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Finding in the track of firearm wound answers its range of discharge - an atypical case of firearm wound

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ABSTRACT

Firearm injuries are well known for their atypical findings and appearances in routine autopsies as well as medicolegal examinations of living person. Usually the range of firearm is given on the basis of findings of effects of remnants of gunpowder discharge on the body and the same is substantiated by the ballistic expert who examines the alleged weapon of offence and performs various tests on it to confirm about the use of particular weapon. But here a single finding of firearm injuries was so typical and peculiar that not only the range in itself became evident at autopsy but also confirmed the theory of alleged suicide as per inquest report. In the present case the firearm wound was situated over the right temple, a common site for suicide in a right handed person, and the blackening was found around the hole of skull that made the whole picture clear particularly in respect to the range and manner of firearm injury.

Key words: - firearm wound, range of discharge, entry wound, exit wound, blackening.

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1. INTRODUCTION

A vast majority of suicidal gunshot wounds are contact wounds. Close range wounds are rarely present (Prahlow, 2010). An analysis of a large series suicidal firearms death has determined characteristics of firearm injuries. The type of weapon used was a revolver in 49.8%, an automatic pistol in 19.5%, a rifle in 30.0%, and some other firearm in 0.7%. The site of the entrance wound involved the head in 83.7% of cases with right temple being the most common site, the chest in 14.0%, the abdomen in 1.9%, and a combination of sites in 0.4%. Contact wounds were found in 97.9%, intermediate in 2.0%, and a combination of these or an unknown range in the remainder (Kohlmeier et al., 2001). In a study of rifle wounds, it was found that 96% were contact in nature with suicides, while only 5% were contact with homicides (Molina, 2008). Shotgun wound suicides were found contact range in 96% of cases, while shotgun wound homicides were contact range in 8% and distant range in 59% (Molina et al., 2007). In contact wounds that occur over the skull, the explosive gases and smoke that discharge from the weapon dissect between the skin and the bone in the area immediately surrounding the entrance defect. The contact wounds vary in their appearance depending upon whether there was firm or loose muzzle contact with the body surface and also upon the caliber of the firearm. The size of entry wound in such cases is usually large and crateriform in shape but it can also be triangular, stellate, cruciate, elliptical, due to explosive effect of gases in skin and subcutaneous tissues. The bullet splits the tissue without removing it (Mukherjee, 2011).

In some contact wounds over head instead of the classical stellate or cruciform wounds one finds a large circular wound with ragged, blackened and seared margins (DiMaio, 1999). In the later case, the bullet mostly drills a circular hole in the skull with fissured fractures running from its circumference into the adjacent area. There is often muzzle imprint due to distension of subcutaneous tissues. Whole or near whole of the gunpowder discharge is taken into the track of the wound with deposition of gunpowder remnants around the entrance hole involving the inner aspect of scalp, skull, duramater and the brain that at times produces a characteristic pattern. Overall, the wound has all unanimous findings corroborative and justifiable to a suicidal contact firearm wound.

The instant case was justifying the circumstances on the basis of pattern of findings in the track of firearm wound that were suggestive of not only suicide but also the range of discharge pronounced as contact.

2. BRIEF HISTORY

A well built wrestler male of 50 years was brought to the Dep't of Accident and Emergency PGIMS, Rohtak in Nov. 2012 with alleged history of self inflicted gunshot injury, over his head with his licensed revolver. On inquiry from relatives it was found that he was a right handed person and purportedly reported suffering from some unknown mental illness due to some domestic interaction for quite some time.

3. EXAMINATION IN THE EMERGENCY

The patient was unconscious, with sluggish reacting and fixed pupils, pulse and BP non-recordable, GCS (3/15) $E_1V_1M_1$ and was staging in the gasping condition. Nasal and right ear bleed were present. The resident doctor noticed an entry wound over right temporal region with irregular margins (Figure 1) and an exit wound over left temporal region with everted margins (Figure 6). Immediate emergency tracheostomy was performed and all the necessary supportive measures were carried out but the patient could not be revived and expired after a short survival period.

4. AUTOPSY

The dead body was brought for autopsy to the Dep't of Forensic medicine PGIMS, Rohtak next day morning. On external examination the body was observed to be of a well built male person with length 179 cm. The body was wearing a white kurta-pajama with collar and sleeves of kurta smudged with dry blood stains at places. Face and neck were smudged with adherent blood clots streaks all over. Post mortem lividity, fixed, was present over dorsum of the body. Rigor mortis well developed all over the body. Tracheostomy wound was present over front of the neck.

5. INJURIES NOTICED OVER THE BODY

An oval shaped entry wound of firearm of size 1.5x1 cm was present over right temporal region of scalp situated 4 cm medial to right ear, 9 cm away from midline and 170 cm above right heel. The margins were inverted, irregular and surrounded by an abrasion collar of width 0.5 cm over its anterior margin with blackish soot deposit over it. Small tears were present within the abrasion collar at places. The tissues inside were somewhat looking charred and cherry red (Figure 1). On dissection the wound was going medially and almost horizontally. The layers of the scalp showed evidence of soot deposition and ecchymosed (Figure 4). The underlying skull showed corresponding hole measuring 2x1.5 cm which was surrounded by an area of black-grey soot deposition of width 0.5 cm around it except over its anterior aspect where the outer table was missing and inner table was visible. A linear fracture was radiating down from the margin into the squamous temporal bone for 7 cm. Small fissure fractures were present in the margins

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Figure 1

Entrance wound over right temple: Partial outline of abrasion collar on the front aspect of the wound margins; multiple tears of the margins of the wound ; slightly everted margins at places surrounded by cherry red blood stains up to the ear; no muzzle impression was appreciated around the wound

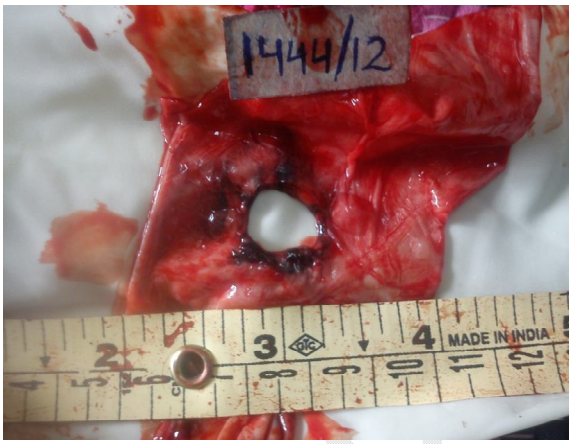

Figure 3

Blackening over margins of duramater around entrance hole

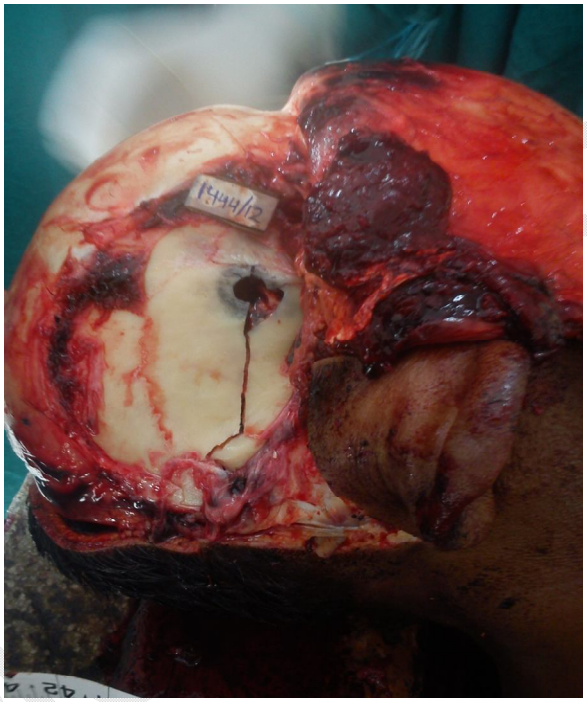

Figure 2

Blackening around the entrance hole over right temporal bone; radiating linear fractures from the margins; small fissure fractures on the margins

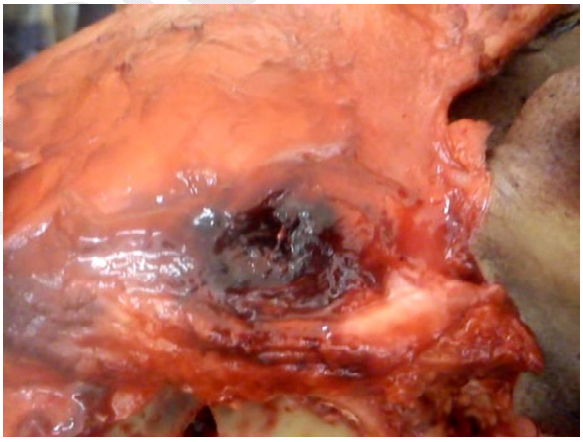

Figure 4

Appreciable blackening and ecchymoses in and around entrance hole of the reflected scalp on its inner side

around the central hole (Figure 2). The inner table around the central hole was beveled. On further dissection, the underlying dura showed hole measuring 2.5x2 cm with black-grey area of soot deposition over its margins (Figure 3). The brain showed organized subarachnoid hematoma in right frontal-temporal-parietal region over an area of 8x3 cm and organized subdural hematoma over an area of 7x4 cm over right frontal-parietal region (Figure 6). The wound was penetrating frontal lobes of the brain from right to left across the sylvian fissure. The track showed somewhat expansion with in the brain. The wound further pierced the duramater over left temporal region, left temporal skull region which was showing beveling of the outer table around the hole measuring 2x1 cm and exit out through left temporal region of scalp at the same level (Figure 5). Accumulation of blood was seen in the foramen magnum in the

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Figure 5

Exit wound over left temple region of scalp with everted margins

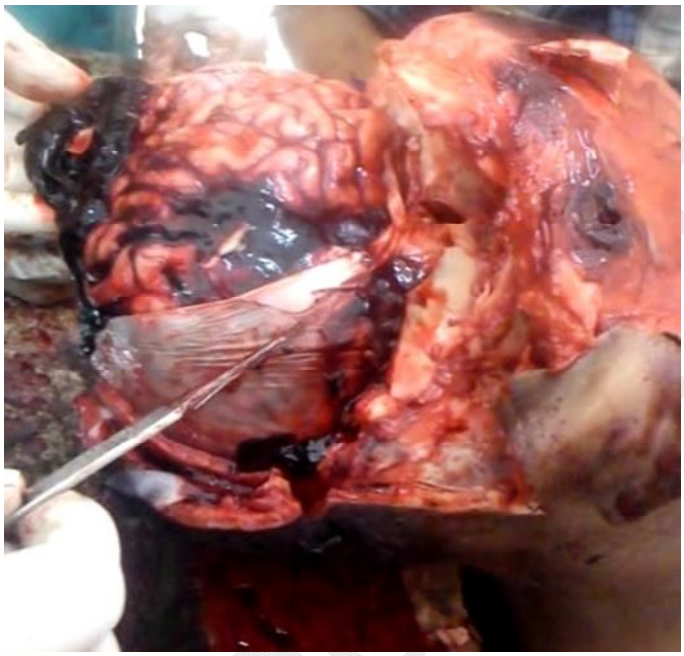

Figure 6

Well appreciated Subarachnoid and subdural hematoma over right fronto-parietal lobes of brain

form of subdural hematoma extending up to the T_3 spinal canal level with compression of the underlying cord. Linear fracture of anterior cranial fossa was present.

On the basis of these findings the cause of death in this case was pronounced to be cranio-cerebral damage consequent upon of head injury as a result of contact rifled firearm ammunition discharge; could be suicidal as alleged or otherwise

6. DISCUSSION

Out of the questions being asked by investigating agency in a victim of firearm injury, one is regarding the range of the firearm discharge. The most difficult problem is distinguishing a distant from a contact wound. In deciding the range of the firearm discharge, the pattern and distribution of gunpowder residue is of paramount importance. The factors that can affect the amount and distribution of gunshot residue (GSR) on skin and clothing include: (1) firing distance, (2) length and diameter of the firearm barrel, (3) characteristics of the gunpowder, (4) angle between the firearm barrel and target, (5) characteristics of the cartridge, (6) the environment (moisture, wind, heat), (7) type of clothing, (8) intermediate targets, and (9) characteristics of the target (tissue type, putrefaction, blood marks) (Tugcu et al., 2006). The characteristic findings of remnants of discharge of gunpowder on the body usually solve this problem during examination of such bodies by the forensic experts but when the findings are altered and not as per described pattern due to multiple factors (supra), then it creates dilemma for the experts while pronouncing fact of range of firearm. Estimating the range of firearm discharge is one of the most important aspects of the interpretation of firearm wounds (Knight, 2004). It is the duty of the autopsy surgeon to give opinion about the range of firearm on the basis of autopsy findings, and should not be kept it pending for ballistic expert. It is well referenced that all the components of gun powder are discharged in the body when the weapon is pressed right angle with the body surface, so, grossly the effect of smoke can be observed in the track in the form of blackening. When gap remains between the body surface and the puzzle then the gases may leak in the surrounding area and the smoke effect may not be appreciated in the track but observed externally around the entry wound.

7. CONCLUSION

To conclude, we want to state that when the external findings are not characteristic to be of contact wound like the presence of the puzzle impression, the internal findings may reflects a clear picture that it is a victim of contact range, as was observed in the present victim during postmortem examination, well appreciable blackening on the outer table of punched in entry hole of skull, duramater and even on brain substances up to the end of the track. This means that all the constituents of gun powder blast were forced in to the track of firearm wound. This may points to the suicidal theory, although, it may be otherwise also.

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