

GUNSHOT WOUND TO THE HEAD – COMMON ERRORS IN DIAGNOSING THE DIRECTION AND DISTANCE OF THE SHOT /A CASE REPORT/

Biliana Mileva*, Metodi Goshev, Martin Angelov, Teodora Kiryakova, Atanas Christov, Alexandar Alexandrov

Department of Forensic medicine and deontology, Medical faculty - Medical University – Sofia

ABSTRACT

Introduction: Firearm-related injuries are a leading cause of morbidity – as the use of firearms increases and they are relatively easy to obtain. The wounds, caused by them, have their specifics, determinate by the type of the weapon, the projectile and the effect of the additional factors of the shot. In the forensic practice, the correct interpretation of the wounds is extremely important for the reconstruction of the events that led to the accident – whether it is a case of homicide or suicide. **Materials and methods:** Forensic autopsy, performed according to the standard section technique. **Case presentation:** We present a case of a 70-year old man, who died in a hospital from a gunshot injury to the head. In the Department of Forensic Medicine and Deontology Sofia, after a careful examination of the body of the deceased and analysis of the medical records from the hospital where he was treated, some discrepancies were found. **Discussion:** Not all of the firearm-related injuries are fatal - in some cases the interval between the trauma and the death is prolonged and both the entrance and the exit wounds can be surgically treated, which can lead to difficulties in diagnosing the direction and the distance of the shot. **Conclusion:** The aim of this article is to emphasize the need for trauma specialists to be alerted for the possibility of misinterpretation of gunshot wounds and to realize the medicolegal implications.

Key words: firearms, gunshot wounds, forensic medicine, errors in diagnosing.

INTRODUCTION

Firearm-related injuries are a leading cause of morbidity – as the use of firearms increases and they are relatively easy to obtain [1]. The wounds, caused by them, have their specifics, determined by the type of the weapon, the projectile and the effect of the additional factors of the shot [2]. In the forensic practice, the correct interpretation of the wounds is extremely important for the reconstruction of the events that led to the accident. Each traumatic injury has its own specific characteristics the morphological appearance which can help us determine the type of the object causing them – if it's caused by a blunt object, by stab-incised weapon or by firearms and the direction of the trauma [3, 4]. Having this knowledge, we have to find out the cause of death and whether it is connected with the trauma or not. Subsequently, after collecting all the information connected to the case (from the crime scene investigation, information from the police, medical records and autopsy findings) we have to declare whether the injury is caused by the deceased himself or not – something essential for the determination of the manner of death - suicide, homicide or accident [5].

MATERIALS AND METHODS

Full forensic medical autopsy was performed according to the standard section technique. Also, we performed a detailed analysis of the medical records from the hospital where the deceased was treated.

CASE PRESENTATION

A 70-year-old man who died in a hospital after a gunshot injury to the head was brought to the clinic of Forensic Medicine and Deontology Sofia. It was reported that he tried to commit suicide at his home, but he was found still alive by his family and they took him to the hospital. The medical records from the hospital showed that emergency surgical interventions and

manipulations were carried out - further extension and surgical treatment of the entrance and exit wounds from the projectile and two-sided decompressive craniectomy - fragments of the bones were removed for evacuation of the subdural hematoma. It was also written that the wound located in the right temporal area of the head is larger than the wound located in the left half of the head and for that reason it was defined as an exit gunshot wound. This information was little worrying at the beginning while we were reading the medical records because that kind of direction of the shot – from left to the right is not very characteristic for a right handed person. At the time of the autopsy, during the external examination of the body we found out that there were surgically treated and sutured wounds on the both sides of the head. The wound located in the right temporal area of the head was star-shaped (Figure. 1) and bigger than the one situated on the left temporal area (Figure. 2). The wound on the left was slice-shaped with the presence of an additional linear surgical incision that was reaching the parietal area of the head.

The internal examination of the body started with opening of the head. We found a massive bilateral bruising of the soft tissues and the temporal muscles. In addition, big fragments of the cranial bones, in the area where the projectile has passed, were missing – which made it almost impossible to determine which the entrance wound is and which - the exit one. Then we started a careful and thorough examination of the preserved bone fragments. In the left part of the head we didn't find even a section that could be suspected to have been in contact with the passing projectile – everything was removed during the craniectomy – a fragment with diameter about 6 cm was missing from the left temporal-parietal part of the cranium (Figure. 3).

After the removal of all the soft tissues of the right part of the head in the zone of craniectomy we found semi preserved round-shaped fractured part of the bone with massive blackening of its edges (Figure. 4). In this area the inner lamella of the bone was broken in a larger area according to the outer one, like a cone directed with its base to the cranial cavity (Figure. 5). The brain in the wound channel was torn, crumpled and bruised. No other traumatic injuries were found on the body during the autopsy.

DISCUSSION

Not all of the firearm-related injuries are fatal - in some cases the interval between trauma and death is prolonged and both the entrance and the exit wounds can be surgically treated, which can lead to difficulties in diagnosing the direction and the distance of the shot and in some cases doubt might be raised about the manner of death (suicide or a homicide) [6]. If such a case, as the one presented, goes to the court with obvious discrepancies between the diagnosis in the medical records and the autopsy findings - it is almost certain that a good defense attorney will question the clinician's conclusion, which on its hand may well create uncertainty and doubt in the judge leading to its rejection or disregard [7].

In the above mentioned case the diagnose in the hospital where the deceased was treated was made only according to the size of the both wounds as it is widely known that usually the exit wound is bigger than the entrance one. Based on the established autopsy findings – the star-shaped form of the wound in the right part of the head, the semi preserved round-shaped fractured part of the bone with massive blackening of its edges and the specific direction of the fractures - we can declare with great certitude that this was the entrance wound. The conclusion we made is that the man had died from a gunshot injury to the head with subdural and subarachnoid hematoma and destruction of the brain tissue in the wound channel and that this is a case of a contact gunshot injury with direction of the shot from right to left – usual for a right handed person.

CONCLUSION

As during the surgical treatment the wounds change their authentic appearance doctors should at all times describe the anatomical site, size and wound features accurately, and should never simply state "this is the entrance and this is the exit wound" which in some cases is difficult enough even for forensic pathologist during autopsy. If there is more than one wound present, it is even more imperative to describe each injury accurately without naming them and without trying to correlate entrance with exit wound. The aim of this article is to emphasize the need for trauma specialists to be alerted for the possibility of misinterpretation of gunshot wounds and to realize the medicolegal implications.

Statement for Potential Conflicts of Interest – No potential conflict of interest was reported by the authors.

REFERENCES

1. Collins, K. and Lantz, P., "Interpretation of Fatal, Multiple, and Exiting Gunshot Wounds by Trauma Specialists," *Journal of Forensic Sciences*, Vol. 39, No. 1, 1994, pp. 94-99, <https://doi.org/10.1520/JFS13574J>. ISSN 0022-1198
2. Раданов, Ст. и колектив. Съдебна медицина и медицинска деонтология, Учебник за студенти по медицина, Сиела, 2006. Стр. 141-144
3. Amadasi A, Cerutti E, Spagnoli L, Gibelli D, Gorio C and Cattaneo C. The Difficult Task of Interpreting Cut Marks, Gunshot Wounds and Ligature Marks on the Skin: A Cautionary Note. *Austin J Forensic SciCriminol.* 2016; 3(1): 1047.
4. Stone, I. and Petty, C., "Interpretation of Unusual Wounds Caused by Firearms," *Journal of Forensic Sciences*, Vol. 36, No. 3, 1991, pp. 736-740, <https://doi.org/10.1520/JFS13083J>. ISSN 0022-1198
5. Ilina Brainova-Michich, Stanislav Hristov, MinkoMinkov, MD, PhD², Vasilis Avramidis, A CASE OF TRIPLE GUNSHOT SUICIDE, XI Annual Meeting of the Balkan Academy of Forensic Sciences (BAFS), 10-13 June 2015, Iasi, Romania (poster).
6. Multiple variations of firearm injuries - A case report Naik S.K., Kumar P., Atal D.K., Murari A. (2011) *Journal of Forensic and Legal Medicine*, 18 (7) , pp. 325-328.
7. Phillipre breu-Reis, Andonis Nasr, Flavio Saavedra tomasich, IwanCollaco, Misdiagnosed injuries in the Prehospital trauma care: Better training needs to be implemented, *Panamerican journal of trauma, critical Care & Emergency Surgery*, September-December 2014;3(3):93-96.



Figure 1. Star-shaped wound in the right temporal part of the head



Figure 2. Wound located on the left temporal part of the head



Figure 3. Missing part from the left temporal-parietal part of the cranium after decompressive craniotomy



Figure 4. Semi preserved round-shaped fractured part of the bone with massive blackening of its edges

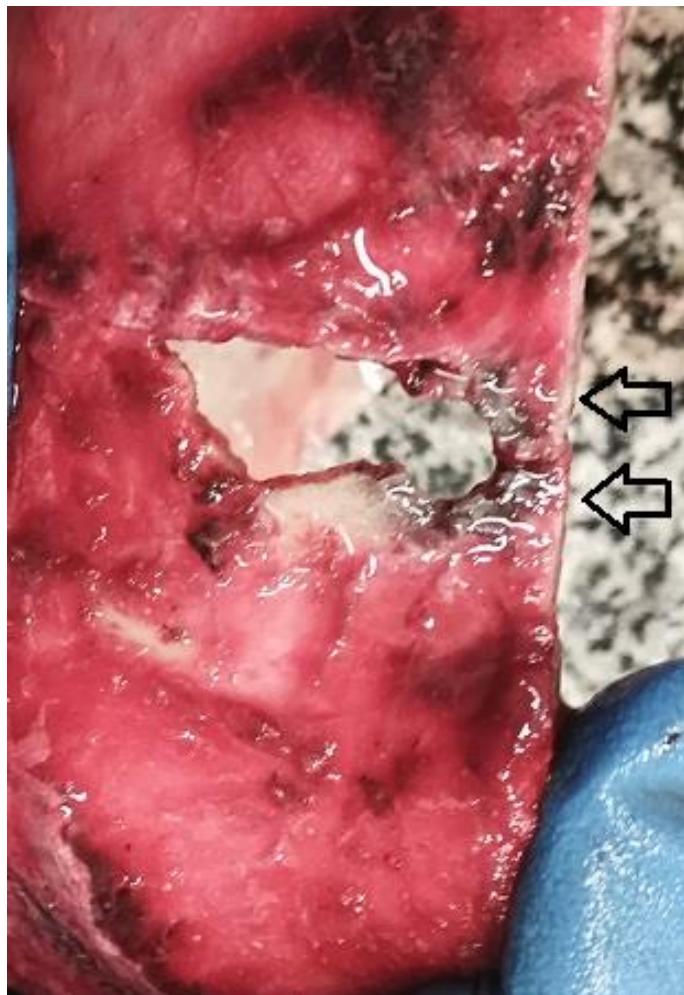


Figure 5. The inner lamella of the bone was broken in a larger area according to the outer, like a cone directed with its base to the cranial cavity

*Corresponding author: Biliana Mileva, MD Department of Forensic Medicine and Deontology
Medical University, Sofia Zdrave 2 Str., Sofia 1431, Bulgaria Tel.: +359 878 456 219 e-mail:
bibs_15@abv.bg*