



### H64 Bolt Gun Deaths — The Prevalence and Etiology in a Northern European Setting

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After attending this presentation, attendees will better understand the etiology and prevalence of bolt gun-related deaths in Sweden as well as autopsy findings associated with bolt gun injuries.

This presentation will impact the forensic science community by providing information on the prevalence, etiology, and associated autopsy findings of bolt gun-related deaths.

Bolt guns are devices used for slaughter in the meat industry. They consist of a cylindrical metal tube in which a bolt (metal rod) is placed. The cylinder is placed on the forehead of the animal and the rod is fired by the discharge of a blank round. After discharge, the bolt is retracted back into the bolt gun by spring tension.

Bolt guns produce different autopsy findings than regular firearms, namely a lack of explosive damage and a lack of exit wound.<sup>1,2</sup> Little is known about the demographics and variations in autopsy findings in human bolt gun deaths. The goals of this study were: (1) to expand the knowledge of autopsy findings in bolt gun deaths; and, (2) to examine the etiology and prevalence of such deaths in a north European medicolegal autopsy series. This study presents a series of all Swedish bolt gun deaths from 2007 through 2013, as well as a case report of a death from a bullet-loaded bolt gun.

The Swedish medicolegal autopsy database was searched for all deaths in which the Swedish equivalent (“slaktmask”) of the word “bolt gun” was mentioned from January 1, 2007, through December 31, 2013. A complete autopsy was performed in each case. Police and hospital records were reviewed as well as the autopsy reports, including toxicological analyses.

There was a total of 17 cases during the study period, equivalent to 2.8 deaths annually, equivalent to 0.18 deaths per 100,000 citizens per year. These were 15 suicides, 1 homicide, and 1 undetermined manner of death. A majority ( $n = 15$ ) of the decedents were male; the only two female decedents were one suicide and one homicide victim. The mean age of all decedents was 59 years (range 24-86, Standard Deviation (SD) 15) and, among the suicides, 62 years (range 41-86, SD 11). In four cases, the decedent survived initially but died later after admission to the hospital, with a survival time of, on average, one day (range 0-3 days). In all cases, the entrance wound was a circular defect in the skin and skull with an underlying cylindrical defect in the brain tissue. Most commonly, the entrance wound was located on the forehead ( $n = 9$ ), followed by the crown ( $n = 4$ ), the temple ( $n = 2$ ), and the back of the head ( $n = 1$ ). In the homicide case, the entrance wound was located on the neck. In seven cases, there were descriptions of secondary, radiating fractures of the base of the skull.

In one case, the decedent was found at a workshop next to his home with a bolt gun lying next to him. There was an empty 9mm shell casing lodged in the gun. At autopsy, a ragged circular defect on the forehead as well as a smaller L-shaped defect on the back of the head was noted. On internal investigation, there was a bullet trajectory in the brain, passing the left frontal lobe, slightly beneath the corpus callosum, and exiting the back of the left occipital lobe. There was a circular defect in the frontal bone with radiating fractures of the skull base as well as a smaller, uneven fracture of the back of the skull, also with radiating fractures to the skull base. This is, according to research, the first published death from a bolt gun loaded with a bullet, producing an exit wound while the core findings remained the same.

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These findings are in line with the sparse previous literature regarding bolt gun deaths.<sup>1,2</sup> Common findings include a circular defect in the skin and skull with an approximately 15cm-deep cylindrical defect in the brain tissue. There may also be radiating fractures of the base of the skull. This presentation also describes a death from a bolt gun loaded with a bullet. In conclusion, bolt gun deaths are rare; however, they produce specific autopsy findings compared to regular firearm deaths.

### Reference(s):

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2. Perdekamp M.G., Kneubuehl B.P., Pollak S., Thierauf A. Secondary skull fractures in head wounds inflicted by captive bolt guns : autopsy findings and experimental simulation. *International Journal of Legal Medicine*. 2010;605–12.

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**Forensic Science, Bolt Gun, Etiology**