

CASE REPORT

Air guns: An underestimated danger - case presentation, literature review and legal interpretation

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Introduction: The compressed air weapon is a type of arm to which the projectile is propelled due to the compression of air in a sealed chamber. These types of weapons belong to the category of non-lethal weapons and ammunition subject to authorization. However, accidental fatal cases, suicides or even deaths with intention attributed to these types of weapons are described in the literature. **Case presentation:** We are discussing the case of a 5-year-old boy who, at a picnic with several families, is shot and killed with a compressed air rifle, left unattended. The medical crew arrived at the scene could not save the boy's life. Necroptic examination revealed a gunshot wound through the heart, with the projectile stuck in the lateral-internal wall of the right ventricle. The projectile identified was a metal type projectile (lead), with a length of 8.5 mm and a diameter of 4.5 mm. **Conclusions:** Compressed air weapons, although considered non-lethal, have proven over time their extremely dangerous potential through the fatal injuries produced. Raising public awareness, limiting use and enforcing strict legislation could prevent tragic events.

Keywords: air gun, fatal heart injury, forensics

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Introduction

Non-lethal weapons and ammunition are intended for utility purposes, for recreation or self-defense, designed in such way that, through their use, death is not caused. The compressed air weapon, uses the expansion force of compressed air or pressurized gases in a container cylinder for throwing the projectile [1]. According to the Romanian legislation on weapons and ammunition, air guns belong to the category of non-lethal weapons and ammunition subject to authorization. The most common types of air rifles use spring piston, gas piston and pre-charged pneumatic mechanism and projectiles can range from 4.5 mm to 12.7 mm in caliber. Often presented as "toy guns," these types of weapons got in children possession many times because regulations are not seriously taken in consideration in comparison to conventional firearms [2]. Accidental fatal cases, suicides or even deaths with intention attributed to these types of weapons are described in the literature.

Case presentation

We present a fatal case that according to the official autopsy request issued by the County Police Department, occurred at a picnic with several families, on which occasion, one of the participants puts at the others disposal a compressed air rifle (legally owned) to shoot on target for entertainment. At first, only adults were allowed to use the gun, but later, children were also allowed, a 5-year-old boy being shot. The victim loses consciousness, so cardiopulmonary resuscitation (CPR) is performed while 112 is called. On arrival, the medical crew finds a left thoracic gunshot wound, a 3 points Glasgow Coma Scale and unmeasurable

vital signs. Despite the emergency procedures performed, the boy's life could not be saved. Death is pronounced and the forensic autopsy is requested according to the Romanian legislation. On external examination of the body, a 5 mm diameter shot wound is found, circularly marked by a contusion ring (representing an entry wound), located on the superior antero-lateral side of the left thoracic wall. Below the entry wound, corresponding to the 5th intercostal space, a pleurotomy surgical wound was also noted. At internal examination, a transfixing wound was identified through the left lung, pericardium and the left ventricle, with the projectile stuck in the right myocardium wall, at the atrioventricular junction (Figure 1, 2). The projectile identified was an undeformed metal type (lead), with a length of 8.5 mm and a diameter of 4.5 mm (Figure 3). The autopsy report concluded that the death was violent, due to a blind shot wound, with a pulmonary and pericardial transfixing pathway, with a perforating cardiac wound, respectively with hemothorax and hemopericardium; external and internal traumatic injuries found during the forensic autopsy were caused by shooting with a metal projectile (lead); there is an unconditional direct causal link between the traumatic injuries and death; the shooting range was most probably low, but forensic data requires corroboration with the investigation data.

Discussion

According to Romanian legislation weapons are classified as follows: *prohibited weapons and ammunition* - weapons and ammunition whose procurement, possession, carrying and use are prohibited for individuals and legal persons, with the exception of institutions that have competences in the field of defense, public order and national security; *lethal weapons and ammunition* - weapons and ammuni-

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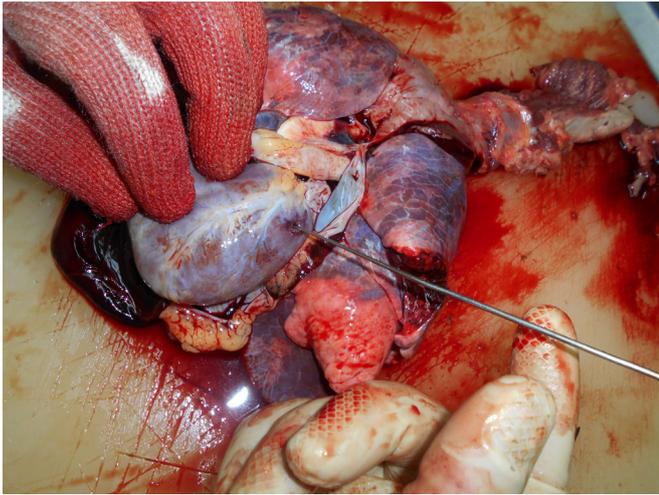


Fig. 1. Left ventricle lesion.

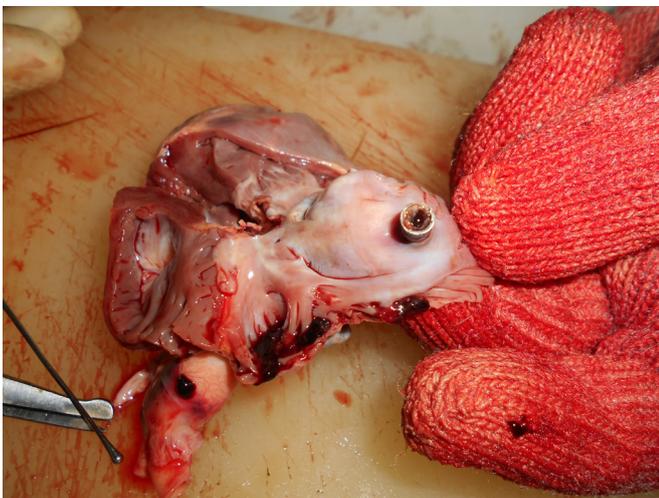


Fig. 2. Pellet localisation

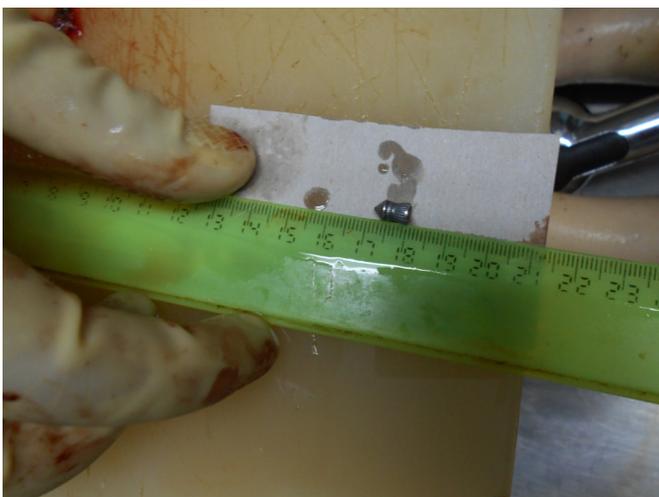


Fig. 3. Pellet examination.

tion, the use of which can cause death or serious injury; *non-lethal weapons and ammunition* - weapons and ammunition intended for a utility purpose or for leisure, made in such way that, through their use, they do not cause death. Air guns belong to the category of non-lethal weapons subject to authorization, which for throwing the projectile, use the force of expansion of compressed air or gases under pressure in a cylinder-container [1]. In 2019, a leg-

islative supplement is published, which introduces a new category of weapons: *weapons and ammunition potentially lethal* - the use of which can cause death or serious injury to people; the weapon is presumed to have lethal potential when used on a person from a distance of less than 5 meters or when the gun is fired at the person's vital organs, especially the head area [1]. This category now includes the air weapons, subject to authorization. Air guns can produce a wide variety of traumatic lesions, from superficial ones to severe, cranial, neck, thoracic and abdominal injuries. Among these, the most common are the superficial ones, but serious or fatal injuries are also quite often reported [2]. Literature shows that over time there have been reported multiple cases of accidental or intentional shooting with air guns or rifles. In 2020 Guenther et al. publish a similar fatal case, also referring to 39 other cases of cardiac injuries after shooting with air guns. Of them, 5 died [3]. In 2006, Kuligod et al. describe a fatal case of a 12-year-old boy accidentally shot in the cephalic extremity, who survived for 4 days [4]. Milroy et al. also describe a series of 5 fatal air gun shots, 3 of them with head injury and the remaining 2 with chest injury [5]. Mogni et al., in 2019, also publishes a case presentation of a male who was shot with an air gun in the chest and died short time after admission [6]. We cannot specify whether the cases with cardiac lesions described by Milroy et al. and Mogni et al. were included in Guenther's study. Radojevic et al. report in 2014 a fatal laryngeal oedema on a 48-year-old man, after a neck shot using an air rifle [7]. In 2020, Dumencic et al. report a 9-years-old boy who died after being shot with an air gun; autopsy revealed an entrance gunshot wound on the left lateral side of chest, through the left lung, heart and diaphragm, and a pointed lead pellet (caliber 4.5 mm) was found deep in the liver [8].

Stankov et al, in 2013, describe a case of a 6-year-old girl who accidentally got shot by her brother in the chest; the projectile was found in the bottom of the pericardial sac, which was completely filled with blood due to 2 stellate perforations in the wall of the aorta [9].

In Romania, although the mass-media reports injuries or even deaths by shooting with air guns, only one case was presented in the medical literature. In 2008, Popa et al. describe the case of a man who died after a head shot with a Walther type P 88 air gun, with Diabolo type pellets [10]. In their paper Gabor et al., state that victims are males in 81-84% of cases, and 37-54% of injuries occur between the ages of 6-14 [11].

Referring to the weapons and ammunition regime, the rightful owner of an air gun has the obligation to keep the weapon and ammunition listed in the weapon's permit, secured in such way as not to allow access to them by unauthorized persons, and only use it in areas that are not accessible to the public or in specially arranged or signposted areas, under such conditions that they do not endanger the bodily integrity or life of people. It can be transported only if it's kept in a cover, luggage or packaging, not loaded with

ammunition [1]. The authors can therefore assume that in the presented case, the gun owner did not comply with the weapons and ammunition regime and did not take all the safety measures required by law.

Increasingly advanced technology led to the development of high-velocity air weapons capable of causing life-threatening injuries, but according to our legislation, muzzle velocity is restricted to 220 m/s. Heart injuries should be evaluated like any other penetrating wound, concentrating on the probability of a hemothorax, hemopericardium with cardiac tamponade, myocardial lesion or embolization [12].

Conclusions

Air guns have proven over time to be much more dangerous than the general population considers. Literature data shows that serious injuries or even deaths are frequently reported following accidental or intentional use of air guns. We recommend a harsher liability for not-complying with the arms and ammunition regime, considering their potential lethal outcome.

A nationwide consistent scientific reporting of all the cases would also be useful. Under no circumstances should air guns be left unattended and children should be warned about the danger of these types of weapons.

Authors' contribution

CC - Conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, visualization, writing-original draft, writing-review and editing, translation

TH - Investigation, methodology, visualization, translation, data curation

KSP - Autopsy, conceptualization, methodology, visualization

CCR - Methodology, validation, supervision, visualization, conceptualization, final approval

Conflict of interest

None to declare.

Disclaimer

The case report was conducted in accordance with the Declaration of Helsinki and does not represent a legal framework.

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