Firearm in forensic science: Comparative Study

Sneha Ranjan

BA.LLB (HONS.), 4th year, Manav Rachna University, Faridabad

Abstract

In this paper, in the first part, I will discuss about the Firearms, its meaning and its importance. Nowadays in majority of the crimes firearms are involved, whether it is theft, dacoity, threatening etc. Firearms is not only limited to the crimes but it is also used for their safety reasons by people like big business tycoon, politicians etc. in both legally as well as illegal manner. In the second part we traced the history of firearm from 13th century till present, like how it evolves and the method like “bullet identification”, “photos and resource used to identify firearm, bullet verification etc. The third part of the paper contains the international perspective of the firearm and compare it with India with some case laws. For instance, NIBIN has developed by ATF created for maintaining a national database of 2D or 3D image of using 2-3 D image of cartridges. In the continution Malimmath committee report is discussed that why forensic science is important & suggestions given by them like to make certain changes in the CRPC, create awareness among the general people, judges, prosecutors, etc. To create DNA database to store DNA of the terrorist, accused, so that it could be easy for them to investigate in future. At last conclusion of this research topic has been given like what India should do to compete with US we need to consider the points given by the Malimmath Committee in its report, need of better forensic lab etc.

Introduction

Firearm means arms of any description adapted to discharge a projectile or any of its kinds by the action of explosive or other forms of energy. It is designed to discharge projectiles from distance with the intention to kill or at least incapacitate. Basic job of a fire arm is to

a) Discharge a projectile with sufficient energy to kill.

b) Ensure that the projectile travels in the required direction.

c) To ensure that a bullet, as distinct from shotgun pellets, arrives at its target nose first.

Now a days fire arms are used frequently in crimes like murder, terrtorisms, dacoits, assassination mob violence, police encounter and firing etc. hence it is important evidence for the purpose of criminal investigation and trials. In order to identify evidence of a firearm we look at the ammunition fired. The individuality of the marks imprinted by a gun on a fired cartridge or on a bullet is universally recognised. Firearm and fingerprint has one similarity & that is both of these have their identical mark & they can never be similar to each other and

1 P.C white (ed.), Crime Scene to court p.no. 269 (Royal Society of Chemistry, Cambridge, second edn./2004).

hence the accused person in the past have been convicted solely on the basis of firearm evidence.

Therefore, when-ever a crime is occurred through firearm, the police or investigating officer from the crime scene submits it in the forensic laboratory for further investigation. From the evidence collected the analysis of gunshot residue collected by the person, hands or other body surface can also be detected. Forensic evidence from weapons is utilised in the investigation and prosecution of criminal cases, and it can be used to connect crimes that are suspected to be associated.

**Importance**

1. To establish the link between the evidence and the culprit.
2. To decide whether the given incidence is a case of murder, or of an accident, killing in self-defence or a suicide.
3. It helps in the determination of the sequence of the events.
4 Distinguishes between real and fake incidence.
5. Establish the number of shots, their directions and ranges and the number of firearms used in the incidents.

**Historical Perspective**

The evolution of firearms can be traced back to the discovery of gunpowder. By the 13th century, the Chinese had already created primitive firearms, such as the hand cannons. These weapons, which were very crude at the time, were refined into more reliable assault and warfare tools during the 14th century.³

**Cases of bullet identification from the beginning** - Dr. A.L. Hall published an article in the Buffalo Medical Journal in June 1900 claiming that bullets shot through various marks and types of weapons of the same calibre were imprinted with rifling markings of diverse types.⁴

In 1907 Frankfurt Arsenal employees were tasked with investigating which guns were fired during the riot in Brownsville, Texas, in which American infantry. Magnified pictures of the firing pin impressions on the cartridge cases were utilised as a means of identification. They were able to positively identify 11 of the 39 cartridge cases analysed using this method.

**Use of photomicrographs** – In order to identify the weapon from which the bullet was discharged, Balthazard took photomicrographs of bullet landings and grooves. After these

---

investigations, he came to the conclusion that the cutter used in rifling a barrel never leaves the same marks every time it passes through the barrel. These patterns, which must be unique to that barrel, are printed on any bullet that passes through it as a series of striations. Accordingly, he reasoned, it could be prove beyond a reasonable doubt that a fired bullet came from the barrel of a certain firearm. The importance of Balthazard's work cannot be over stated, for it is based on this foundation that modern science is built. In a study published in the Chicago Police Journal in 1936, Calvin Goddard credits Philip Gravelle for inventing the comparative microscope in 1925. In this, his claim was an evolution of Albert Osborn's document examination comparison microscope. The microscope was made up of a Zeiss optical bridge, Spencer microscope bodies, Leitz eyepieces, Bausch & Lomb objectives, and Remington Arms Company bullet mounts.

Emile Chamot of Cornell University also describes the use of a comparison microscope, using an optical bridge designed by Bausch and Lomb, for examining small arms primers in 1922. Russian mineralogist, A.V. Inostrszeff, who, in 1885, designed an optical bridge for comparing the colour of minerals. Philip Gravelle he was the first who realized its use in the forensic comparison of striations on bullets and cartridge cases.

In 1927, Robert Churchill bought a monocular microscope and photomicrographs. He saw an advertisement for the comparison microscope in an American periodical. This was the first time microscopic evidence had been presented to a court in the UK. The Gutteridge murder case was solved using this type of microscope.

The fact of the case “Constable Gutteridge” are as follows.

There was a motor car which used by the murderers in killing Constable Gutteridge, police found a fired revolver cartridge case from that car. Whilst the fact that a microscopic comparison had been made was not particularly significant, this was the first time that such evidence had been presented to a court of law in the United Kingdom.

**International perspective of ballistic**

Before 1980-90s the ballistic examiners use to proof the result of firearm residues by comparison magnifier, analysing shape of metal pattern of distinctive mark and options, they match it against alternative firearm. But unfortunately at that time no machine or anything was available that can store the data. Firearms identification was labour intensive and long task as while establishing the connection between different cases, all what we can do was to have trust on the memory of the examiner.

---

5 Ibid 146
7 ibid 148
Post 1990s, the scenario changed, computerised image and database were applied to rhetorical proof analysis. Further the systems like DRUGFIRE, Bureau of Alcohol, tobacco, firearm explosive (ATF) funded bulletproof started being used in searching new ballistic proof against huge volume of already collected picture. Later they started to share their database with the other multiple agencies & permitting search within region of the country.

With the span of time ATF created NIBIN for maintaining a national database of 2 or 3 D image of using 2-3 D image of cartridges, which are recovered from crime scenes or test-fired from confiscated weapons, and computes similarity scores between a newly acquired cartridge and the database entries. When small-arm examiners ensure candidate matches, detectives will use the data generated by the links among gun crimes to assist solve their cases. BulletTrax-3-D image acquisition technology was specifically designed to boost the flexibility of enforcement agencies. In India no such database is existed to record ballistic. Delhi HC in case “Sourabh Mangoo vs. State of GNTC “the court told Delhi Police to assess the possibility of creating a ballistic database, storing reports of all firearms which license are issued or indorsed to the public, which can be assessed.”

Majority of labourites in US are public means they are financed by the federal, state or local unit of government and there are undetermined no. of private labourites as well (approx. 50-100). There are approx. 470 labourites present in US. In private labourites even the accused can give samples to test. There are some semi-government labs also which charges the government bodies as well for the forensic test & the result of all these labs are admissible in the court. While in India there are limited no. of labs are available, in court, only government verified labs results are admissible not the others.

Like China has develop a satellite positioning chip to find the location of firearm and trigger alert when guns are taken out of designated area. The developer of technology also said that the chips used China’s Beidou Navigation Satellite system to send real-time location data back to control centres and if the owner of the arm is away from his weapon then he will also send an alert.

---

**Importance of Forensic In Ballistic Through Case Laws**

**Case in America**

In *United States v. Monteiro*, ample documentation was lacking, as the experts didn’t created any sketches or images. The court wrote: “Until the premise for the identification is

---


10 Max M. Houck & Jay A. Siegel Fundamental of Forensic Science 11, (UK, 2010)


12 United States v. Monteiro, 407 F. Supp. 2d 351

4 burnishedlawjournal.in
represented in such some way that the procedure performed by [the examiner] is reproducible and verifiable, it is inadmissible.”

In United States v. Diaz\textsuperscript{13} in this case court found that

The record failed to support the conclusion that identifications may be created to the exclusion of all alternative firearms within the world. Thus, “the examiners who testify during this case might solely testify that a match has been created to a, reasonable degree of certainty within the ballistics field\textsuperscript{14}.” Even courts that admitted the evidence expressed reservations. For example, in United States v. Williams\textsuperscript{15}, the Second Circuit upheld the acceptability of firearms identification proof involving bullets and cartridge casings. The opinion, however, contained some cautionary language: “We don't would like this opinion to be taken as expression that any proffered flight skilled ought to be habitually admitted.

Some recent cases show limitations surrounding the reliability of firearms identification evidence. In 2009, a district court in United States v. Taylor\textsuperscript{16}, In this case the defendant had killed Mr. Chunn by a gun shot. When the investigation took placed then defendant was told his co prisoner (who was the member of FBI) about the place where he had disposed of the weapon. From that information the FBI team went there and recovered the said weapon and send it for the forensic testing. Mr. Nicolas, government expert of firearms forensic tested it and said that the bullet is fired from that weapon (which is recovered).

The court wrote: attributable to the restrictions on the irresponsibleness of firearms identification proof mentioned on top of, Mr. Nichols won't be permissible to testify that his methodology permits him to succeed in this conclusion as a matter of scientific certainty. Mr. Nichols conjointly won't be allowed to testify that he will conclude that there's a match to the exclusion, either sensible or absolute, of all different guns. He might solely testify that, in his opinion, the bullet came from the suspect rifle to among an affordable degree of certainty within the firearms examination field.

**Indian case**

Jaidev and Hari Singh v. State of Punjab\textsuperscript{17}, in this the case the Court was of the opinion that wherever a gun is employed within the commission of a criminal offense, the prosecution, must bring knowledgeable proof to attach the injuries with the weapon and its alleged manner of use.

In the case of Ajay Singh v. State of Bihar\textsuperscript{18}, the pistol used in the perpetration of the crime was never sent to the ballistic expert for examination. This was seen as a lacuna on the part of

\textsuperscript{13} United State V. Diaz, 2007 WL 485967
\textsuperscript{14} United State V. Taylor, 663 F.Supp. 2d 1170
\textsuperscript{15} Jaidev and Hari Singh v. State of Punjab, 1963 Cri LJ 495
\textsuperscript{17} Ajay Singh v. State of Bihar AIR 2000 SC 3538
the prosecution but the case did not go in favour of the appellant as there were witnesses who testified to the satisfaction of the Court that accused had done that act of crime.

**Malimath Commission report on forensic science in India**¹⁹

1. In his report, they called for amending several articles of the Criminal Procedure Code to reflect the principles of forensic science. For example- A specific law should be enacted to direct the police to established uniform standards for genetic information and to create appropriate safeguards to prevent abuse.

2. We should create a national DNA database so that it can be used to fight against terrorism and we need better laboratories in order to handle DNA samples and evidence.

3. Awareness should be made among general public, Prosecutors, judges and police machineries.

4. The work in Forensic Science Laboratories being interdisciplinary in nature, there is a need to develop and supplement the —General Criteria for Laboratory Accreditation for the purpose of accrediting Forensic Science Laboratories.

5. The document- Specific Criteria for Accreditation of Forensic Science Laboratories has been evolved by a Technical Committee specifically constituted for the purpose. It supplements the document General Requirements for the Competence of Testing and Calibration Laboratories and provides specific guidance on the accreditation of Forensic Science Laboratories for assessors as well as the laboratories who are preparing for accreditation.

**Conclusion and suggestion**

Forensic evidence plays a important role in helping courts to reach logical conclusion. Therefore, the expert/professional should be encouraged to undertake technological (science backup) help in legal work and simultaneously the atmosphere in court should be congenial to the medical witness. When it comes to the outcome of a case, this is critical because if good specialists fail to appear in court, less objective professionals will fill the void, affecting justice. Different organisations have recognised the necessity to include more and more professionals in expert testimony. Though several suggestions have been presented to the Ministry of Home Affairs, one of them being the development of a Forensic Council, where not only the Evidence Act, but also the Information Technology Act and the Code of Criminal Procedure will be complementary to science.

Ballistics evidence matching is intended to assist police investigations of crimes involving firearms, thereby increasing the chance of arrest, conviction, and punishment of criminals.

---


burnishedlawjournal.in
Unlike US, India also need to make a data base to collect the records of ballistic, a certain guidelines must be given to analysis finger print from the guns as suggested by the Delhi HC.

India is also working on it to increase its scope in the field of forensic but it needs more to develop. First we need more and more laboratory where testing can be done. India has 29 Fingerprint Bureaux, 29 state and 7 central forensic20 labs with different specialization & all have no. of vacancies available. Hence we required more and more experts in this area as well. Secondly the data collections in regard of firearms must be shared with each region so that it can help the strong the case in court of law Like US does. Finally apart from other subjects like psychology, law, computer science etc. we need forensic science as a separate subject so that we get more and more expertise in the filed which ultimately help in the future.


burnishedlawjournal.in