



Staining in firearm barrels after experimental contact shots



C. Schyma^{a,*}, K. Bauer^a, J. Brünig^a, C. Courts^{b,c}, B. Madea^b

^a Institute of Forensic Medicine of the University of Bern, Bühlstrasse 20, CH-3012 Bern, Switzerland

^b Institute of Legal Medicine of the University of Bonn, Stiftsplatz 12, 53111 Bonn, Germany

^c Institute of Legal Medicine of the University of Kiel, Arnold-Heller-Straße 3, 24105 Kiel, Germany

ARTICLE INFO

Article history:

Received 25 October 2016

Received in revised form 6 January 2017

Accepted 31 January 2017

Available online 10 February 2017

Keywords:

Suicide
Firearm
Wound ballistics
Backspatter
Biological traces
Gun barrel

ABSTRACT

After contact shots to the head biological traces inside firearm barrels can be found. This study was conducted to simulate and to evaluate such staining. Five current handguns of four inch barrel length in the calibre .22 long rifle, 7.65 mm Browning, 9 mm Luger and .38 special were used to perform 24 contact shots on silicone coated, gelatine filled box models using the triple contrast method. The staining was documented by endoscopy and swabs gathered from both ends of the barrel were analysed by quantitative PCR. With the exception of the .22 revolver, all firearms showed distinct staining which decreased from the muzzle to the rear end of the barrel. The pattern was varied, showing droplets, elongated forms or stripes. In 14 of 24 shots, staining reached the chamber. The staining results were comparable to real suicide cases.

© 2017 Elsevier B.V. All rights reserved.

1. Introduction

Close contact gunshot wounds are common in suicides. In medico-legal practice backspatter on the hand of a deceased can help identify the gunshot injury as self-inflicted. In suicide cases rejected organic material can also be found on and inside the firearm. Systematic studies could demonstrate the presence of biological traces in barrels of suicide firearms by endoscopy and DNA analysis [1,2]. In a first approach, generation of such traces was realised in experimental contact shots using different models [3]. Within the scope of the research project “The Point-Blank Shot – from the shot to the stain: an interdisciplinary forensic analysis.” funded by the Swiss National Science Foundation (SNF), the experimental procedure was refined by introducing the “triple contrast method” [4]. A fluid mixture of acrylic paint, blood and radiocontrast agent was sealed into thin foil bags which were placed in front of the target models. The paint component made an optical visualisation of backspatter possible, whereas human blood allowed the detection of invisible traces by PCR analysis. The addition of the radiocontrast agent barium sulphate was necessary for the imaging of the target models by computed tomography. With this approach, the propagation of material in and against the shooting direction inside the target model as well as inside the barrel could be controlled. The following study was performed to

describe the staining inside the barrels after contact shots using several types of current handguns in forensically relevant calibres with the identical barrel length.

2. Material and methods

According to the triple contrast method [4] 2 ml heparinised human blood, 2 ml acrylic paint (CPM, Erkrath, Germany) and 1 ml barium sulphate-based radiocontrast agent Micropaque[®] (Guerbet, Brussels, Belgium) were mixed and sealed into thin 5 × 5 cm² foil bags. Blood samples were taken by venipuncture from adult, informed and consenting volunteers. The study design had been approved by the ethics committee of the University Hospital Bonn.

The foil bags were attached to the lid of a plastic box (12 cm × 10 cm × 9 cm) which then was covered with a 3–4 mm-thick layer of silicone and stored at 4 °C for 16 h. Finally, 1 l 10% gelatine ‘Ballistic III’ (Gelita, Eberbach, Germany) was filled into the boxes which were then stored at 4 °C for another 48 h.

In this study, 5 current handguns with four inch long barrels, two revolvers and three semi-automatic pistols were used. The most frequent handgun calibres in forensic casework were tested: .22 long rifle, 7.65 mm Browning (.32 auto), 9 mm Luger and .38 special. Non deforming ammunition was fired with close contact of the muzzle. In the calibre 9 mm Luger two kinds of ammunition were used: the subsonic Fiocchi cartridge for comparison with the other tested subsonic calibres and the supersonic Geco cartridge which is more widely spread and

* Corresponding author.

E-mail address: christian.schyma@irm.unibe.ch (C. Schyma).

Table 1
Firearms and ammunition used, staining inside the barrel and results of quantitative PCR.

	Firearm	Calibre	Type of firearm	Cartridge	Bullet weight [g]	Barrel length [mm]	Staining				DNA concentration [ng/μl]	
							Anterior part	Posterior part	Chamber	Elongated	Anterior part	Posterior part
1	Arminius HW5 ^a	.22 WMR	Revolver	22 long rifle HV CCI	2.6	100	0	0			–	–
2							1	0			–	–
3							0	0			–	–
4							1	0			0.0050	0.0002
5	Walther PP Sport	.22 long rifle	Semi-automatic pistol	22 long rifle CCI	2.6	98	3	2	+	x	2.4851	0.6671
6 ^b							3	2	+	x	1.2728	0.1009
7				22 long rifle HV CCI	2.6		3	1	+	x	0.2828	0.0035
8							3	1	+		0.2675	–
9	Walther PP	7.65 mm Browning	Semi-automatic pistol	7.65 mm FMJ Geco	4.8	98	3	2–3		x	0.4310	0.0055
10							3	2–3		x	0.9462	0.0172
11							3	3	++	x	0.3538	0.1150
12							3	2		x	0.2866	0.1225
13	S&W Mod. 5906	9 mm Luger	Semi-automatic pistol	9 mm Luger FMJ Geco	8.0	100	3	2	++	x	0.1989	0.0113
14							2–3	1–2	+	x	0.1271	0.0025
15							3	3	++	x	0.3403	0.0135
16							3	3	+	x	0.1048	0.0330
17				9 mm Luger FMJ Fiocchi	10.2	100	3	2–3	++	x	3.3030	0.9175
18							3	3	++	x	0.2015	0.0224
19							3	1	+	x	0.3637	0.0492
20							3	2		x	2.5140	0.2534
21	Astra Cadix	.38 special	Revolver	38 special LRN S&B	10.2	100	3	2		x	0.4941	0.0096
22							2	1			0.4398	0.0008
23							2	1	+	x	0.0688	0.0286
24							3	2	+	x	0.5874	0.1633

Staining in the chamber: + single spots, ++ multiple spots.

S&W: Smith and Wesson, Springfield, USA.

S&B: Sellier & Bellot, Vlašim, Czech Republic.

CCI: Cascade Cartridges Inc., Ammunition, Lewiston, USA.

HV: High velocity.

FMJ: Full metal jacket.

LRN: Lead round nose.

^a The .22 WMR revolver was only used as .22 long rifle firearm.

^b Jammed cartridge.

Download English Version:

<https://daneshyari.com/en/article/4760330>

Download Persian Version:

<https://daneshyari.com/article/4760330>

[Daneshyari.com](https://daneshyari.com)