

One year experience of emergency service in patients with penetrating head trauma due to firearm

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Abstract

Objective: We aimed to share the features of 45 patients with firearm injuries related head traumas and our experiences in their treatments.

Methods: Our cases consisted of 36 males 45 patients in total between the ages of 18-65, who were brought to the emergency service of our hospital due to firearm injuries. For this retrospective study, it was accessed to the patient data from the archival records of our hospital. The demographical data of the patients like age and gender, and the records such as type of injury, injured area in head, diagnosis, treatment and follow ups were reviewed.

Results: There were sinus injury related epidural haemorrhages in 8 of patients who underwent urgent surgical intervention (17.8%). In 18 of the patients (39.95%) who underwent surgery had supratentorial injuries and 7 (15.55%) had infratentorial injuries. All these 25 patients (55.50%) who underwent surgery had multiple intracranial injuries (compression fracture + subdural haemorrhage + contusion + pneumocephalus + SAH + brain edema). Four of these 6 patients with multiple injuries had abdominal injuries. Two patients had haemopneumothorax. There were vertebra and extremity injuries in 2 patients with abdominal injuries.

Conclusions: Brain injuries occurring with the firearm head injuries are seen as multiple injuries and their rate of mortality is quite higher.

Keywords: Head Injuries, Firearm, Penetrating, Surgical Intervention

Introduction

Head traumas take an important place among the physical traumas caused by a variety of reasons. Head trauma accompanies to 50% of deaths based on all traumas and constitutes a substantial part of trauma related death cases (1).

Two types of accidents that causes to bodily injuries typically accompanied by head traumas occurs in our region frequently. The first type is the traffic accidents connected with commonly used motorcycles and the second type is the traumas related to falling down from the top of the flat roofed houses, which are used for a variety of reasons in summer months. In line with the precautions to be taken for these reasons, it is thought that the rate of such traumas will decrease with the modification of the physical environment.

The types of injury in case of war occur through high energy weapons, bombs and cluster bombs. Considering the main purpose of producing such weapons is to kill, the severity of injuries in war is estimable.

While injuries occurring in such environments end up with death, the survival of those who reach to hospitals alive for treatment is a struggle against weapons produced to kill.

In this study, we aimed to share the features of 45 patients with firearm injuries related head traumas and our experiences in their treatments

Material and Methods

Our cases consisted of 36 males 45 patients in total between the ages of 18-65, who were brought to the emergency service of our Hospital due to firearm injuries between August 2012 and September 2013 (M=80% and age average=28,2). For this retrospective study, it was accessed to the patient data from the archival records of our hospital. Only the patients with head trauma or multiple organ injuries accompanied by serious head trauma were involved in the study. Patients without head traumas were excluded from the study.

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The demographical data of the patients like age and gender, and the records such as type of injury, injured area in head, diagnosis, treatment and follow ups were reviewed.

Findings

When they were brought to the emergency service, all patients had undergone brain computerize tomography (BCT). Urgent surgical interventions were implemented to 33 of these 45 patients (73.3%) (Table). There were sinus injury related epidural haemorrhages in 8 of these patients who underwent urgent surgical intervention (17.8%). There were sagittal sinus injuries in 6 and transverse sinus injuries in 2 of these patients.

All patients with sinus injury were operated and their postoperative follow ups and treatments were performed in the intensive care unit, and they were all lost on the postoperative 1st - 9th days during their intensive care unit follow ups.

In 18 of the patients (39.95%) who underwent surgery had supratentorial injuries and 7 (15.55%) had infratentorial (posterior fossa) injuries. All these 25 patients died while they were being followed up between the postoperative 5th and 13th days. These 25 patients (55.50%) who underwent surgery had multiple intracranial injuries (compression fracture + subdural haemorrhage + contusion + pneumocephalus + SAH + brain edema). Four of these 6 patients with multiple injuries had abdominal injuries. We maintained General Surgery, abdominal surgical intervention and then cranial intervention in 3 of 6 patients with coexisting abdominal injuries in the same session. A patient with grade 2 liver injury was suggested clinical follow up without the need for general surgery.

Two patients had haemopneumothorax and one was implemented right tube thoracostomy and the other was implemented bilateral tube thoracotomy. Also, there were vertebra (lomber-1 in one and lomber-5 in the other) and extremity injuries (humerus in one and both femur and tibia fractures in the other) in 2 patients with abdominal injuries. 2 patients with extremity injuries were evaluated by orthopedists in the emergency service. Urgent surgery was not planned.

Both were implemented splinting in the emergency service. Immediate treatments were not preferred for these 2 patients due to their bad general conditions.

Due to the type of firearm injuries occur mostly through high energy weapons, 36 of 45 patients died as a result of these injuries, while 5 patients were discharged with motor deficit. 4 patients were transferred to infection diseases due to meningitis



Image 1 A, B.: Foreign body from the shrapnel in the left parietal region with part a result of parenchymal injury, small bone fragments, bleeding and contusions in areas considered

Table 1. Cranial injuries caused by firearms				
Operated n=33 (%73.3)			Non-operated n=12 (%26.7)	
Sagittal sinus injuries	Complicated injury			
Dural sinus injury + epidural haemorrhage	Supratentorial haemorrhage (Compression fracture + subdural haemorrhage + contusion + pneumocephalus + SAH + brain edema)	Infratentorial haemorrhage (Compression fracture +contusion +pneumocephalus + brain edema)	Subarachnoid Haemorrhage + pneumocephalus	Contusion + pneumocephalus + SAH + cerebral edema
n=8, (%17.8)	n=18, (%39.95)	n=7, (%15.55)	n=3, %6.6	n=9, %20.1

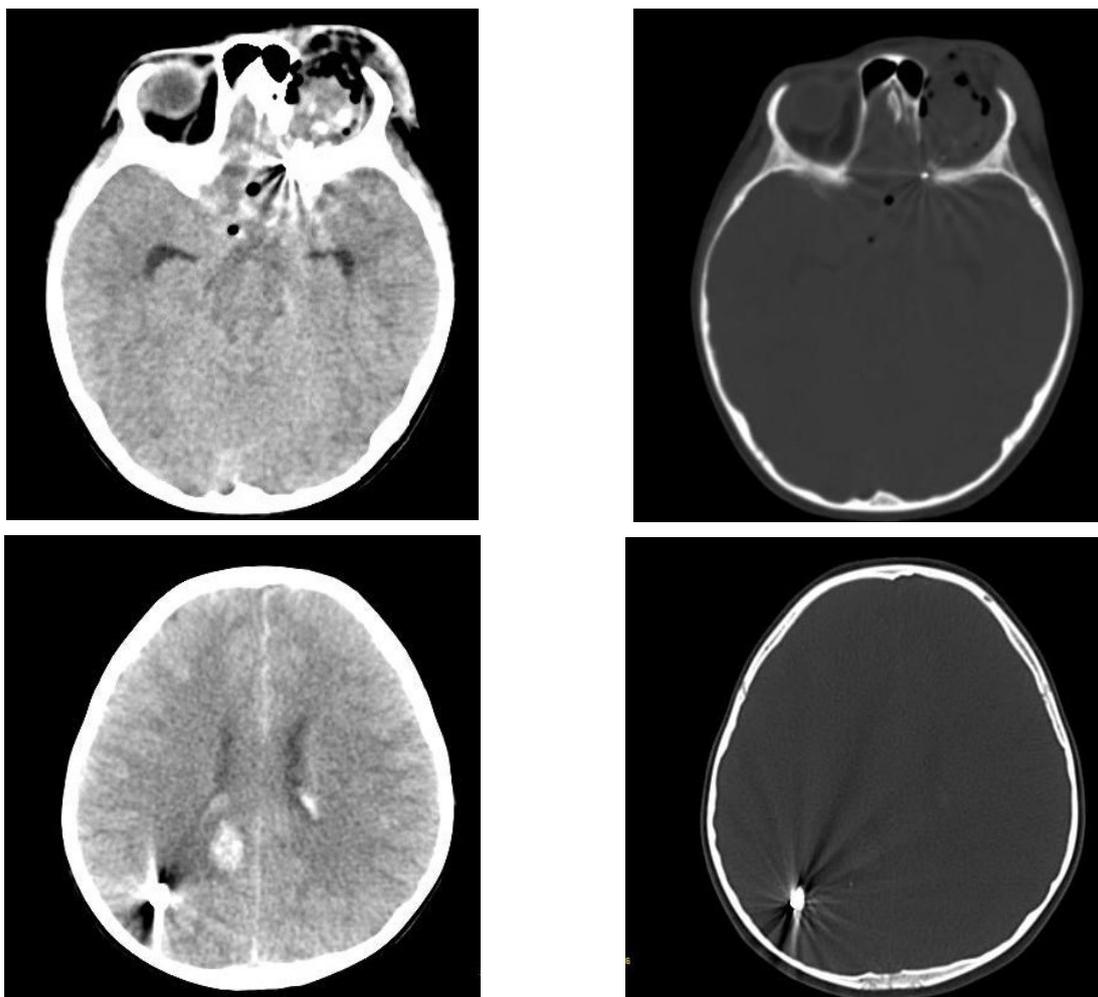


Image 2 (A,B,C,D): Foreign body left orbital gunshot wounds to the right pariatookspital region extending from the inner wall. It is seen outside the left eye, bone fragments extending into the parenchyma, contused area and especially intraventricular hematoma seen in the area.

Discussion

As a result of a shot through the head, various degrees of injuries occur according to the type of weapon, shooting distance, angle and speed of bullet entry to the head (10). Various degrees of skull fractures occur in the area of bullet entry to the head in connection with the bullet mass and speed. Bullet leads to both damage through direct effect and damage to distant tissues through shock waves by dragging the pieces of fractured bones (9).

Penetrating head injuries are seen in males more in the literature searches (2,4,5,8,11,14). In our study, such injuries were also determined higher in males in comparison to females (males: 80% and females: 20%).

The reasons for this may be males to be keen on weapons more, carry guns more and fight directly in front in wars. In our study, a significant part of the cases were patients coming from Syria, where war continues 50 km away from our hospital.

The purpose of the surgical intervention in firearm head injuries is to implement decompression in intracranial pressure increase and clean the injury to prevent infections that could occur due to foreign substances and necrotic tissues. We implemented surgery to 33 patients. There were sinus injuries in a substantial part of the patients we implemented surgery and urgent surgery was implemented to these patients for sinus repair. Combined injuries were detected in the CT examinations of the other patients underwent surgery.

Dural sinus injuries are seen in 10% of firearm injuries (7). In our study, the dural sinus injuries were determined a bit higher comparing to the literature (17.8%). This can be explained with a substantial part of the patients involved in our study to have injuries from a war environment.

Subarachnoid haemorrhage (SAH) is a pathology that is frequently seen in penetrating head traumas. It was reported 31% to 80% in researches in the literature.

This rate was determined as 93% in the study performed by Ziyal et al. (15). And in our study, it was determined at the rate of 82.2%. The reason for observing a high rate of SAH can be bullet entering the head to move through the parenchyma and lead to vascular injuries. Even if SAH is not seen alone frequently, it is often observed in patients with multiple intraparenchymal injuries.

With the effect of the bullet, pieces of bone and hairs, and foreign substances like stones and grains on the ground, where wounded person fell, are carried to brain parenchyma tissue. If patient had undergone surgery, these foreign substances must be cleaned as much as possible during the operation. Even if the wounded person is operated, the brain tissue cannot be cleaned off these foreign substances. Foreign substances can be reason for infection and meningitis and they frequently require antibiotherapy during the follow up periods. The BOS leak occurring as a result of the penetrating injuries also poses a great risk for meningitis and intracranial abscess (4, 3, 13). The second surgical intervention to remove foreign substances may cause increase of neurological symptoms and bacterial propagation (12). In our cases, any second intervention was not performed in order to remove foreign substances.

Arterial dissection, dural venous sinus injuries may occur following the firearm head injuries (15). SAH may develop following the vascular injuries. Both vascular injuries and SAH increase the rate of mortality and morbidity in penetrating head injuries due to reasons such as pneumocephalus, compression fracture and brain edema (6). The mortality following the firearm injuries was determined between 16% and 32%. In our study, this rate was determined much higher as 80%. Patients involved in our study to come from the nearby war territory and the use of high energy weapons and cluster bombs during the war can be the reason for this higher mortality.

Conclusion

Brain injuries occurring with the firearm head injuries are seen as multiple injuries and their rate of mortality is quite higher.

Conflict of Interest: The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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