

**SPONTANEOUS MIGRATION OF A BULLET ALONG HEMISPHERE: A CASE REPORT*****S.Kağan Başarslan\**, *Bedi Günenç\*\*****\*Department of Neurosurgery, Faculty of Medicine, Mustafa Kemal University, Hatay, Turkey**\*\*Clinic of Neurosurgery, State Hospital, Hatay, Turkey***Abstract**

We report the case of a 45-year-old man with a gunshot injury as an example of spontaneous migration of a metallic foreign body within the brain. Initial computed tomography showed the bullet in the right frontal region. In the control scan of the restorative surgery, radiological examination revealed that the bullet had migrated posteriorly due to the effect of gravity, lodging in the entrance hole of posy parietal lobe. Although there are a few literature reports of spontaneous migration of a bullet within the brain, this case was unique as the patient was fully conscious and need to second operation to prevent any neurological deficit.

**Key Words:** Bullet, firearm injury, migration

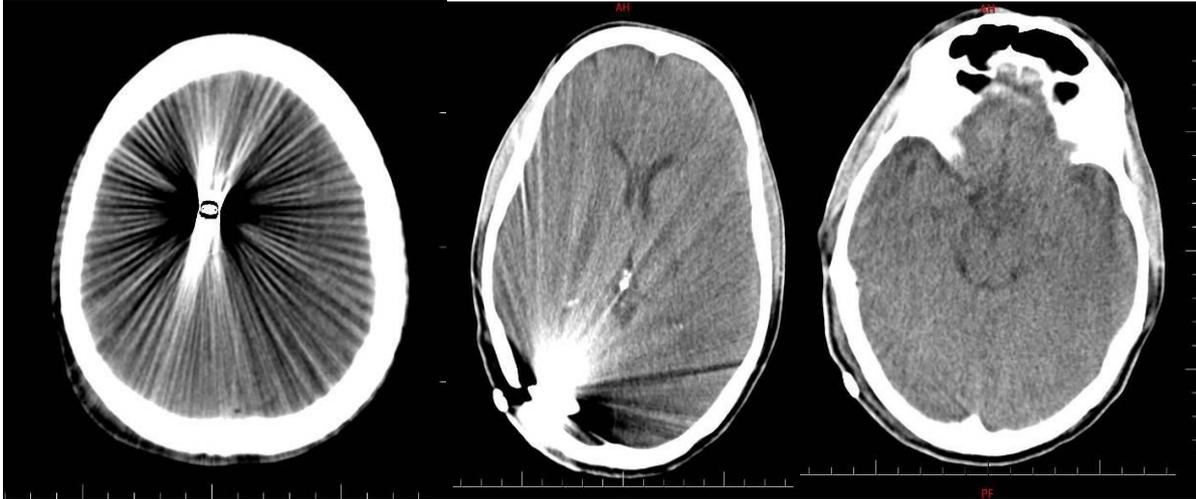
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**INTRODUCTION**

Firearm injuries of head often require emergency surgery. Surgical intervention aimed at preventing secondary neurological damage, and it is usually not desired to strive for the removal of the foreign bodies remained away from inlet hole. The repairing of entrance with proper debridement is considered enough in most cases that do not require decompressive surgery (1). We describe a case in that migration of bullet along hemisphere made it easy to remove it by a second surgery.

**CASE**

A 45 year-old male was referred to the hospital with gunshot injury. On admission, he was conscious, but presenting left hemiparesis with a wound on the right upper occipital scalp. Computed tomography (CT) revealed a bullet that had entered the calvarium posteriorly and remained into frontal lobe, passing through whole right hemisphere with its trajectory (fig.1,2). Owing to good neurological status and no sign of intracranial pressure effect, we preferred the conservative surgery with a small craniotomy around entry hole and debrided all contused tissues and bone fragments before duraplasty with galea. Control CT scan showed that the bullet had moved along its trajectory in the reverse direction and was based on the entrance hole. The projectile appeared to be easily removable, so we decided to remove the heavy object by a second operation in order to prevent additional damage.



**Figure 1a.** Axial cranial CT slice of parenchyma window shows the hyperdense bullet causing metallic artifacts in upper parietal location. **1b.** After first operation, the control CT scan of the head showing the entry wound right occipitally and the missile came back and situated the entrance. **1c.** CT scanning again for the control to the second operation.

## DISCUSSION

Migration of an intracranial bullet is a rare complication of gunshot injuries to the head. The time course for migration ranges from 2 days to 3 months (2). Various theories have been put forward regarding migration of the bullet. The movement of a bullet in the nervous system occurs mainly due to gravitational forces. Gravitational force acting on the bullet, which is heavier than the surrounding medium, has been considered as a cause for migration caudally by the effect of gravity related to the position of the body, especially in the absence of significant cranial trajectory with devitalized neural tissue (1,2). In this case, movement of the intracranial bullet was ascertained to the specific gravity of the bullet, brain softening with loss of tissue resistance, white matter devitalization, and gravitational factors. The gravity, however, appears to be the most important factor responsible for the migration of the bullet.

The indications for removal of an intracranial bullet are controversial and present a dilemma to the neurosurgeon. The management of these injuries needs to be studied in detail during the treatment procedure. Özkan et al. advised that a bullet in the brain should be removed if it can be easily accessed, and removed without giving rise to additional neurological damage (4). Fujimoto et al. stated that presence of a retained bullet and bone fragments do not increase the rate of intracranial infection. So, the removal of the bullet is not necessary to prevent infection (5). Kumar et al. reported that removal of the bullet should be done in patients undergoing surgery for evacuation of a hematoma if it is easily accessible and removal does not lead to further deterioration of the neurological status due to its proximity to vital structures (6). In his study, Fujimoto suggested that a bullet within the

ventricular system should be removed because hydrocephalus can be caused by obstruction of the foramen of Monro or aqueduct of Sylvius; however, a bullet within the brain parenchyma should be removed only when it can be easily accessed. Intracranial retained bullets require neurological observation and serial CT because migration may result in additional neurological deficits, and removal of the migrated bullet is thus advisable. Similarly, we preferred taking the case for second operation instead of leaving the bullet inside the parenchyma.

Surgery tends to achieve debridement of devitalized tissue, removal of bone fragments, hemostasis, dural closure, and suturation of the entrance and scalp wound. In addition, antiepileptic and antiedema agents and antibiotics ought to be administered. It should be kept in mind that a retained bullet might cause potential complications as well as migration, abscess, ventriculitis, hydrocephalus and even toxicity (7). All those may warrant surgical intervention. However, removal of the bullet may cause iatrogenic damage to the brain parenchyma; therefore, if there is no evidence of infection or brain abscess formation or of additional neurological deficit during hospitalization, conservative management can be preferred. The decision of surgical treatment of a bullet injury is difficult, especially if it is in close proximity to vital structures, since removal of the bullet may cause significant neurological damage. But migration can also lead to a worsening of the neurological status of the patient. Therefore, the case was decided to treat surgically by the second operation since the bullet was close to motor area and have a potential for new neurological deficit as a result of the bullet's migration.

Preoperative localization of the bullet is important for its safe removal. CT taken shortly before surgery will be helpful for surgically accessing the bullet. Intraoperative fluoroscopy should also be performed to localize the bullet accurately (6). While plain X-rays are useful in demonstrating change in position, even though they are not sufficient for an accurate anatomical localization for the important operation (5).

In conclusion, if the bullet is close to eloquent structures, surgical intervention may not be considered. It is also recommended that deep-embedded bullets should be left since any attempt at removal may increase the risk of morbidity and mortality. On the other hand, it should be kept in mind that the migration of a bullet may also cause injury to a vital structure, leading to significant neurological damage. When decided such as a surgery, gravity should also be taken into consideration during operation's planning, especially in case of removing heavy metal like a bullet.

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