Homicide by a rifled shotgun slug: unconventional ballistics

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Abstract: Two types of firearms are well known- Rifled and smoothbore. The shotgun is conventionally loaded with shot. Shot is a collective term for small balls of lead used primarily as projectiles in shotguns. Ammunition for shotguns in the USA is shotgun shells, shotshells, or just shells; cartridge is standard usage in the United Kingdom and India. Ballistic expertise in India of the world usually bases on the rigid idiom that pellets emerge from a shotgun while bullets and the like are fired from rifled weapons. Anything not conforming to this reasoning is treated and termed as ‘bizarre’. Homicide by shotgun slugs in India has not been reported extensively, though the incidence may be more than expected. This case highlights the fact that ammunition in the stricter sense may not be ‘pathognomic for a type of firearm and the crime solving agencies must re-educate themselves on this aspect.

Key Words: firearms, smooth bore, rifled

A shotgun is a firearm that is usually designed to be fired from the shoulder, which uses the energy of a fixed shell to fire a number of small spherical pellets called shot, or a solid projectile called a slug. The usual ammunition as mentioned in texts and routinely encountered by Forensic experts is the traditional smoothbore weapon firing pellets from a cartridge. In India, no standard textbook of Forensic Medicine describes the possibility of a ‘rifled shotgun’ in detail. The law enforcement agencies, medico-legal fraternity and the judiciary by and large is under the impression that a shotgun means a firearm firing pellets only though all types of shotguns are available. The typical shotgun used is the 12 bore pump action gun, specially developed for use as a security weapon. It is a single barrel breach loading weapon used by police for riot control by use of rubber ball non-lethal ammunition. Shotguns firing slugs or sabot type shotguns are used primarily by security staff of banks, big business establishments and the like. Such shotgun use 12-gauge Rifled slug Lead with a weight of 28 grams or S1 12 guage Full Choke, weight 12 g 70 mm Slug [1]. A rifled slug from a smooth bore shotgun is effective out to 100 yards [2]. Anyways, security guards using this ammunition rarely get to use it on duty; whenever they do, the results are not what are intended. A case of homicide by use of such a weapon is presented.

Case history
The case was more of an eye opener owing to the recovery of slug pieces from the body of the deceased with evidence of rifling on them, though the weapon used was a 12 bore shotgun. The deceased was a cashier in a bank. One late afternoon, way past the normal public dealing time, two suspicious

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looking young men were stopped by the bank’s security guard as they tried to enter the premises.

The altercation that followed led to a desperate scuffle during which the guard’s gun was
snatched and two shots fired into the bank. One slug lodged into the wall while the other hit the cashier
in the abdomen. One of the assailants ran away, the other was overpowered by the security guard. The
guard had burns in his hands due to his proximity to the discharging weapon. The bleeding cashier
was rushed to Post-Graduate Institute of Medical Sciences, Rohtak and an emergency laparotomy
with right nephrectomy with cholecystectomy with right hemicolectomy with primary repair of the
1st part of the duodenum and packing around the liver was performed. Operative findings showed
the inferior border of right lobe of liver shattered, fundus of gall bladder, right hepatic flexure and
transverse colon were blown off, the 1st part of the duodenum was transected, right kidney was
shattered, massive haemoperitoneum was present and psoas muscle (upper part) was blown off.

The patient was kept on maintenance with blood transfusion and ionotropics. The next day
the treating team diagnosed abdominal compartment syndrome and a re-exploration with zipped
laparotomy was done. Operative findings were around 500 cc of blood clot in the peritoneal cavity
with dilated small gut. No shot/bullet was taken out during any of the surgeries. He passed away the
same night. The dead body was shifted to the Institute’s mortuary for autopsy.

**Findings on autopsy**

Rigor mortis was well developed; post-mortem staining was present over the back. A gauze
bandage was applied over the abdomen (midline) beneath which was a surgical incision with a zip
suture. An ileostomy wound was present over the right iliac area and a surgical wound for drainage
with sutures was over the lateral wall of the abdomen. X-rays were done in the mortuary itself. They
showed oblong/semi-vertical shadows of metallic density and no pellets as expected.

**Injuries over the body**

An entry wound of firearm of size 3.5 × 3.5 cm, oval in shape with irregular margins and tags
of torn skin over the right hypochondrium with collar of abrasion along the margins of the wound
(more so on the inner margin). (Figures 1 & 2) It was situated 6 cm to the right of the midline and
14.5 cm below the right nipple, being 113 cm above right heel. A blood stained gauze pack was
inserted. The surrounding area was abraded more so on the upper part. The wound was directed
antero-posteriorly, lateral to medially and slightly downwards to enter the right abdominal cavity.
(Figure 3) The right lobe of the liver was stitched with dark red clotted blood collected in this area.
The transverse colon and hepatic flexure of the colon were sutured with dark clotted blood
present in this area. Further on, the wound was directed downwards to enter the right retro-peritoneal
space to pierce the peri-nephric tissues and enter the paravertebral muscles at level of Lumber 1st
to 2nd vertebrae. The right transverse process of 1st Lumber vertebrae was shattered. From the
paravertebral gutter in this area, smashed and a deformed metallic ball (one large piece and two
smaller pieces) were recovered. Two black wads and round retaining wads were also found on
further dissection. (Figure 4) On palpation, small spicules of shattered bone pieces were recovered
from the same area. From the abdominal cavity, nine blood soaked surgical packs were taken out.

A firearm wound (grazed type) over the palmar aspect of the right hand (lower part) of size
10.5 × 2.5 cm (~3cm). (Figure 5) It commenced from the base of the thumb onwards to involve
whole length of the palm till the base of the right little finger. It was more wide and deep on the
outer aspect, gradually getting shallow and narrow towards the inner aspect. Multiple tears (the
longest measuring 2.5 cm) were seen from the main wound margin. A collar of abrasion was noticed
over the entry wound (about 2/3rd of an arc) on approximation of separated skin tags. Tendons and
ligaments were exposed and shattered. Spicules of shattered bones were seen in the exposed area.
Figure 1. Entry wound of firearm with ileostomy & surgical zip type wound

Figure 2. View of the entry wound of firearm

Figure 3. The track of the slug into the peritoneal cavity

Figure 4. Shattered pieces of the slug & wads recovered from paravertebral gutter

Figure 5. The hand wound
**Ballistic examination of recovered fragments**

The recovered metallic balls and wads were sent for ballistic examination to the State Forensic Science Laboratory. Ballistic tests showed that the fragments were of a 12-gauge rifled lead slug. The range of fire had been about 50 yards thereby causing maximum destruction with being fired within its effective range.

**Discussion**

The fact that a smoothbore gun can have ‘rifling’ or that shotguns can fire slugs is not very well recognized by the Forensic fraternity in India. A taxing and well known problem in ballistics for both the police and autopsy surgeons however is the use of improvised firearms by criminals (called DESI/KATTA in the North of the country) who use pellets in rifles or bullets in shotguns. The ballistics of this easily manufactured and available weaponry is baffling as no rule of conventional ballistic holds true for them. For this very fact, range determination is quite difficult if not impossible. In India, use of improvised country-made pistols is widespread, especially in the regions of Bihar and Purvanchal. The manufacture of these weapons has become a cottage industry and the components are often manufactured from scrap material, such as gun barrels fashioned from truck steering wheels [3]. It is very common to read news items reporting police uncovering a ‘factory’ of such weapons, usually in the rural hinterlands [4].

A firearm expert is often confronted, is to opine on the wounding capability of fired bullet at various ranges. It poses varied problems if it is a smooth bore homemade/improvised firearm designed to fire revolver, pistol or rifle cartridges. Such firearms are used to an appreciable extent in crimes in India and other developing countries. The available ballistic tables are irrelevant and inapplicable obviously because bullets fired from smooth bore firearms are neither imparted spin nor do they achieve desired muzzle velocities [5].

The first effective shotgun slug was introduced by Wilhelm Brenneke in 1898, and his design remains in use today. Most shotgun slugs are designed to be fired through a smoothbore barrel, which means that they must be self-stabilizing and capable of passing through a choked barrel. Much later shotguns were produced with rifled barrels, and slugs were designed to be fired from them with spin stabilization. As these specialised “shotguns” were far more accurate than a smoothbore gun, they also usually featured greatly improved sights. Many of these slugs use saboted sub-caliber projectiles, resulting in greatly improved external ballistics performance [6].

The earliest shotgun slugs were just lead spheres, of just under the bore diameter. Later types of slugs, the Brenneke and Foster slugs, used a weight-based design and rifling-like fins to provide stability and the ability to easily compress and pass through a choked barrel. These could be fired through a smoothbore barrel with reasonable accuracy, and significantly extended the effective range of the shotgun slug. The latest improvement is the saboted slug, fired from a rifled shotgun barrel which is designed to engage the rifling in a rifled shotgun barrel and impart a ballistic spin onto the projectile. A 12 gauge 402 gr. shotgun slug has a muzzle velocity of 1600 ft/sec and muzzle energy of 2485 ft-lb.[7]

Ward and Nolte evaluated the impact and penetration characteristics of the Remington® Copper Solid sabot shotgun slug with standardized ballistic tests and used this information to predict tissue wounding patterns. The slug, sabot, and wads of this unique projectile separate and create independent impact points in a stereotypical manner independent of barrel type. This pattern of separation allows estimates to be made of ranges of fire. Wounds created in human tissues by this ammunition have asterisk-shaped configurations, and nose fragments may be deposited in tissues and seen radiographically. Rectangular wounds created by the tumbling or yawing slug might be mistaken for intermediate target wounds.[8]

Shotgun slug injuries are rare, severe, and fully comparable to those inflicted by high-velocity projectiles. A case of gunshot suicide of a 59-year-old man with a shotgun loaded with
shotgun slugs is reported by Hejna.[9] The first two shots were fired into the heart region, but did not hit the vital organs of the victim’s thorax and did not cause immediate incapacitation. The man was able to reload and refire. The third shot was fired into the region of right temple; the last shot caused severe cerebrocranial gunshot injury and was fatal. The victim did not pull aside his clothing to expose his skin before shooting into the heart region.

A 78-year-old hunter was found dead beside his raised hide with a gunshot wound to his chest. In the present case, the reconstruction of the shooting event revealed an accident. Disregarding all safety rules, the hunter had placed his superposed rifle-shotgun on the chair and pulled the barrels of the cocked gun towards his body. One of the triggers interlocked with the button of a camping chair’s cushion and a shot was fired. Furthermore the morphology of wounds from shotgun slugs is discussed on the basis of the autopsy findings.[10]

A case of extended suicide resulted in two fatalities due to cranio-cerebral gunshots from a 12-gauge shotgun firing Brenneke shotgun slugs. In each case, the gunshot shattered the skull and the brain and in one case, large parts of the brain including a complete hemisphere were ejected similar to a “Krönlein shot”. The location of the trajectory close to the base of the skull, the muzzle gases and the ballistic characteristics of the missile contributed to this rare form of head injury. The wadding material and the metal screw attached to the Brenneke slug can be of forensic significance.[11]

Sabot shotgun slugs are not a new projectile, but the Brenneke SuperSabot shotgun slug has never been reported in a homicide. Tharp and Jason report the case of a 28-year-old man killed with multiple gunshot wounds during an alleged “drive-by” shooting. At autopsy, a 496.2 grain slightly deformed projectile with a base diameter of 5/8” (1.7 cm) was found within the decedent’s clothing. Six distinct bullet tracks were identified. Investigating officers recovered an additional projectile of the same type, which had undergone more extensive deformation after striking and penetrating the tailgate of a truck. Further investigation identified the projectiles as the Brenneke SuperSabot shotgun slugs.[12]

A young black male was shot to death by an unknown assailant who then fled the scene. The medical examiner who responded to the scene noted a freshly deformed metal screw in the immediate vicinity of the body. The autopsy findings of additional, very similar screws in the body, noted on X-ray and consistent with having caused the injuries sustained, revealed the missiles to be 12-gauge Brenneke shotgun slugs.[13]

A 40-year-old man was placed in custody in St. Johns, Canada in 2008. According to Sheriff’s Office investigators, the assailant fired once from a shotgun at the victim who sat in a vehicle. The slug from the gun went through the windshield and hit the victim in the chest.[14]

George H. Kasolas shot and killed his nephew Pete Hardez, in December 1947 with a homemade slug which he fired from his shotgun. The body was then drenched with kerosene and burned to death.[15]

The instant case was a revelation of sorts for all present during the autopsy. The radiological findings were unusual as oblong shadows with metallic density were visualized instead of pellets, the weapon being the commonly seen shotgun of a bank security guard. The massive damage seen on dissection in the abdominal cavity caused by this un-intentional fire on an unintended victim by a ‘rifled’ shotgun slug was a surprise.

A bigger surprise was the recovery of a ‘bullet’ like slug with fins on sides from the paravertebral gutter. It is suggested that autopsy surgeons re-educate themselves in terms of unconventional ballistics which could cause error of judgment if any such autopsy is conducted at the peripheral or district centers where no forensic expertise is available in India.
References