The Dangers of ATVs

PAMELA HORN, MSN, CRNP, RNFA,
JAN KLAMAR, MD,
JONATHAN GRONER, MD,
and KEVIN KLINGELE, MD
Nationwide Children's Hospital
Columbus, Ohio

An all-terrain vehicle—ATV—is described by the American National Standards Institute as one that "travels on low pressure tires, with a seat that is straddled by the operator, and with handlebars to be used for steering."[1] By this definition, an ATV is designed for interactive riding by a single operator. Drivers are able to shift their weight freely in all directions depending on the situation and terrain. According to ATV safety standards and recommendations, children younger than 6 years are never to be on an ATV of any size—alone or with someone else. Retailers are supposed to give safety information to consumers when an ATV is purchased. Most of these vehicles have thorough safety guidelines listed on their Web sites.

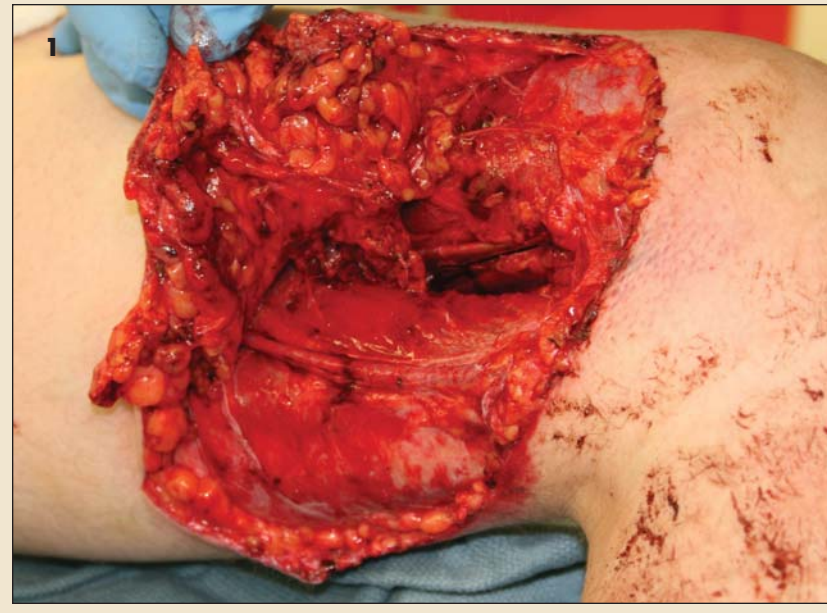
ATVs come in different sizes with engines that range from 50 cc to over 700 cc (horsepower cannot be correlated). The adult-sized ATVs can weigh 500 to 700 lb. This brief description should be kept in mind while reading the case studies that we present here. These cases involve pediatric patients who were admitted to our Level I urban pedi-

The authors are affiliated with Nationwide Children's Hospital in Columbus, Ohio. Ms Horn is a nurse practitioner and program coordinator for orthopedics. Drs Klamar and Klingele are pediatric orthopaedic surgeons. Dr Groner is a pediatric trauma surgeon. The authors would like to thank Dr Groner, who contributed the photographs in this photo essay.

Case 1

A 16-year-old was riding a 4-wheel adult-sized ATV without a helmet. When jumping his ATV, the vehicle hit hard coming down; he was propelled over the handle bars and the ATV landed on top of him. He sustained a full-thickness, large (22.5 cm) left distal medial thigh soft tissue injury. The exact mechanism was unknown. The saphenous vein, which was not injured, can be seen in **Figure 1**. There were no other significant injuries or fractures.

The patient underwent surgical intervention for irrigation, drainage, and closure of skin, fascia, and muscle. He received 48 hours of intravenous antibiotic therapy. **Figure 2** shows the closure. The wound healed well.



Case 2

A 6-year-old was a passenger on an adult-sized ATV with his uncle. The ATV rolled over on both of them when the uncle lost control. The boy was wearing a chest protector at the time but no helmet. He sustained extensive injuries to both inguinal areas and to his mid-anterior thighs and lower legs. **Figure 3** shows an angulated, displaced distal tibia as well as fibula fractures. CT scan and an anteroposterior radiograph of the pelvis (**Figure 4**) revealed bilateral nondisplaced pelvic bone fractures involving the right superior pubic ramus and bilateral inferior pubic rami.

The open right tibia wound was extended surgically, irrigated copiously, and the fracture was reduced. Intravenous antibiotic therapy was administered for 48 hours. A drain was placed in the open wound, and the patient was placed in a long leg cast (**Figure 5**). The drain was removed in 2 days through an opening in the cast.

The patient healed without complications.

atric center during the past 2 years. All injuries were sustained while the patient was riding on an ATV.

ABOUT ATVS

In 1980, ATVs were viewed as both recreational and utility vehicles. Deaths from ATV use rose from 29 in 1982 to 299 in 1986. Between 1982 and 2004, over 2000 children died as a result of ATV crashes. During that time, 31% of all ATV-related deaths occurred in children under age 16. Between 2000 to 2004, an average of 500 children and adults perished from ATV-related injuries and approximately 115,000 persons per year were injured during that time.[2-4] From 2001 to 2005 there has been a 24% increase in serious injuries.[5] As of 2005, there were about 6.2 million ATVs (an 89% increase in sales in 5 years) in the United States operated by over 15 million people. This has greatly increased the risk of morbidity and mortality.[6]

Injuries from ATVs can occur anywhere in or on the body. Musculoskeletal injuries are the most common. In 2004, one study noted that extremity fractures were the most prevalent, occurring in 38% of patients.[7] Lower extremity injuries (including 3 partial foot amputations) were more common than upper extremity injuries. Torso injuries accounted for 22% of patient complaints and pulmonary contusions (not abdominal injuries) were associated with increased morbidity and mortality. Brain injuries occurred in 19% of the children and were significantly associated with long-term disability or death.[7] In another study, only 35% were wearing helmets.[6]

At our hospital between January 2006 and August 2007, we had

Case 3

A 16-year-old girl was riding as a passenger on an adult-sized ATV without a helmet when her boyfriend lost control and the ATV rolled over. She sustained a closed head injury, multiple bruises, abrasions, and contusions. A right temporal skull fracture and right temporal fossa epidural hematoma were diagnosed (**Figure 6**).

The patient was treated with close monitoring of the skull fracture and hematomas. She was admitted for 4 days and had follow-up with physical medicine because of the head injury. She will see the neurosurgeon for serial rechecks and scans. She will continue to be monitored closely for her traumatic brain injury because of some memory difficulties, and she will need therapy for an indefinite period.

Table – A sample of admitted patients injured in an ATV accident*

Age	Injury details	Diagnoses
16	Passenger, ATV struck from behind by another ATV	Skull fractures, pneumocephalus, abrasions, contusions, pelvic fractures
12	Driving alone, crashed/roll-over	Grade II liver laceration
11	Driving alone; went onto county road and collided with motorcycle; thrown from ATV	Fractures: thumb (open), humerus, finger with dislocation, arm tendon laceration, ulna, femur (open), tibia (open), multiple contusions, abrasions and laceration
13	Driving alone; struck by auto when crossing a road incorrectly	Supraorbital roof fracture, positive loss of consciousness with closed head injury, iliac wing fracture extending to sacroiliac joint, multiple pelvic fractures, tibia fracture, ankle fracture, multiple abrasions and contusions
5	Driving alone, lost control; fell on ground and ATV ran over arm and neck	Closed head injury, elbow fracture, multiple abrasions
14	Driving alone; rolled ATV; leg pinned by a dune buggy	Pelvic fractures, femur fracture, anal and urethral injuries
4	Passenger with father; ATV flipped backwards, caught leg on steering wheel	Femur fracture
9	Passenger with mother; ATV entered road; struck by a van going 50 mph	Tibia fracture, fibula fracture, closed head injury, multiple abrasions
11	Driving alone; patient jumped off ATV before it struck a tree	Spine fractures, T7 through T10; L3 fracture; pelvic fractures, contusions, abrasions
14	Driving alone uphill; ATV roll-over	Depressed nasal fractures, zygoma fractures, sinus fractures, orbital fractures, radius and ulna fractures, lacerations and contusions

ATV, all-terrain vehicle.

*From Nationwide Children's Hospital, Columbus, Ohio, between January 2006 and August 2007. A total of 125 patients in the trauma registry were treated for ATV-related injuries during this period.

125 patients in the trauma registry who were treated for ATV-related injuries. Of those, 92 were admitted (73%). Sixteen patients seen initially in the emergency department (ED) as trauma alerts were discharged; 17 patients were transferred from another facility and discharged from the ED. Of these 125 patients, 71% were male and 29% were female. There were no fatalities. The **Table** lists just a few of the more serious injuries seen here over the past 13 years, during which there were 2 fatalities. Other injuries include pneumothorax, spleen lacerations, degloving injuries, amputations, spinal cord injuries, and mandible fractures. Fewer than half of the admitted patients had been wearing a helmet, which could account for the many closed head injuries.

In our hospital over the past 20 months, only 14% of those injured were 16 years or older (the recommended age for use of ATVs). If younger patients or their parents had not ignored the warnings, the list would be much shorter. ■

REFERENCES:
1. Specialty Vehicle Institute of America. State all-terrain vehicle requirements. 2006. Available at: www.atvsafety.org/InfoSheets/SummaryChart-May2006.pdf. Accessed October 22, 2007.
2. State ATV information. Deaths associated with ATVs by state. Available at: www.atvsafety.gov/state/state.html. Accessed October 22, 2007.

3. Aitken M. Testimony of Mary Aitken, MD, MPH, FAAP, on behalf of the American Academy of Pediatrics. Commerce, Science and Transportation Subcommittee on Consumer Protection, Product Safety, and Insurance Hearing on All-Terrain Vehicles. June 6, 2006. Available at: http://www.aap.org/advocacy/washing/ATV_testimony_Commerce_final_draft.pdf. Accessed October 18, 2007.
4. Murphy N, Yanchar NL. Yet more pediatric injuries associated with all-terrain vehicles: should kids be using them? *J Trauma.* 2004;56:1185-1190.
5. Consumer Federation of America. ATV injuries and deaths slightly increased. ATVs are not toys. December 6, 2006. Available at: http://www.consumerfed.org/pdfs/CFA_Press_Release_CPSC_ATV_Injuries_and_Deaths_Report_12.06.06.pdf. Accessed October 17, 2007.
6. Kelleher CM, Metze SL, Dillon PA, et al. Unsafe at any speed—kids riding all-terrain vehicles. *J Pediatr Surg.* 2005;40:929-934.
7. Bhutta ST, Greenberg SB, Fitch SJ, Parnell D. All-terrain vehicle injuries in children: injury patterns and prognostic implications. *Pediatr Radiol.* 2004;34:130-133.

Mature Drivers Only

All-terrain vehicles (ATVs) can be fun. However, the driver needs to be emotionally and physically mature enough to operate one. In 2006, the American Academy of Pediatrics (AAP) issued specific recommendations for policy makers regarding children and off-road motorized vehicles.[3]

- ***Children under 16 years should NOT operate ATVs.*** They do not possess the physical strength, coordination, or judgment necessary to drive these vehicles safely.
- ***A driver's license should be required to operate an ATV.*** At present, an unlicensed child is allowed to operate (or ride on) a high-speed, heavy machine but need not be licensed to drive a car in any state.
- ***Alcohol use by operators of ATVs should be prohibited, with zero tolerance among 16 to 20-year-old operators.*** Just as alcohol is illegal while driving a car, it should be prohibited when driving any other motorized vehicle.
- ***ATV use should be banned on paved roads.*** ATVs are not safe to operate on roads and highways. There are few or no lights, no mirrors, no signals, and no safety features. The ideal terrain is a designated, well-maintained trail.
- ***Appropriate protective gear should be required to operate an ATV.*** Helmets save lives. Other gear (gloves, chest protectors, and extremity gear) decreases the chance of injury.
- ***Carrying passengers on an ATV should be prohibited.*** Most ATVs are not designed to carry passengers. The larger seat is designed to allow the adult rider to shift his or her weight and to maneuver as needed.
- ***ATVs should never be operated before sunrise or after sunset.*** ATVs are challenging enough to operate under ideal conditions. Darkness adds risk for injury from unseen immobile and mobile objects.
- ***Manufacturers should redesign ATVs to improve safety.*** Rollbars could greatly reduce the number of injuries sustained during rollovers, and seat belts may limit the number of patients thrown from or who fall off ATVs. Headlights that automatically turn on when the engine is started would make the vehicle more visible. Devices that limit maximum speeds should be employed when an inexperienced driver is operating the vehicle. Efforts should be made to design ATVs so that they cannot carry passengers.

SAFETY TIPS

Both the Consumer Product Safety Commission (CPSC) and the ATV Safety Institute offer the following tips:

- ***Anyone planning on driving an ATV, regardless of age, should take a hands-on training course.*** Courses are offered by the ATV Safety Institute.
- ***No children should ride on an adult-sized ATV.*** More than 90% of children who die in ATV-related crashes were passengers on an adult ATV.
- ***Children younger than 6 years should never be on an ATV, either as a driver or a passenger.***
- ***Children 6 years and older should only ride on ATVs with 50 cc to 70 cc engines.***
- ***Those 12 years and older should only ride on ATVs with 70 cc to 90 cc engines.***
- ***Those 16 years and older can operate ATVs with engines larger than 90 cc.***
- ***Wear protective gear.*** The number one safety device is a helmet. In addition, the CPSC suggests over-the-ankle boots, goggles, gloves, long pants, and a long-sleeved shirt to help prevent cuts, abrasions, and injuries from rocks, trees, and other debris.
- ***No passengers.*** Period.
- ***Do not ride on pavement or public roads.***
- ***Inspect the ATV before each use.*** Check tires and wheels, controls, cables, and chains.
- ***Read the owner's manual.***
- ***Do not operate an ATV while under the influence of alcohol or drugs.***

The AAP would rather that no child ride on an ATV. However, if the above commonsense rules and regulations are followed, many injuries and/or deaths can be prevented. All pediatric ATV injuries and deaths are preventable.