

Peculiarities of gunshot injuries caused by shots Fort-12RM pistol using cartridges of calibre .45 Rubber

¹Bobkov P, ²Perebetiuk A, ²Gunas V

¹ Vinnitsa Regional Bureau of Forensic Medical Examination, Vinnitsa, Ukraine

² National Pirogov Memorial Medical University, Vinnytsya, Vinnitsa, Ukraine

Abstract

Significant distribution of non-lethal weapons among the population of Ukraine in recent years has been an impetus for in-depth study of forensic medical features of the injuries that they cause. In particular, a special interest in forensic examination and investigation would have given data on the peculiarities of injuries caused by the model of the weapon, depending on its decoration. That is why the purpose of our work was to study the peculiarities of damage to textile material when shot from a nickel decorated pistol "Fort-12RM" equipped with cartridges of calibre .45 Rubber. The shots were carried out in the target, which represented pieces of cotton fabric, from distances from point-blank range to 1.5 m at right angles with further investigation of the defect and tissue in general. As a result of the study, for the first time the boundaries of close and not close ranges of a shot for a pistol "Fort-12RM" were established; for the first time, a contact-diffusion method for the nickel decorated "Fort" gun was conducted, which, at point-blank range firing, revealed the deposition of nickel, which in shape resembles the imprint of the muzzle; for the first time morphological features of damages of cotton fabric formed at shots from a pistol «Fort-12RM» from different distances of a shot were described; it has been discovered that pieces of material of cartridges of calibre .45 Rubber can be observed at all distances of the shot in the form of small flaky and filiform elements of black colour. Thus, the specific features of the damage were discovered and the limits of the ranges of the shot for the nickel decorated pistol "Fort-12RM" equipped with cartridges of calibre .45 Rubber were discovered.

Key words: gunshot injury, non-lethal pistols, clothing damage

Zvláštnosti strelných poranení spôsobených strelami pištole Fort-12RM s použitím nábojov kalibru .45 Rubber

Abstrakt

Významná distribúcia neletálnych zbraní medzi obyvateľstvom Ukrajiny v posledných rokoch bola impulzom pre hĺbkové štúdium súdnolekárskych charakteristík poranení, ktoré spôsobujú. Zvláštny záujem o súdnolekárske vyšetrenie by poskytol údaje o zvláštnostiach poranení spôsobených modelom zbrane v závislosti od jej dekorácie. Cieľom našej práce bolo študovať zvláštnosti poškodenia textilného materiálu pri výstrele z pištole "Fort-12RM" s niklom zdobenými nábojmi kalibru .45 Rubber. Strely sa uskutočňovali na terč, ktorý predstavovali kúsky bavlnenej tkaniny, od priloženej zbrane až po vzdialenosť 1,5 m v pravých uhloch s ďalším kompletným skúmaním defektu a tkaniny. Výsledkom štúdie bol prvý opis hraníc bližších a vzdialenejších okrajov strelného defektu výstrelu pištoľou "Fort-12RM". Prvýkrát bola použitá metóda kontaktnej difúzie pre niklom zdobenú "Fort" pištoľ, ktorá pri strelbe z prázdnej zbrane odhalila ukladanie niklu, v podobe odtlačku ústia zbrane; po prvý raz boli opísané morfológické znaky poškodenia bavlnenej tkaniny vytvorené pri výstrele z pištole «Fort-12RM» z rôznej vzdialenosti; bolo zistené, že kusy materiálu nábojov kalibru .45 Rubber je možné pozorovať pri všetkých vzdialenostiach strelby vo forme malých vločkovitých a filiformných častíc čiernej farby. Boli opísané špecifické vlastnosti poškodenia a hraníc defektu výstrelu pre pištoľ "Fort-12RM" s niklom zdobenými nábojmi kalibru .45 Rubber.

Kľúčové slová: strelné poranenie, neletálna zbraň, poškodenie šatstva

Correspondence address:

Valery Gunas, MD, Assoc Prof
National Pirogov Memorial Medical University, Vinnytsya
Pirogov street 56
21018 Vinnitsa
Ukraine
e-mail: freekozak1@gmail.com

Introduction

Significant distribution of various types of non-lethal weapons is a new challenge for forensic medicine. Damage caused by gas, pneumatic and non-lethal weapons requires detailed research. Works that highlights characteristics of damage with the use of gas and pneumatic weapons partially satisfied today's needs of the investigating authorities (1). Despite its common generic name (non-lethal weapons), one cannot ignore the fact that even the mediated action of the cartridges can cause death, without affecting vital organs (2).

At the present stage, the study of forensic medical characteristics of clothing damage caused by non-lethal weapon is practically unexplored. Most research works are conducted on combat versions of pistols (3-6). It should be noted that even such works are carried out on standard models of pistols, while the features of damage caused by nickel decorated (nickel decorated) pistols in general still remain unknown. All this pushes to study the peculiarities of damages that can be caused by decorated non-lethal pistols.

Methods

For the study, the nickel decorated gun "Fort-12RM" equipped with cartridges of calibre .45 Rubber was used. As targets, pieces of cotton fabric with the size of 210x297 mm, which was attached to a special frame, were used. Shots were carried out from point-blank range (hermetic and non-hermetic), 5 cm, 15 cm, 25 cm, 50 cm, 1 m, 1.25 m, 1.5 m at right angles. Damage was investigated under ordinary lighting, using photographic and microscopic research methods. The unexposed particles of gunpowder were detected by chemical and physical reactions (Eydlin and Vladimírsky respectively) as well as microscopic research method. The metallization of damage was determined using the contact-diffusion method of investigation (also known as the method of colour imprints). The colour of the additional factors of the shot was determined using a ruler with a colour scale by Mokanyuk with co-authors (7).

Results

At contact shot the defects of the tissue of irregular square shape, in the size of 1.0x1.0 cm and rectangular shape 1.0x 0.9 cm were formed. The edges of the injury were uneven, fringed, protruding into the lumen for different lengths, injured, thinned, slightly inward (in direction of the cartridges flight), without signs of burning, pale grey (12.1 and 12.2, here and below - by the scale of Mokanyuk with co-authors) (7).



Fig. 1 The muzzle of the gun "Fort 12RM"

Around the damage was observed the concentric deposition of the dark grey (12.6) and black-grey (12.7) soot of 0.2-0.4 cm wide and an outer diameter of 2.1 cm. At this concentric deposit, there was a ring of illumination with small deposits of soot. Continuous damage is located against the backdrop of a muzzle end of the weapon (tattooing), which is a contouring deposition of the soot of less intense grey (12.4) and light grey (12.3 and 12.2) colours. This sediment has an irregular pear shape that narrows downwards, a total length of 4.5 cm and a width of 3.8-4 cm. The upper and lower edges of the imprint are clear-cut, on the sides lighter. In the lower part of the imprint, 1.6 cm from the centre of the transverse damage, there is a horizontal grey band (12.4) of 0.9x0.15 cm, which corresponds to the imprint of the upper edge of the recoil spring guide rod. In addition, when the shot is non-hermetic, around the damage, especially in the lower region, numerous unexposed particles of gunpowder of the semi-spherical and round-shaped light-yellow-orange colour (6.3) were found.



Fig. 2 Damage of target at contact shot

In the examination of lesions that were formed at shots from a distance of 5 cm, damage was detected in the form of a defect of the tissue of irregular square shape, 0.9x0.9 cm in size. The edges of damage are pale grey, uneven, fringed, the threads protrude into the lumen at different lengths. The ends of the threads are loose and thinned, partly wrapped inward in the direction of the cartridges flight. However, signs of burning fibres at the edges of damage were not detected.

Around the damage there is a concentric deposition of soot of light grey colour (12.3) to a width of 1.0-1.2 cm and an external diameter of 3.4 cm. This concentric deposit contains a darkening grey (12.5) and dark grey (12.6) colours in the width of 0.8-1.0 cm with minor intermittent areas of illumination, with a total external diameter of 5.0-5.2 cm. These deposits of soot from the inside outside gradually become lighter and disappear at 3.5-4.0 cm from the centre of transverse damage. Also, a lot of semi-burned and unburned gunpowder particles (similar to those described above) have been found around the damage.

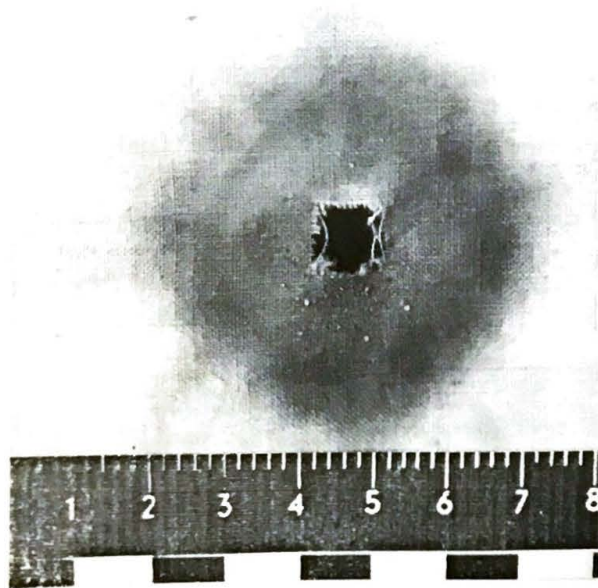


Fig. 3 Damage of target at shot from a distance of 5 cm

For shots with a distance of 15 cm, appeared damages of irregular square or rectangular shape, in sizes from 1.0x1.0 cm to 1.1x1.1 cm. The edges of the damages were uneven, fringed, with loose ends of threads and thinned ends of fibres, as well as with the presence of undamaged single threads, which arcuately protrude into the lumen of damage. Signs of burning fibres were not detected. The ends of the threads were white. Around the damage observed deposits of soot in the form of a barely noticeable circle or oval of very pale grey (12.1) colour of 1.8-2.2 cm in width and a total external diameter of 5.0-5.5 cm. It was observed the deposition of numerous unburned and semi-burned gunpowder particles of light

yellow-orange colour in a plot of 4.5x3.5 cm, and single particles at a maximum distance of 6.5-9.5 cm from pass-through damage.

In the case of shots that were carried out from a distance of 25 cm transverse damage had an incorrect oval or rectangular shape, in sizes from 1.0x1.0 cm to 1.1x1.0 cm. There were no signs of burning. Deposits of soot for damage were not detected. Deposition of numerical particles of gunpowder in the area of 5x5 cm, and single particles at a maximum distance of 6.5 x 10 cm were observed. There are also multiple pieces of material of a cartridge (rubber), which have the appearance of scalper and filamentary elements of black colour in size from 0.05x0.02x0.01 cm to 0.2x0.1x0.1 cm. In addition fuzzy and intermittent traces of rubbing of black colour were observed on the edges of the defect.

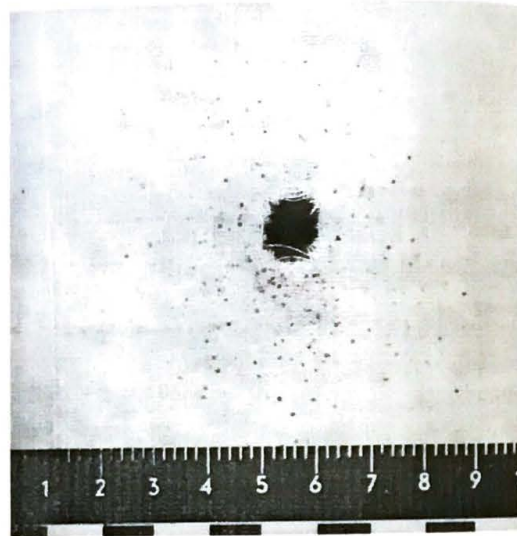


Fig. 4 Damage of target at shot from a distance of 25 cm

It was found out that at shots with a distance of 50 cm transverse damage have an incorrect oval or rectangular shape, in size 1.0x1.0 cm. Morphological characteristics are similar to those with a distance of 25 cm. In micro and macroscopic studies revealed fewer gunpowder in the area of size up to 10cm. Soot not found.

After a shot from a distance of 1 m, found that transversal damage had an incorrect oval or rectangular shape, in sizes from 1.0x1.0 cm to 1.1x1.0 cm. Morphological characteristics are similar to those described above. Features: single gunpowder (3-4 pieces) and lobes of the cartridges.

At a distance of 1.25 m, pass-through lesions were square; in size 0.9x0.9 cm. Morphological characteristics are similar to those described above. Gunpowder and soot traces were not detected. In the microscopic study, the particles of the cartridge were detected (a small amount).

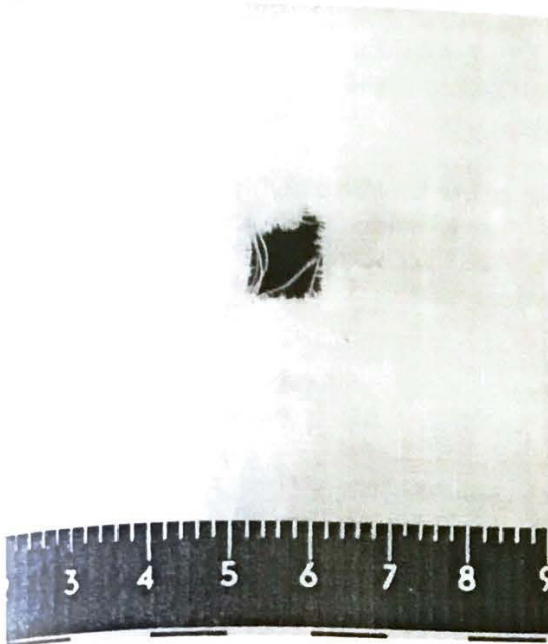


Fig. 5 Damage of target at shot from a distance of 1.25 m

Studying pieces of tissue at shots at a distance of 1.50 m revealed transverse damage, having a square shape, in size 1.0x1.0 cm. Morphological characteristics are similar to those described for a distance of 1.25 m. In the macro- and microscopic study, no gunpowder, no soot has been detected. The particles of a cartridges of black colour were detected.

Investigation of the damage site of contact shots for the presence of metals have done by the standard contact-diffusion method (method of colour imprints) with the use of the reactant-developer - a saturated alcohol solution of rubeanic acid. Pre-recorded for 20 minutes in 25% solution of sodium thiosulfate, washed and dried photographic paper, was soaked for 10 minutes in a solution of solvent reagent - 12% ammonia solution and applied to the area of damage on the fabric (exposure time 10 minutes). A multilayer object, separated on both sides by sheets of white paper and fragments of microporous rubber, were placed under a press that provides a pressure of 1 kg/cm² for 10 minutes. After the contact, the emulsion layer of the photographic paper is processed by the reactant-developer - a saturated alcohol solution of rubeanic acid. After 2 seconds on a photographic paper in the area of damage appeared sputum colour of purple colour, which partially repeats the shape of the muzzle end of the pistol. The appearance in areas of purple (or blue-violet) coloration is typical of the deposition of nickel, which is a metal covering the surface of an experimental pistol. The presence of copper is not detected. Before the study, a reagent control with pre-contaminated copper and surface was conducted.



Fig. 6 Result of contact-diffusion method on the area of damage at contact shot

Similarly, we investigated the presence of metals on the target fragment from the defect site that was formed during the shot. The contact-diffusion method showed in the area of target fragment ring-shaped imprint that arose as a result of contact with the rubber bullet, the spotty purple colour in the form of a ring with a diameter of 0.9 cm. The purple colour is typical for the deposit of nickel, which is the covering metal the surface of an experimental pistol. The presence of copper is also not found.

Conclusion

Thus, for the first time installed: the boundaries of close and not close ranges of shot for the gun "Fort-12RM". The close range of the shot was 1 meter (the distance at which there were observed additional factors of the shot); for the first time, a contact-diffusion method for the nickel decorated "Fort" gun was conducted, which revealed the deposition of nickel, which in shape resembles the imprint of the muzzle of the pistol; for the first time morphological features of damages of cotton fabric formed at shots from a pistol «Fort-12RM» from different distances were described; it has been discovered that pieces of material of the cartridges of calibre .45 Rubber can be observed at all distances of the shot in the form of small flaky and filiform elements of black colour.

References

1. Legin GA, Bondarchuk AO, Perebetjuk AN. Sudebno-medicinskaja harakteristika vhodnyh otverstij pri vystrelah iz pnevmaticheskogo pulevogo oruzhija. Sudebno-medicinskaja jekspertiza. 2015 Mar 1;58(2):14-6.
2. Musiienko DV, Kaplia OI, Perebetiuk AM. Kontuziia sertsia yak prychnyna smerti pry urazhenni drobom z neblzykoi vidstani. Sudovo-medychna ekspertyza. 2016(1):80-3.
3. Shcherbak VV. Sudovo-medychna kharakterystyka vohnepalnykh poshkodzhen tkanyn odiahu pry postrilakh vpryutl iz pistoletu Fort-14TP". Krymy-

- nalastyka y sudebnaia ekspertyza. 2014(59):484-91.
4. Shcherbak VV. Diahnostychni oznaky postrilu iz pistoleta Fort-12 v mezhakh blyzkoj dystantsii. Sudovo-medychna ekspertyza. 2015(1):47-50.
 5. Shcherbak VV, Tolmachov OO, Kundyus OV, Abdurasulov AA. Mozhlyvosti vstanovlennia modeli vohnepalnoi zbroi pry postrilakh z pistoletiv Fort kalibru 9kh18 mm. Kryminalistychnyi visnyk. 2014(2):128-33.
 6. Shcherbak VV, Tolmachov OO, Kundyus OV, Abdurasulov AA. Mozhlyvosti vstanovlennia modeli vohnepalnoi zbroi pry postrilakh z pistoletiv Fort kalibru 9kh18 mm. Kryminalistychnyi visnyk. 2014(2):128-33.
 7. Petruk VH, Mokaniuk OI, Mokaniuk VO, Kvaterniuk SM, Kvaterniuk Ole. Sposib vyznachennia i reiestratsii koloru ta rozmiriv ushkodzen v sudovo-medychnykh doslidzhenniakh.