Air Rifles Are More than Toys: BB Gun-Related Traumatic Brain Injury

Blaine Klopotek, PA-C; Richard Weibley, MD; and Rene Chapados, MD

Abstract

Gunshot wounds are traumatic events that emergency departments around the country treat on a daily basis. An increasing number of these wounds are being caused by air rifles that shoot ball bearings (ie, BB guns) and, although uncommon, the results can be fatal. The general public and most practitioners may not realize the damage these “toys” can inflict. This article highlights an unfortunate event involving a BB gun accidentally discharged at close range and the consequences. Data from recent and older studies are discussed regarding the firepower of these guns and their potential for injury.

Air rifles that shoot ball bearings (ie, BB guns) have been in production for decades and are considered by most to be not much more than a toy. This leads to the perception that these guns may be safe for children to use unsupervised; however, modernization has made BB guns into weapons with potentially lethal power. Accidental injuries from BBs can cause a wide variety of complications because of their ability to penetrate the skin, eyes, skull, thorax, and abdomen. This article presents a case of a BB gun-related traumatic brain injury and further discusses BB gun injuries and their prevention.

CASE REPORT

A 10-year-old boy was shooting his BB gun at targets in the backyard with his 12-year-old brother when they ran out of BBs. Assuming that the gun was empty, the older brother pointed it toward the victim and discharged it approximately one foot away from his head. Unfortunately, there was one BB left in the gun and it struck the 10-year-old brother above his right ear. The mother was summoned immediately by the older brother and discharged approximately one foot away from his head. Unfortunately, there was one BB left in the gun and it struck the 10-year-old brother above his right ear. The mother was summoned immediately by the older brother and they found the younger brother lying on the ground, unconscious, unresponsive, and with apneic breaths. Emergency medical services arrived, intubated him, and flew him via helicopter to the emergency department (ED).

Initial examination in the ED revealed a small entrance wound over the right temporal region and above the ear. After sedation was discontinued, the patient was unresponsive with 4-mm reactive pupils, decerebrate positioning, and hypertonic reflexes. A head computed tomography (CT) exam without contrast revealed bone fragments displaced into the right temporal lobe, extensive parenchymal, intraventricular, and subarachnoid hemorrhages. The scan also showed a projectile tract traversing from the right to left temporal lobe with possible Circle of Willis involvement, and a metallic BB in the left temporal lobe (Figures 1 and 2). A cerebral angiogram showed no evidence of vascular injury.

The neurosurgery department was consulted and the patient was taken to the operating room (OR) for a right temporal craniectomy with debridement of bone fragments and placement of an intracranial pressure monitor. Immediately after, a left frontal burr hole with placement of a ventricular drain was completed. The patient was admitted to the pediatric intensive care unit (PICU) for further management. His intracranial pressures (ICPs) and cerebral perfusion pressures (CPPs) were managed with temperature regulation, hyperosmotic therapy, low-normocarbia, sedation, paralytics, head of bed elevated to 30 degrees, minimal stimulation, and eventually a pentobarbital coma. Repeat head
CT scan without contrast showed a similar presentation as before, with increasing brain ischemia. Four days after his arrival, due to his deteriorating clinical exam and difficulty controlling his ICPs and CPPs, the patient was taken back to the OR for a bifrontal and bitemporal decompressive craniectomy. Ongoing neurological exams never improved, but rather worsened to no gag reflex, pupils at 2 mm and fixed, no spontaneous movements, and a minimal, ineffective respiratory effort.

After a PICU hospital course of 1 week, the patient’s family changed his medical status to “do not resuscitate” and ultimately decided to have his body sent for organ procurement.

DISCUSSION

BB guns are classified as nonpowder guns but they can still cause serious injury. Each year, nearly 14,000 shootings occur, with the large majority (roughly 67%), occurring in persons aged 19 years or younger.1,2 The highest incidence occurs in children aged 10 to 14 years, and predominantly in males.3 Because of advancements in gun safety, these injury rates have declined substantially since the early 1990s; however, they still pose a significant threat of morbidity and mortality.4,5 Of note, most incidents are of unintentional nature and occur within close proximity to the victim’s home.3

Most people underestimate the firepower of modern BB guns. Actual firearms and BB guns have a mechanism of action that is very similar, and some BB guns can produce muzzle velocities that are faster than many low-velocity handguns and rifles.5 For example, a .38 caliber Smith & Wesson revolver fires at a velocity of 234 m/sec, but 50% of BB guns sold in the United States fire with a muzzle velocity of 152 to 282 m/sec.4,5 Recent studies state the muzzle velocity in some BB guns can be 364 m/sec.6 Given these numbers, BBs possess enough kinetic energy to penetrate skin and, depending on the body region, to fracture bone.7,8 The extent of injury is due largely in part to the distance from which the BB is fired.9 This patient was fired upon at close range, resulting in the BB entering his temporal bone.

Treatment and management should be determined on a case-by-case basis, with surgical intervention potentially preventing further complications. As with other medical conditions, prevention is better than a cure. Efforts have been focused on passing legislation regulating the power of BB guns, informing owners of their potential, and encouraging manufacturers to promote safety measures.10 Most importantly, adult supervision of activities associated with BB gun use may be the best option. Although the past two decades have seen a reduction in the number of injuries, the potential for and the incidence of them still remains.

CONCLUSION

BB guns should be considered more than toys. The ongoing number of fa-
talities raises concern about the amount that may occur in the future. With any type of gun, tragedy can strike at any moment, with the sequelae being detrimental and sometimes fatal. Although the extent of injury is closely dependent on the power and type of BB gun used, certain precautions should be taken to prevent harm. Parents, supervising adults, and clinicians need to be cognizant of the facts and continuously encourage safe practice. Ultimately, injuries associated with BB guns should receive prompt medical attention and management similar to that of other firearm-related injuries.

REFERENCES


