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5.6 mm blank alarm cartridges (stun) – experimental studies

Summary

Shots with blank 5.6 mm Long cartridges (known as stun or alarm ammunition), being taken against a living person or animal, according to the conductors of the experiments, can injure vital organs or cause mutilation (e.g. loss of sight, extensive burns etc.), skin cuts etc. In the described case, the traumatic factor is a targeted stream of burning gunshot gases. Less dangerous consequences were caused using the Short firing cartridges. The stipulation is that the experimental shots were fired from the guns of barrels, as required, longitudinally separated by a partition so that the initial kinetic energy of the gas streams is reduced. Using guns of the barrels without partitions should result in increasing the danger to living beings, during the experiment such barrels were not used because of the statutory ban. On the skin of the firing hand (or on the shooter's outer garment) the gunshot residues can be looked for.

In conjunction with socket flares with a pyrotechnic charge, the blank ammunition can serve as a means of accidental or deliberate ignition of flammable materials such as hay, straw, heap, thatch, dry forest floor.

Keywords Lapua, Umarex, S & B, Sellier & Bellot, GSR, 0.22 inch blank ammunition, alarm weapons, shot with touchdowns, burning gas stream, alarm gun, gas gun, damage to organs, skin breakdown, shot in craniofacial, destruction eyes, upper respiratory tract burns, burns, damage to teeth, denture damage, defence necessary state of need, blank gunshot, laden pyrotechnic flares, fire, arson.

Introduction

Although the Act of 21 May 1999 about weapons and ammunition[1] has been amended several times and re-defined as to its basic assumptions (in particular, the legal definition of a weapon and its relevant parts), the article 11 paragraph 11 exempted all alarm weapons (of flash and explosive sound) from the obligation to register or obtain a licence for their possession. In the current legislation, the constitutive characteristics of such weapons are – 1) calibre of up to 6 mm (article 11 of section 11 of the aforementioned Act) and 2) possibility of repeated use; moreover, arising as a result of the combustion of the ammunition; and – substance striking a target at a distance of not more than 1 metre, discharged from a barrel or its substitute, (article 7 (3) of the aforementioned law on weapons and ammunition)[2].

For several years, short alarm weapons have been advertised in the mass media, including commercial websites, as a handy gadget within the range of available military accessories.

General assumptions, the rationale and aim of the research, literature. Discharging characteristics

From the evidential point of view, different sorts of weapon, firearms and side arms, as well as hazardous tools resembling guns but shooting blank ammunition, such as alarm guns, all used to be the subject of

1 Dz.U.[Journal of Laws] 2012 item 576, and amendments

2 The Act does not provide a legal definition of the concept of „impact", thus it requires interpretation. Moreover, taking into account the principle of *lege non distinguente*, it can be suggested assuming, solely instructionally, that the distance of 1 metre is measured in the linear extension of the axis of the barrel, establishing the zero point as crossing the given axis through the surface of the muzzle.

casework examination in the Second Polish Republic – as tools of traumatic impact – mainly in the framework of forensic medicine. A major example of such an approach might be, released in 1938 by the Military Institute of Scientific Publications in Warsaw, written by Stanislaw Manczarski[3], the extensive (400 page) monograph of judicial and medical research (including specifying the pattern and model of weapon, as well as identifying fired shells and bullets) of firearms and gunshot injuries, and the majority of the statements and forensic investigative opinions included have not lost their relevance today.[4] The capability of alarm guns loaded with blank ammunition to cause serious injuries was described by S. Manczarski in several places, for example, in descriptions of standard weapons, in chapter I, section *G. Alarm Weapons.*[5], in a description of the traumatic properties intrinsic to cartridges for such equipment[6]. In Polish post-war literature in forensic medicine, references to hazard to life caused using blank cartridge fire guns are seen in the work of Prof. B. Popielski [7]and Prof. W. Grzywo Dąbrowski.[8]
An examination of possible threats or, on the other hand, benefits of legal order and a sense of security arising from the developing trends of small-calibre personal firearms with non-penetrating or blank ammunition, after 1990, was taken at the Forensic Military Police Department by Jerzy Kasprzak[9].

As a result of the experiments, the following conclusions were made with regards to danger to bodily integrity as a result of the use of blank ammunition firearms – *"Experiments carried out with blank ammunition have shown that the use of the examined revolvers and pistols from a distance of up to 1 m (distance incompatible with the safety regulations given in the instruction) can cause burns and other bodily harm. Using the weapon by putting it directly to a man's body can cause bodily harm and even death"*[10] Moreover, conclusions cited by J. Kasprzak, P. Geertinger and J. Voigt's from a Danish study on gunshot effects carried out on human corpses (using blank, central ignition gas ammunition, 8 mm cal. and a Walther PPK gas pistol) indicate their deadly effect on a person's vital organs. The author adds that *"the results of the Danish research, unfortunately, have been confirmed in Polish criminal practice. A few instances of shots using a gas pistol put directly against a person ended in their death"*.[11] However, for reconstructing the course of an event, of great importance seems to be the assertion that *"the practice shows that sometimes blank ammunition is more effective than gas. Blank ammunition causes an acoustic effect, there is also a visible flame from the barrel... There have been cases of such a strong psychological impact of blank cartridges on a person, which claimed to have heard a bullet whiz"*.[12]

The chances of inflicting injuries, even the lethal ones, as a result of firing a stream of hot gases is known from military practice, hence the safety rules during shooting with the training cartridges, called blind rounds are followed. Similar observations, particularly as to stage incidents, can be found in the literature of Russian forensic medicine.[13] From the more recently available Russian literature, one can also point to the 660-page monograph entitled Судебно-медицинская баллистика, indicating the birth of a new discipline combining medicine, forensics and weapon expertise.[14] At the outset of this work, on page 5, the thesis of a combined complex character of gunshot wound is proved in which the mechanical, thermal and chemical properties can be separated and in the part referring the harming of a man with a blank cartridge, it is concluded that all of these are factors taking part in the shot, with the exception of the impact of the projectile (p. 269 et seq. – Повреждения от выстрелов холостыми патронами).

3 At that time a Doctor of Medicine and senior assistant in the Forensic Medicine Department at Józef Piłsudski University in Warsaw.

4 S. Manczarski: *Uszkodzenia postrzałowe, Broń palna – amunicja – identyfikacja broni palnej – ocena sądowo-lekarska*, Warsaw 1938, WINW.

5 Ibidem, p. 43 et seq.

6 Ibidem, p. 281 et seq.

7 cf. B. Popielski: *Uszkodzenia postrzałowe w świetle spostrzeżeń sądowo-lekarskich w latach wojennych i powojennych*, Warsaw, PZWL, 1950.

8 cf. W. Grzywo-Dąbrowski: *Medycyna sądowa dla prawników*, London, 1957, Wydawnictwo Prawnicze, p. 132, 134.

9 Professor at the University of Warmia and Mazury in Olsztyn.

10 J. Kasprzak: *Broń obezwładniająca*, Minsk Maz., Żelazo, 1991, p. 28

11 J. Melnick, op. cit., pp., 28–29.

12 J. Kasprzak: *Broń gazowa*, Minsk Mazowiecki, Żelazo, 1991, p. 19.

13 Авдеев М.И. – Судебно-медицинская экспертиза трупа, Moscow, 1976, Медицина, p. 243.
Выстрел без пули разряженным патроном (холостой выстрел) может причинять на очень близком расстоянии тяжолые и смертельные повреждения внутренних органов, переломы костей. Большинство таких происшествий связано с выстрелами на сцене, в любительских спектаклях. Иногда выстрел прозводится в шутку, в себя или в другого человека со смертельным исходом.
„A shot from a very close range with a blank cartridge, with no bullet, can cause severe and fatal injuries to internal organs, bone fractures. Most of these incidents are linked to stage performances, not professional ones. Sometimes the shot shall be treated as a joke, to himself or to another person, with a fatal consequence".
Similarly Громов А.П. -Лекций судебной по Курс медицине, Moscow, 1970, Медицина, pp. 98–99.

14 Попов В.Л., Шигеев В.Б., Кузнецов Л.Е. -Судебно-медицинская баллистика, Russia, 2002, Гиппократ.

Experimental studies of the use of a 5.6 mm alarm weapon and the standard cartridges (possible to be possessed without registration or the Police/Military Police licence) were undertaken with the intention of examining the real forensic dangers of its use by an individual as a means of unlawful assault and, on the contrary, to consider the possibility of meaningful use of this weapon as a legal instrument of defence of necessity from the attack (preventive function, forensic protection according to P. Horoszowski). At the same time, it should be considered that the alarm weapon when compared with other types of firearms, "bullet" or gas, creates the least risk of causing a fatal effect, which, in the case of self-defence, minimizes, within the permissible limits of such defence, the chances of using excessive force.

For the experiment with the 5.6 mm (in. 0.22 inch) alarm bullets, two revolvers were used, available without commercial licence, originally manufactured exclusively for firing blank rimfire cartridges which externally differ in the lengths of scales, namely, the first, only for firing short cartridges, marked as RG 56 Le Petit, of foreign production, with a seven-round magazine, self-tightening cock mechanism and a longitudinally fluted barrel of a length of 46 mm (plus 18 mm of the additional gas duct as the extension of a cartridge case in the chamber), and also, the second revolver, for firing 5,6 mm long cartridges as well as the short ones of Polish production labelled as Start Mod Baflo 9 with a nine-round magazine, self-triggered cock mechanism a longitudinally fluted barrel of a length of 82 mm.

In the muzzle of both barrels, dextrorotatory threads are set which can be used to attach a blunderbuss (non-convertible with one another, being a part of factory settings of each of the cited revolvers), intended to fire/eject differently coloured signal flares at a distance of 82 mm.

Both revolvers have remained in factory standard, without modification, in accordance with the contents of the alteration ban, Art. 6, 1 and 2 Law on Weapons. During the experiment, the following blank cartridges were used: 5.6 mm Long of Lapua GmbH and UMAREX companies and 5.6 mm Short of UMAREX and START S&B companies as well as signal or illumination flares of ABA company of red, green, yellow and white smoke.[15]

The issue of injuries and damage to clothing which were caused or were likely to have been caused by firearms, however not by alarm weapon, was, in recent years, the subject of publications in "Problemy Kryminalistyki", for example, the richly illustrated article by G. Bogiel *"Gunshot injuries of the human body"*[16], and as for the use of the blank cartridges, to a calibre of 6 mm (used for shooting with a cartridge of separate loading rather than with an integrated one), the articles by K. Ćwik and H. Juszczyk *"Statutory Qualification of KESERU K-10 and ZORAKI K-10 Revolvers from the Aspect of Legality of Having them within the Territory of Poland"*[17] and *"Comparison of characteristics of Bullets Fired from home-made and commercially manufactured guns"* by R. Kotapka and H. Juszczyk[18].

Fig. 1. Revolvers and cartridges used during the experiment.

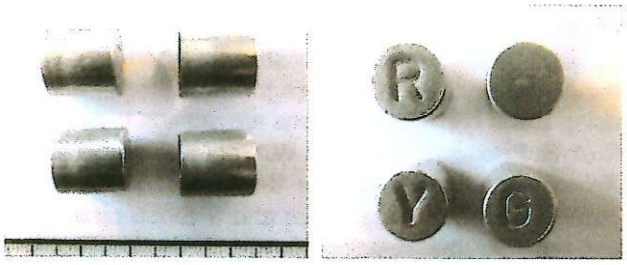

Fig. 2. Coloured signal flares.

The energy values of the projectiles, cited by R. Kotapka and H. Juszczyk, allow us to accept as proven the thesis that at least in one case, during the described experiments, the kinetic energy of the stream of gunshot gases as a result of firing, igniting and propelling, loads of a 5.6 mm long blank cartridge

15 Leuchtsignalsterne 10, 15 mm; manufacturers do not give information about components of primers and propellant substances.

16 FK No. 217/1997, p. 5 et seq.

17 PK 279/2013 p 53 et seq.

18 PK 281/2013, p. 36 et seq., where in Tables 3 and 4 the results of the experimental research on measuring forensic relevant values are given for the shot with a separate loading cartridge (5.5 diabolo bullet of 0.86 g loads and propellant substance of a blank cartridge Long) from a home-made modified air rifle. For the distance of 1 m from the muzzle, the highest projectile speed was 639 m/s, and the lowest 511.4 m/s, and its kinetic energy was calculated accordingly as 175.6 J and 112.5 J.
For the distance of 5 m, the highest projectile speed amounted to 570.3 m/s, while the lowest was 518.7 m/s and respectively, the kinetic energy of the projectile amounted 139.9 J and 115.7 J.

could not amount to less than 112.5 J at the muzzle, and it is highly probably that it exceeded this value in others.

In view of the quoted statement, the impact of the stream of burning gases from the examined firearms on the surroundings, including its destructive factors (provided for in the Act), changing the state of the object due to the directed mechanical impact/ heat impact, will also be treated as subject within the meaning of classical physics[19]. Of course, the energy released in the fired blank cartridge, due to, for instance, differences in the length of barrels, should be noticeably lower than the one quoted in the R. Kotapka and H. Juszczyk's experiment; and therefore, one would expect less value of work in such a shot. A lower ability to perform work by the short cartridge in comparison with the long cartridge is also assumed.[20] To sum up – the work of the 5.6 mm alarm cartridge, caused by the products of the shot, rely on the ejection of air from the barrel and then firing the directed stream of burning gunshot gases with the accompanying phenomenon of thermal, sound and light, as well as changes in the state of objects that it encounters, the so-called partitions, caused as a result of the impact of this stream of gases[21].

Prima facie, the performance of the identified cartridges allowed the experimenters to observe unexpected results. A thick layer of snow[22] enabled to examine the approximate propelling abilities of Long and Short cartridges, fired from the above-mentioned revolvers using their typical screwed blunderbusses, by measuring the distance the signal flares fell.[23] . A shooter, 180 cm tall, firing from a "standing" position, from a straight arm raised from the horizontal level by approximately 30 degrees, along a forest road protected from the wind, for a total of 10 shots from a "Start Baflo 9" revolver with ten Long LAPUA (5) and Long UMAREX (5) rounds – got the debris in nine falls of the flare, a few meters outside the line denoting a distance of 85 m. The same shooter, under the same conditions, shooting from a "Le Petit" gun, with six "Short" rounds – START S & B (3) and UMAREX (3) companies – got the debris of six flares outside the line indicating a distance of 40 m.[24]

In terms of the effects on life and health,[25] new interesting information about medical effects of gun shots can be found in a medical report[26] based on the results of the medical action in 20 incidents of those with gunshot head injuries, transported to the Military Medical Institute hospital from January 1998 to December 2010 (the guns shot from their own hand or that of another), wherein a person shot from a gas weapon was lived.[27] Alarm weapon (of power loads) also appear in cases of other events of criminal interest, e.g. during struggles of the riot control units with aggressive crowd during mass brawls of various groups of football fans (so-called stitch-ups) putting up active resistance to security.[28]

While planning the experiment, efforts were made to adopt its conditions to the methods and research approach of those assumed in the Polish forensic literature.[29] Therefore, e.g. for visualization and documentation, the results of the effect of sprayed hot gunshot gases (i.e. deformation, changes) on the

19 A certain analogy to the scheme of the cumulative stream could be noted, at this point.

20 Primarily due to the significant differences in the size of the propellant.

21 Some references on the non-bullet factors of destruction can be found in chapters 5 and 6 of the book: Włodarczyk E. Balistyka końcowa pocisków amunicji strzeleckiej [Terminal Ballistics of Shooting Ammunition Bullets], vol. I, London, 2006. WAT; also Попов В.Л., Шигеев В.Б., Кузнецов Л.Е. – Судебно-медицинская баллистика, op. cit., p. 269 et seq.

22 Regarding the apparent indication of the place where the flare fell, excluding the possibility of starting fire.

23 of the loads of 4.5 grams, 15 mm of the metal jacket length 15.5 mm coloured smoke.

24 According to the experimenters, it cannot be excluded that obtaining such a relatively significant trajectory could influence the propulsive action of pyrotechnic flare load.

25 The practice of forensic science shows that the vast amount of criminal incidents with the use of a firearm takes place when the distance between the shooter and the target rarely exceeds a few metres. For this distance, the above cited kinetic energy values of the projectile although they are lower than the energy of the bullet fired e.g. from a combat gun, they exceed several times the values which are sufficient to cause serious injuries or death of a man being shot (ca 20 J), even the smallest of the currently produced Russian guns – 5.45 mm PSM pistol achieved 129 J for the 5,45x18 МПЦ (7Н7) coreless bullet and for the core one -119 J energy at the muzzle, and now rarely seen „pickpocket", 6.35 mm FN Baby (6,35x15,5 Browning) indicates only 86 J.
Source: Боевые пистолеты России – ТТ – Макаров – ПСМ – Стечкин, Издательский дом Гелеос, *2005,* pp. 190–191.

26 P. Mielniczek, G. Zieliński, A. Koziarski, J.K. Podgórski, *Obrażenia postrzałowe głowy – postępowanie diagnostyczne i terapeutyczne,* „Lekarz Wojskowy" no. 3, vol. 89, 2011.

27 Ibidem, p. 197.

28 From 6 January 2014: http://wiadomosci.onet.pl/bialystok/pijany-pasazer-grozil-bialostockim-kontrolerom-pistoletem/l4y43, The fact should also be taken into account that the possession of different sorts of alarm (power loads) handguns, along with other dangerous items, is disputed among people entering the stadium, rioters, hooligans etc.

29 Particularly in the publications by prof. Mariusz Kulicki e.g. *Forensic problems of using firearms*, 1972; *The factual issue of modern firearms*, 2001.

appearance of empty beer tins[30] shot with the weapon in direct contact with the tin, was photographed, as well as charred paper after shooting from the distance of 10 cm and the noticeable traces of burning of the propellant substance[31] etc. The impact of gunshot flame on fabrics of animal and industrial origin, encountered during the course of police forensic activities at a crime scene or during visual inspection of the victims, were checked.

Specific experience

Firing rounds at night, during cloudy weather revised the purposefulness to take further, more accurate measurement of the length of the flame and the distance of ejected particles. The range of the exhaust flame for the Short cartridge did not exceed the statutory limit. For the Long cartridge, it was noticed that eight out of ten experimental shots indoors could might exceed the statutory limit by one meter of the range[32]. It should be noted that due to the ethical principles regarding the possible experiments, all tests were performed on inanimate objects.[33] Burning, glowing gunshot debris in flight, longer (than 1 meter) by tens of centimetres, were noticed and recorded on a negative film. Observation and photographic documentation[34] of the trajectory of fired rounds, carried out in darkroom conditions in the manner of "lightning hunters" (in the darkroom, the shutter opened in T position, the film scrolled after each firing) allow for assuming that the visible scope of the gunshot product – targeted flame and speeding burning remnants of the propellant substance, in the case of Short cartridges of both producers, do not exceed one meter; however, in the case of the Long cartridges (both producers) if the flame of the shot normally reaches the limit of 1 m, the burning gunshot debris fly even several dozen centimetres farther (from 40 to 90 cm), and it is possible that for that fact, they may, for example, cause eye injury, temporarily or permanently.

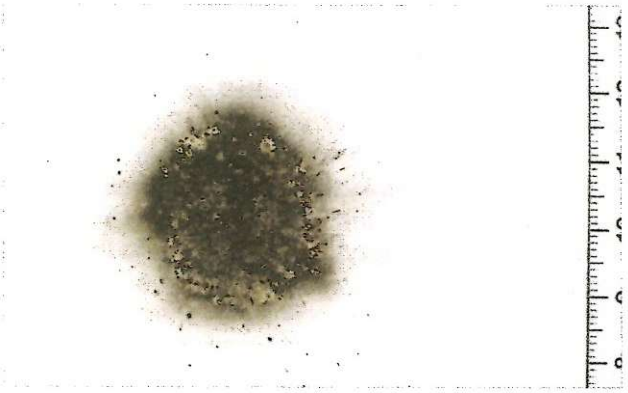

Fig. 3. Charred material after firing Long loads.

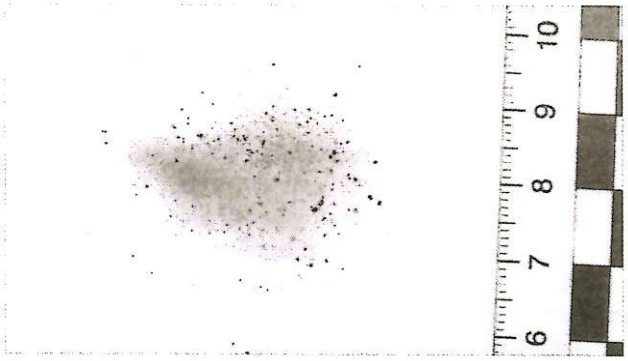

Fig. 4. Charred material after the Short loads.

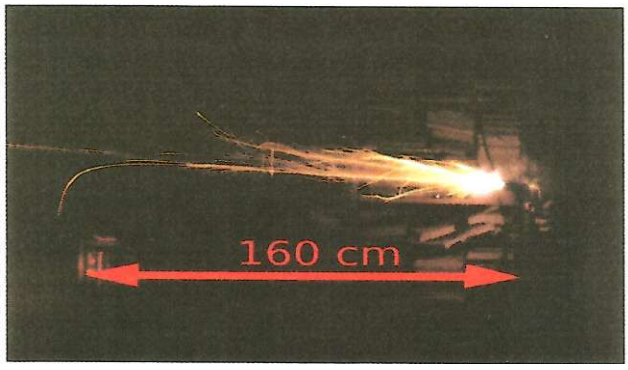

Fig. 5. Range of gunshot products.

At the same time, the audibility/energy of the sound effect should be considered as an argument justifying theses on high, transonic expansion velocity of the gunshot gases[35].

The next stage of analysing the results of the experiments was to determine the relationship between the shot with an alarm cartridge, usually in the case of

30 Similarly to the recent method of assessing the ability of the bullet trajectory to puncture pine planks (e.g. 8 planks for 7.62 mm TT pistol). In this case, the role of planks played empty cans.

31 Unfortunately, due to the lack of technical feasibility, there was not any possibility to examine other significant forensic evidence which is recommended for good forensic practice in cases of actions involving the use of firearms (for example, the composition of the soot, the presence of seared propellant, etc.).

32 The destructive action to 1 meter, according to the Weapons Act does not specify what action is considered and how to measure it, evaluate.

33 With the exception of human corpses or their parts, it should be clearly stated, in the context of the above-mentioned experimental results by Danes on human corpses, quoted by J.Kasprzak, cf. Footnote 10.

34 On the analogue black-and-white negative Ilford 400 ASA / 120 lens Xenar 3.5 / 105 at a distance of 2 m and analogue colour negative Rossmann (Konica) 200 ASA / 135, Pentacon lens-auto 2.8 / 29 from the distance of 1.5 m.

35 The bang of the shot is sometimes deliberately weakened by reducing the outlet speed.

putting the weapon directly touching the object, and damage to the material that was shot.

As it was mentioned, to visualize the effects of firing/work performed by long and short cartridges, taking into account the alarm guns action, a similar method of testing gunshot energy (percussion force) to the one that had been applied recently, i.e. the one which involved shooting at pine planks was used[36]; the shots were fired at a single, empty, undamaged 0.5 litre metal beer tin of an outer diameter of 66 mm[37] (measured with a calliper) and giving the following results:

- two UMAREX Long cartridges – after firing a single cartridge there was (1) a dent of 51.8 mm, (2) a dent of 40.2 mm, perforations of the aluminium were difficult to photograph and were only seen by putting a visible light source into the interior of the tin where the barrel was placed.

Fig. 6. Dented tin – 2 UMAREX Long cartridges.

- two LAPUA Long cartridges after the single shot (1) a dent of 37.7 mm occurred (2) a dent of 41.8 mm, when the visible source of light was put into the tin interior, perforations of metal sheet were visualized where the barrel was placed.

Two tins were fired with Short rounds of the parameters as mentioned above. After firing, with the barrel directly against the object: with two Short UMAREX cartridges, after a single shot there was (1) a dent to 53.3 mm, (2) a dent to 54 mm and after putting a light source into the interior of the tin, the perforation where the barrel was place was not visualized.

- Short Start 6 S & B, after firing with the above single charge (1) there was a dent to 54 mm, (2) a dent to 55.2 mm, the perforation was not seen.

Moreover, analysis of the photographs taken while firing the Long loads indicates a retreating the part of the burning substance through clearances in the weapon in the direction of the shooter's hands, which

Fig. 7. Perforations indicated by arrows.

may justify the thesis of the need for careful forecasting the list of substances that should be looked for (also in terms of GSR, the cartridge has a primer on the case rim) on the hand, outerwear etc. of a forensic investigation of a person suspected of firing a shot.

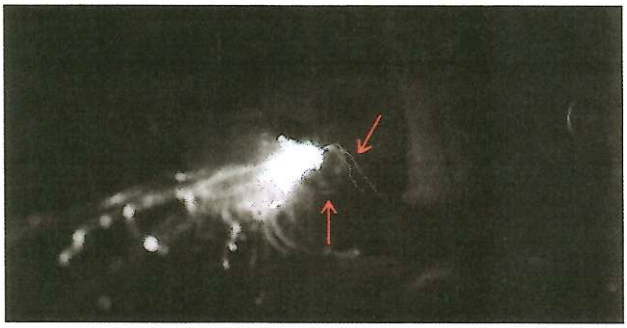

Fig. 8. Shot in the direction oblique to the axis of the lens, at the same time there is probable reverse spread of the gunshot particles (see arrow – Gun Shot Residues?)[38]. The top arrow indicates the spreading gas, the bottom arrow indicates the shooter's hand.

As for the above-mentioned cartridges, their percussive action was checked. Putting the gun directly to the fixed typical hunter's clay pigeon, 20 clay pigeons were shot (5 short and 5 long cartridges of particular manufacturers) obtaining the destruction of the fixed clay pigeons in each case, regardless of whether the muzzle was put to from the concave or convex side (black – red). When the long cartridge was

36 e.g. for 7.62 mm pistol eight-inch-thick planks were required for the distance of 25m; Kustanowicz S., Firearms testing, p. 210., Tab. 25.

37 Of an accuracy of 0.1 m.

38 See A. Filewicz, *Kryminalistyczne badania pozostałości po wystrzale z broni palnej*, Warsaw 2001; L. Fojtašek, T. Kmječ, *GSR and the laws of physics*, „Problemy Kryminalistyki" 2008, No. 259.

used, the pieces of the clay pigeon (fragmentation) were scattered within 3 – 4 m from the points where the clay pigeon was fixed and as for the short load, a little closer – up to 3 m. This allows experimenters formulating the thesis that the destructive ability of that direct shot can be at least compared with the ability of the pellet, accurately fired (in a bundle) from a sports smooth-bore firearm at the clay pigeon, also from a distance of approx. 20 – 25 m in the axis of the barrel extension (trajectory).

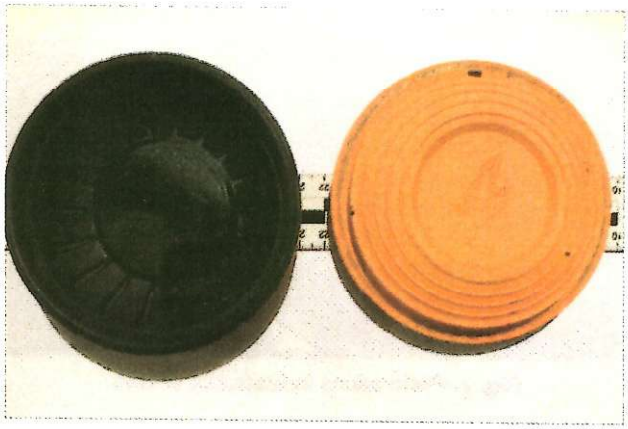

Fig. 9. Clay pigeon – obverse and reverse.

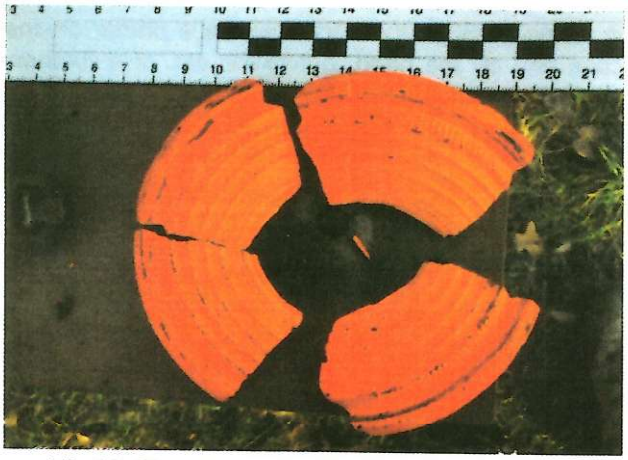

Fig.10. Clay pigeon after the shot – fragmentation.

After consultations with medical doctors – surgeons, ophthalmologists, dermatologists – it was assumed that for checking and visualizing the possibility of inflicting severe injuries to an adult, the skin of the freshly slaughtered pig could be used (which, for instance, serves as an analogue of human skin to train medical students in the art of surgical suturing), and as an analogue of softer parts of the human body (e.g. the eyelids, groin) or the skin of a small child – a fresh skin from chicken or turkey's thigh was used.

While shooting a piece of fresh, raw pigskin, no bullet holes in the dorsal or lateral parts were obtained. A bullet hole with a Long cartridge from the LAPUA Company was possible to be obtained as a result of direct putting the weapon to the armpit area of the skin. It shows significant similarity to the entry wound of a small-calibre weapon.

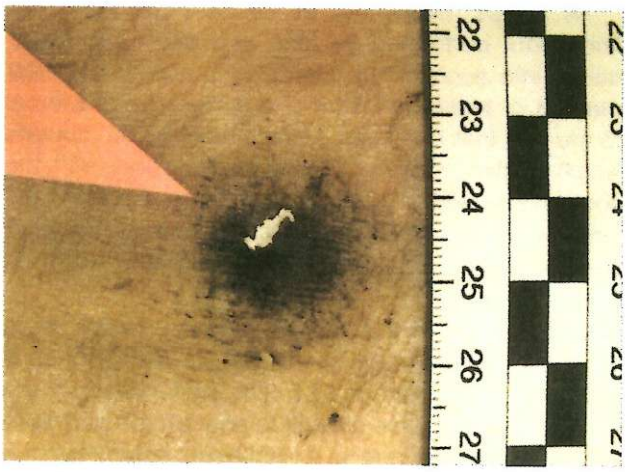

Fig. 11. Shot through the fresh pig skin (armpit area).

The attempt to obtain a bullet hole by direct application to the object, two START S&B and UMAREX Short cartridges as well as two Long and LAPUA were made on fresh, raw skin from turkey thighs, in each case bullet holes were obtained.

Fig. 12. Bullet holes on the skin of turkey.

Then the raw skin removed from a chicken thigh was shot with the Short loads of START S & B and UMAREX companies, with the gun against the skin of the chicken thigh.

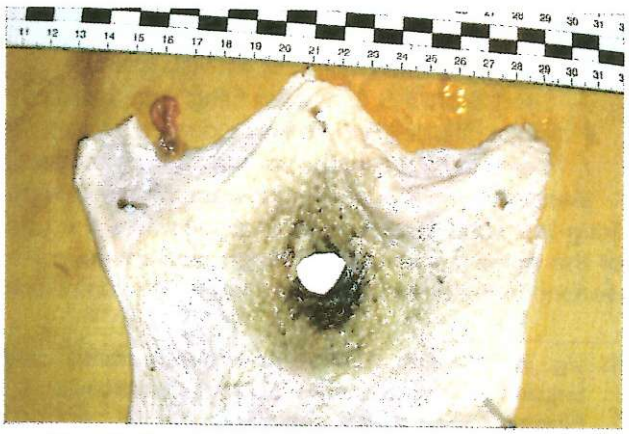

Fig. 13. Shot through the skin of the chicken thighs.

A shot using a Short UMAREX cartridge to a cow's eye (from a slaughterhouse) caused its complete destruction, fragmentation of jelly-like substance (vitreous body?), the effects of the shot failed to be photographed.

In the case of self-harm and in case of a clash with direct physical contact, there is the possibility of taking a shot directly into an open mouth or oral cavity[39]. Attempts to imitate the effect of shots made using an alarm gun (using Long cartridges) involved using dental prosthesis (used, typical dentures) or solvent extracted teeth (one) embedded "in polymer clay" and fixed using a typical dental clamp/articulator and gave the following results:

- acrylic denture of the lower jaw (mandible) broke and was thrown from the clamp (the sequence of changes failed to be noticed);
- premolar tooth got charred and was thrown from the clamp

Fig. 14. Mandibular prosthesis in the articulator/clamp.

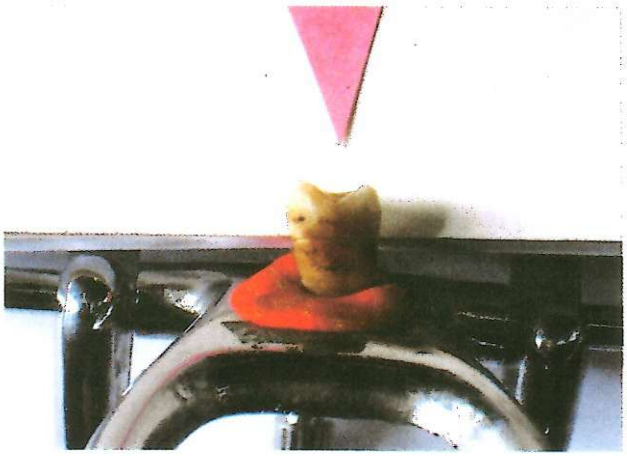

Fig. 15. Tooth in the articulator.

39 Therefore, in the case of injury of the mouth, jaw, cranial and facial areas good rescue practice recommends the rapid inspection of the mouth to prevent post-traumatic displacement of any foreign bodies, e.g. shards of teeth or dental prostheses into the upper respiratory tract.

Fig. 16. Prosthesis after the shooting.

Fig. 17. Tooth after the shooting.

According to the conductors of the experiment, the above results of shooting with both Short and Long cartridges to the analogues of the eyelid skin and eye indicate a significant probability of eyelid and the eyeball injuries as a result of firing "from application". A shot in the mouth carries, primarily, the risk of extensive burns of the oral cavity, tongue, organs of speech and the upper respiratory tract, and also the risk of getting non-specific foreign bodies into the respiratory tract.

Throughout long-term personal observations and reviewing on-line Polish and foreign video reports on riot control units with the aggressive crowds, especially while hooligans, preparing for mass brawls of various groups of football fans (known as stitch-ups), various kinds of face shields and, sometimes, protection for the head and other sensitive parts of the body (the solar plexus, groin, knees, legs etc.) are constructed. The covers are sometimes made of several components of cardboard, easy to get rid of in the event of arresting and, at the same time, sufficient – as opposed to clothing made of synthetic fibre – at shielding the body in the event of being hit with bottles of incendiary liquid they have hurled at the Police, a stone, a Police non-penetrating bullet type SWARM, BĄK etc.

The transparent face shield quite often consists of home-made or manufactured profiles made of Plexiglas (e.g. those used for grindering, sawing or health and safety purposes) of thickness of approx. 1.5 mm, which is similar to the one of Plexiglas goggles or gas masks put on by the security agencies employees or the riot control units during mass events.

Similar in aim but of a greater thickness (approx. 5 mm) are the protective helmet visors often used by the law enforcement formations. The particular ferocity strengthened by anonymity by being present in a crowd could be the reason, as judging from the sequence of events as shown in video reports from Kiev Maidan, of the shooting of Police at close range at helmets and gas mask glasses with objects in the shape of a handgun.

Therefore, an organic glass plate (Plexiglas) of a thickness of 1.5 mm was fixed in a vice and then the shot at close range was fired with the Short load, to obtain a large opening of irregular edges in it. The result of this shot has been recorded photographically. The flame of the shot was noticeable even at a distance of approx. 30 cm behind the bullet hole.

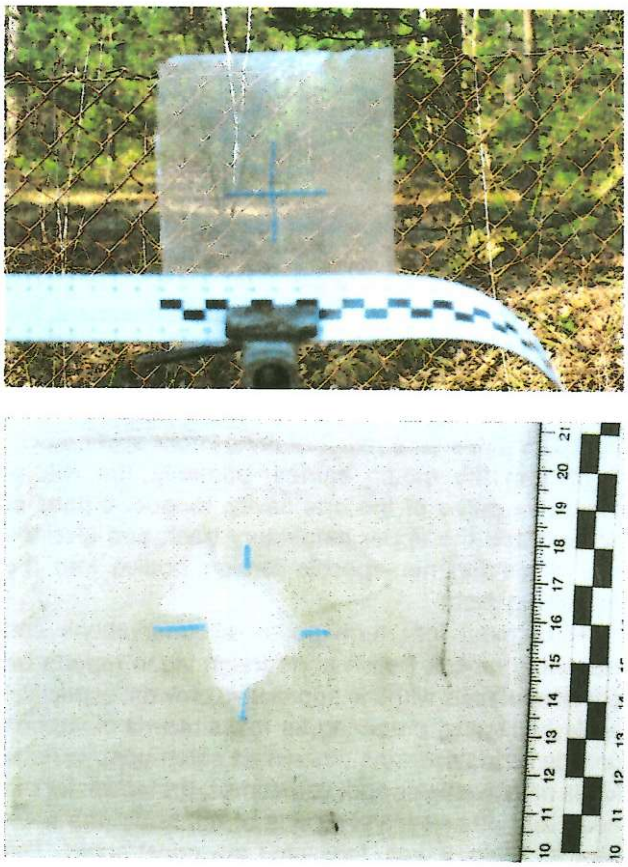

Fig. 18. 1.5 mm Plexiglas plate before and after firing.

A Plexiglas plate of 5 mm thickness, i.e. the one referring to the thickness of the front part of the police helmet visor, was fixed and the shot was fired at close range with a Short load – without noticeable, visible destructing effect, and then the shot was fired at close range with a Long load – also, to the naked eye, without visible destructive effect.

In the case of the shot at close range that involved the transition of the flame on the opposite side of the sheet, beginning from the shotgun gauge of 900g/sq.m to 1200 g/sq.m to 1600 gm/sq.m, only Long cartridges obtained, of both manufacturers, the ability to break through the thick cardboard. At higher cardboard gauges, starting from 1800 g/sq.m, no bullet holes occurred.

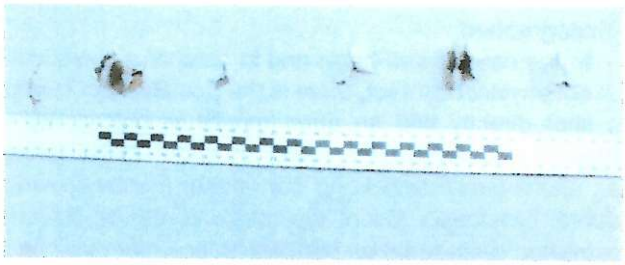

Fig. 19. Firing at cardboard 1200 g/m. sq. (a) front side (b) view of the bullet holes.

During the shooting at close range with 10 Short loads at a summer collection jacket made of lightweight cotton poplin with a synthetic lining, the only effect involved charring obtained in 6 cases, and the effect of charring and burning out one top layer of the material occurred in 4 cases (all UMAREX). The shots at close range, with Long loads of both producers, allowed charring and burning out (6 shots) two layers of fabric (poplin + lining), while only external charring was recorded in 4 cases of shots at the left upper outer pocket (6 layers). There is the possibility of mixing the point of putting the shooting with a blank cartridge barrel with an inlet after such a shot with a small bore live round cartridge.

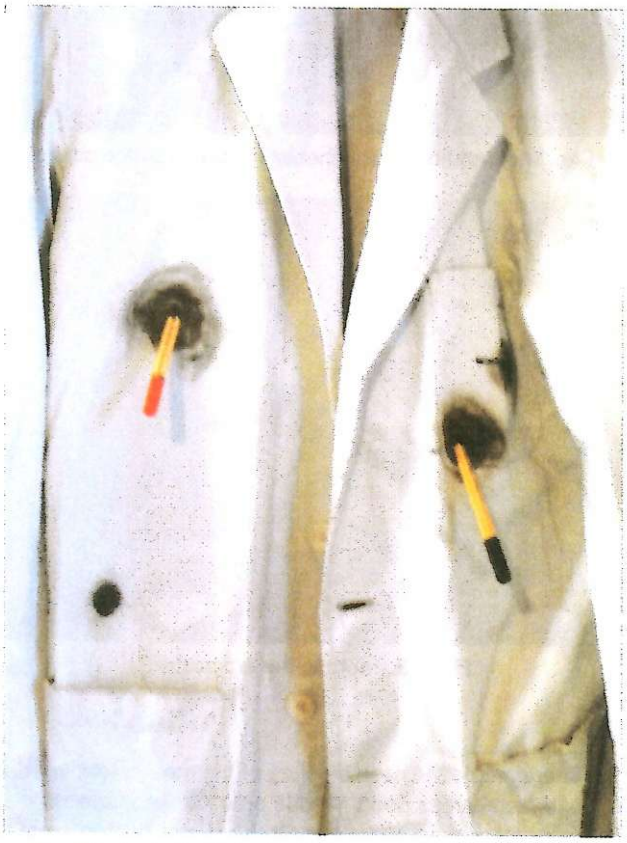

Fig. 20. Jacket with bullet holes and traces of gunshots from entering.

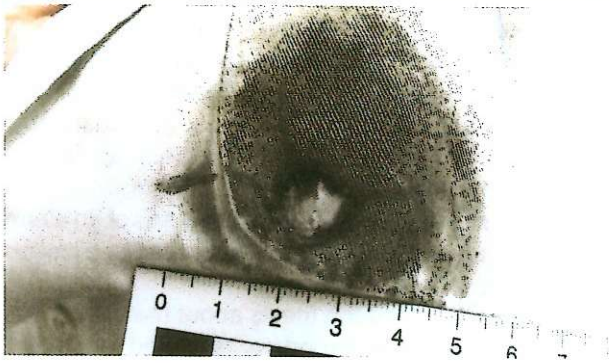

Fig. 21. Bullet holes (inlet) in the jacket.

In contrast, during the attempts to check the impact of the shot from the entering on the inside of a leather glove stuffed with crumpled paper padding, otherwise known as a winter glove, no bullet hole was found in its right side after firing with Short loads. Repeating the test with a Long load, no clearly marked hole was observed, while inside the glove, within a minute, a fire of the insulating lining started, with clear expansion and giving off smoke of a typical odour, with superficial charring (to the depth of approx. 1.5 cm) of the crumpled newspapers stuffing, filling the examined glove.

Fig. 22. Inside part of gloves – hole burned by the shot.

Therefore a reasonable assumption can be made, that in the result of an assault involving, for instance, the so-called "grasping the lapels" of a jacket, a women's tail-coat or so the attacker's hand, even dressed in a glove, fired from entering with the Long cartridge, due to the pain and temperature stimuli will be quite substantially overpowered wherein the boundaries of defence will not be exceeded.

Possibility of arson

The experiments also checked the risks that may arise as a result of intentional or unintentional firing of a colour flare, standard for this type of weapon, especially as the cause of the fire. A bundle of mixed dry straw and hay was placed in a secure container. Then three consecutive shots were fired into it with Short and Long cartridges. Ignition of the straw did not occur. After that, another shot was fired with a Short load at the same straw using a blunderbuss with a flare attached to it (pyrotechnic material reduced to half to imitate the content of a fallen flare). The flare stuck in the straw. "Fire" of the straw (visible flames) occurred approx. 10 seconds after the shot.

Fig. 23. Preparation of experimental "fire" (mixed straw, hay, charcoal for grilling).

Fig. 24. The parts of the experimental "fire".

After burning the straw and the natural extinguishing of the above-mentioned experimental "fire", the site of the "fire" was searched and a metal coating of the flare was found in the debris. Unfortunately, due to the lack of technical possibilities, there were no attempts made to determine whether any forensic traces (chemical) were present in the debris which could indicate the presence of pyrotechnic materials. [40]

40 As for the actual fire, instructing such a research would be necessary in accordance with the rules of good forensic practice involving fire.

Fig. 25. The debris of flare initiating the "fire".

Conclusions

In summary, based on the results of the above-mentioned checks, preliminary experiments on a small number of shots, the thesis can be justified that the use of an alarm weapon (primarily from the Long cartridge) on the body of a man or a large animal from a very close range can cause various and severe injuries, especially if the shot is directed at cranial and facial parts – eyes, a nose and mouth (e.g. dynamic or temperature injury/destruction of the eyeballs, burns and singe (with gunshot soot) of oral mucosa, tongue, oesophagus, windpipe, bronchial tree and also causing mobility of permanent teeth, (primary) damage to acrylic dentures with the subsequent indirect trauma from acrylic debris. Also injuries coming from outside the body cannot be ruled out – streams of burning gases of the skin, coating on both sides of the large vessels of the neck, directing these gases on the exposed surfaces of the skin with burns – permanent deformations (i.e. the range of the activities referred to in Art. 156 and 157 of the Criminal Code of 1997), not even mentioning the real possibility of causing one's death (injury of large neck vessels, reflex cardiac arrest). The ability to effectively and irreversibly harm a human (of even a large animal such as German shepherd) with a Long load merely from the minimum distance, although is not excluded, it seems less likely to be crippling or deadly than in the case of a gunshot with merged ammunition, from the same distance. In any case, in the event of a shot with a blank cartridge, fired in self-defence (a state of necessity), accidental shooting a person, even by a ricochet, is excluded. The list of destruction factors was, in this case, reduced by the absence of a projectile[41].

This would be a significant factor in developing reaction pattern of the attacked person, for example, using a revolver with Long (and even Short) loads against the attacker for the purpose of reasonable self-defence or in a state of necessity (e.g. against an attacking animal).

Many clues regarding the defensive uses of an alarm gun can be taken from the previously cited publication by J. Kasprzak on gas weapons.

The authors defend the thesis about the usefulness of conducting further experiments based on better cognitive instruments and a broader research to determine the real threats to law and order resulting from the intentional, negligent, careless or accidental use of alarm firearms towards the surroundings (people, animals, flammable objects). For this purpose, however, according to art. 6 section 2 of the Act dated 21 May 1999, on arms and ammunition (Journal of Laws 2012.item 576), such experiments could be considered as inconsistent with current law and therefore would require the permission of the public authority.

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41 Interesting tips, with reference to American experts regarding the tactics of using (at close distances) 5.45 mm in size small PSM pistol (the standard МПЦ 7H7 cartridge has a 2.5-gram core bullet and works with the energy of 5.4 J /sq mm) were contained in the above-quoted source *Боевые пистолеты России ...* – pp. 191–192; pp. 196–201.

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Source

Figs. 1–25: authors

Translation Ronald Scott Henderson