fatalities evaluated during the period from January 2008 to December 2014 at the Puerto Rico Institute of Forensic Sciences.

This presentation will impact the forensic science community by describing 90 ATV-related deaths from a forensic perspective, focusing primarily on the types and mechanisms of injury.

ATVs are three- or four-wheel motorized vehicles intended for use by riders on off-road, non-paved surfaces. ATVs are a popular form of motorized recreation and are also used in a variety of occupational settings including agriculture, construction, and law enforcement. With their rising popularity, there was a corresponding increase in the incidence of injuries and deaths due to ATV accidents.

Ninety cases of ATV-related deaths were received for postmortem examination during the period from January 2008 to December 2014 at the Puerto Rico Institute of Forensic Sciences. Of the 90 cases, 74 (82%) were males and 16 (18%) were females. Three fatalities (3.3%) corresponded to people younger than 16 years of age. The ages ranged from 16 years to 20 years in 14 (15.6%) cases, from 21 years to 30 years in 40 (44.4%) cases, from 31 years to 40 years in 26 (28.8%) cases, and in 7 (7.8%) cases the decedents were older than 40 years. In 71 (79%) cases, the fatally injured person was the driver and in 17 (19%) cases the passenger. Two cases (2.2%) corresponded to a motorcyclist and a pedestrian hit by ATVs. In 75 (83%) cases, the accident occurred on a public paved road and 15 (17%) cases occurred in rural areas. In 89 (99%) of the 90 cases, the ATV was used for recreational purposes and in one case for work-related usage. The mechanism of injury included fall/ejection from the ATV in 67 (74.4%) cases, loss of stability and rollover in 4 (4.4%) cases, and collision with a stationary/moving object in 16 (17.8%) cases. In one case, the ATV and the driver were swept away by a river and in two cases, ATVs hit a pedestrian and a motorcyclist. In 31 (34.4%) cases, the death occurred at the scene, 22 (24.4%) of the injured died the same day under medical care, 27 (30%) died between the 2nd and 5th day of hospitalization, and in 10 (11.1%) cases the death occurred after the 5th day of the hospital stay.

The type of injuries found at autopsy were divided into three groups. Head and neck injuries were present in 85 (94.4%) of the cases, thoraco-abdominal injuries were detected in 51 (56.7%) cases, and severe upper and/or lower extremities injuries occurred in 20 (22.2%) cases. Severe head trauma was the cause of death in 34 (38%) of the cases. In one case, the ATV driver drowned in a river. Blood alcohol level was less than 0.08%/weight in 15 (16.7%) cases and higher than 0.08%/weight in 16 (17.8%) of cases. Among illegal drugs, cannabinoids were detected in eight cases, cocaine in one case, benzoylecgonine in seven cases, and opioids in one case. Alcohol and illegal drugs were detected together in nine cases. In 56 (62%) cases, the toxicology came back negative for both alcohol and illicit drugs. Helmet and other security equipment usage were reported in only one case.

The results of this study show that most of the fatalities involved young male drivers. Passenger fatalities involved mostly females. ATVs lack the general stability of other vehicles and are not meant to be driven on regular paved roads. This study shows that most of the accidents occurred on a public road and during recreational use, which are recognized risk factors for ATV-related deaths. Fall/ejection from the ATV was the predominant mechanism of injury. This mechanism, in addition to the lack of use of a helmet, correlates with the most frequent injury found in this study. Head and neck injuries were present in more than 90% of the cases and severe head trauma was the cause of death in nearly 40% of the cases. Head injuries are frequently fatal in ATV accidents as demonstrated in these cases. Head injuries included subdural and subarachnoid hemorrhages, skull fractures, and brain contusions.

There is a lack of research regarding ATV-related fatalities from a forensic perspective. This study demonstrates a wide spectrum of injuries found at autopsy and correlates them with the mechanisms of injury.

---

#### ATV-Related Fatalities, Type of Injury, Mechanism of Injury