# SPONTANEOUS INTRACRANIAL BULLET EXTRUSION: A CASE REPORT

[1]Babagana U, [1]Mohammed B

Neurosurgery Unit, Surgery Department, University of Maiduguri Teaching Hospital, Borno State, Nigeria.

*Correspondences and reprint request to Author: :* Dr. Babagana Usman, Neurosurgery Unit, Surgery Department, University of Maiduguri Teaching Hospital, PMB 1414, Maiduguri, Borno State, Nigeria. Email: babaganau@yahoo.com Tel: +2348035951137

## ABSTRACT

Background: : Head injuries from gunshots related to conflicts and terrorisms are on the rise globally, like-wise the resultant injuries from stray bullets. Intracranial bullets tend to migrate from one part of the brain to another. Most bullets are surgically removed when indicated. Spontaneous extrusion of an intracranial bullet is very rarely reported. Case Report: We report the case of an 8-year old boy who had spontaneous extrusion of an intracranial military bullet while awaiting surgical intervention.The patient sustained gunshot injury from a military stray bullet. The presence of an intracranial bullet was confirmed on radiograph and surgical removal was planned. However, the bullet got extruded spontaneously through the entry wound on the right parieto-occipital area of the skull before surgical intervention. This represents an unusual behaviour of intracranial bullets which had rarely been reported.

Key words: Gunshot, Head injury, Spontaneous extrusion, Stray bullet surgery.

## INTRODUCTION

In the United States of America (USA), Unintentional firearm-related death accounts for up to 3%. [1]While death from gunshot head injuries may be as high as 51 to 84%. [2] Bullet Injury may be from an intentional or unintentional shot. The later may be self-accidental discharge or from a stray bullet. "Stray" has been used as an adjective to describing a person or thing that is "separated from the main body; occurring away from the regular course or habitat. Pathophysiologically, Bullets can cause brain parenchyma damage by causing: laceration and crushing, temporary cavitation, and shock waves. [3]Damage to the brain depends on the kinetic energy imparted, the trajectory of the missile and bone fragments through the brain, intracranial pressure (ICP) changes at the moment of impact, and) secondary mechanisms of injury. The kinetic energy is calculated employing the formula $\frac{1}{2}MV^2$ ,where M is the bullet mass and V is the impact velocity.

As a projectile (Bullet) passes through the head, the destroyed tissue is either ejected out of the entrance or exit wounds or compressed into the walls of the missile tract. This creates both a permanent cavity that is 3-4 times larger than the missile diameter and a pulsating temporary cavity that expands outward. The temporary cavity can be as much as 30 times larger than the missile diameter. [3]

Injuries from stray bullets are on the increase in recent years, from celebratory gun firing [4] and military drills[6,7] to curtail the rising incidence of civil unrest and global terrorisms. The migration of intracranial bullet is in the range of 0.06-4.2% of cases.8 Cerebral softening secondary to oedema and local tissue damage, the specific gravity of the bullet, and gravitational factors. Bullets that cannot move within the brain after an initial movement are presumably walled off by gliosis and fibrotic Scar. These processes usually take from weeks to years.? Expulsion depends on either a bullet is deformed or

Access this article online

Quick Access Code

WEBSITE: www.kjmsmedicaljournal.com

DOI: 10.36020/kjms.2020.1401.011

not. Adeformed bullet may be difficult to expel due to increased resistance of the brain parenchyma over time. [10]

The Glasgow Coma Scale Score at presentation is an important factor in determining the prognosis. [11]

Reported cases of migration of intracranial bullets within the brain with no neurological deficits, demonstrated by neuroimaging at regular follow-ups[12-14] had been reported. Migration of a bullet lodged in the occipital region into the cervical spinal canal presenting with Lhermitte's sign at c4 that subsequently necessitating its removal[15] are well known. Migrations may be multidirectional as reported by Negretto M[2] who observed that during a month of the injury, several CT scans done showed multidirectional spontaneously migrating bullet within the intracranial space. The patient was conscious, with right hemianopsia but no other eloquent neurologic deficit, despite an episode of seizure.

So far, a search of the English literature on spontaneous extrusion of intracranial bullet did not show any result.

We report a case of spontaneous extrusion of an intracranial military bullet.

CASE REPORT:

We present an 8-year-old boy from a village close to a military camp, who presented as a referral from a primary healthcare centre with bleeding from the right side of the head of 26 hours duration. He was found on the ground by his siblings with bleeding from the right side of the head and an altered level of consciousness. There were associated vomiting and two episodes of generalised tonic-clonic seizures. There was no eye witness account of the injury. However, there was an incident of sporadic shootings at the military base a day before his presentation.

He was pale and had a pulse rate of 156 beats per minute, respiratory rate of 25 circles per minute. There was a right-sided vertically oriented parieto – occipital scalp wound measuring about 5cm by 2cm. His Glasgow Coma Scale score was 12/15 (EO=3, BVR=4, BMR=5). Pupils were normal, equal, and reactive to light. There was no focalneurological deficit.

A diagnosis of penetrating head injury was made. His laboratory results revealed park cell volume (PCV) of 17%, normal serum electrolytes, and urea. He was resuscitated with blood transfusion, intravenous fluids, analgesics, and antibiotics.

Skull radiograph revealed a right-sided intracranial bullet located at the parieto-temporal area, with its tip pointing towards the point of entry as shown in figure 1. Brain Computed Tomography Scan (CT scan) done on the 3rd day of admission confirmed the presence of intra-parenchymal bullet which has migrated to the parieto-occipital region with no significant haematoma or oedema (figure 2). He was prepared for surgical removal of the bullet the following day. On the morning of the surgery, the bullet was found to have extruded spontaneously. Subsequently, the scalp wound was dressed daily and then secondarily sutured. The patient was discharged on the 16th day and has remained stable since then.Figure 2: Axial CT Brainshowing

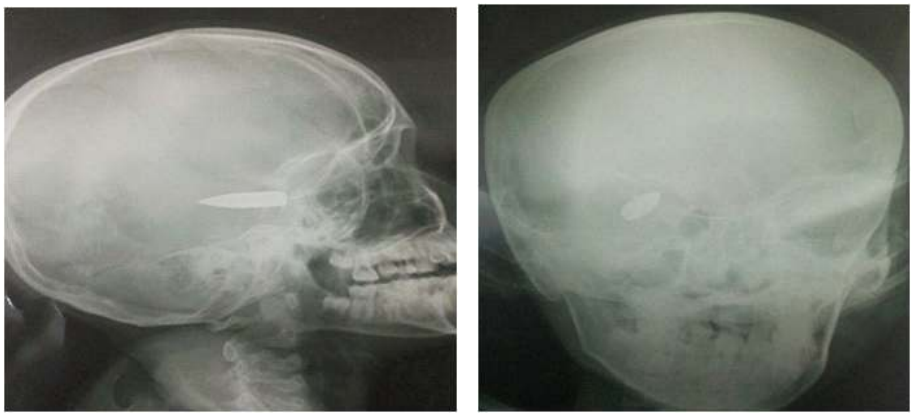

Figure 1: skull X-ray showing intracranial bullet located on the right pariato-temporal area

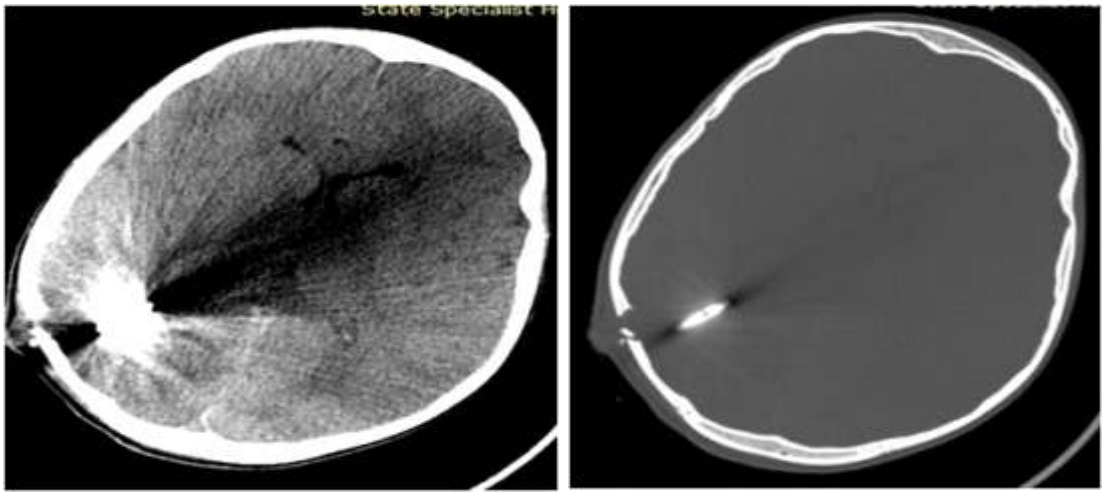

Figure 2: Axial CT Brainshowing parieto-occipital bullet (brain and bone windows respectively)

Figure 3: Showing the extruded bullet

## DISCUSSIONS

It has been reported that Head injury may result from military firing exercises as far as 1.7 kilometres from the victim.[7] In the case of our patient, the distance from the shooting area was not known, though, sounds of gunshots were heard nearby.

Vilvandre and Morgan (1916) were the first to demonstrate the movement of intracranial metallic foreign bodies radiologically in two patients.[16]

Spontaneous migration of intracranial missiles and bullets within the brain as a consequence of gravity and the presence of the primary wound tract has been reported[17, 18]. The resting position of the patient usually determines the direction of the migration of a bullet. It has also been found that bullets tend to migrate to the most dependant part. Rengachary et al[19] described spontaneous posterior migration of the bullet to a more dependent position. Interestingly enough, the orientation of the bullet however remained unchanged. Resting position should be dictated to avoid an eventual migrating bullet to eloquent regions of the brain causing additional neurological deficits.[17]

Also, Ratilal Bernardo[20] et al reported that by advising a patient to lie dorsally, they were able to achieve superficial migration of an intracranial bullet that eased its removal. We advised the patient to frequently lie flat in the supine position. This, coupled with the fact that the bullet's entry point was around the occiput (a dependant part) might have contributed to the extrusion of the bullet along the entry tract. It has been reported [21] that increase in intracranial pressure (ICP) from Valsalva manoeuvre (VM) may result in the extrusion of an intracranial content through a Dura defect and thence facilitating its delivery or extrusion.

Our patient developed upper respiratory tract infection (coughing and sneezing) before the extrusion of the bullet; this, a form of VM and other factors might have probably contributed to the spontaneous extrusion of the bullet.

In conclusion, reported cases of spontaneous migration of intracranial bullets were fairly common. However, spontaneous extrusion of intracranial bullet seems to be very rare, probably never reported before.

CONCLUSION: When surgical removal of a bullet is not indicated, patients could be encouraged to position the head such that the entry wound is kept

as the most dependent part, keeping the track perpendicularly and, also Keeping in mind the possible contribution of Valsalva manoeuvre, the spontaneous extrusion of intracranial a bullets may occur.

REFERENCES


1. Office of Statistics and Programming, National Center for Injury Prevention and Control, Centers for Disease Control and Prevention. www.cdc.gov / ncipc / wisqars
2. Negrotto M, Figueroa R, Sotomayor K (2019) Multidirectional Spontaneous Migration of Intracranial Bullet: A Case Report and Literature Review. Neurosurg Cases Rev 2:019.
3. Federico C Vinas, Brian H Kopell. Penetrating Head (Brain) Injuries. (pTBIs)https: / / emedicine.medscape.com / article / 247664
4. Shaikh HL. Celebratory gunfire.: Dawn; 2012.
5. Syed Asad Ali et al. Aerial Firing and Stray Bullet Injuries: A Rising Tide. Iran Red Crescent Med J2015 April; 17(4): e26179.
6. Golf caddie hit by a stray bullet from the Army shooting rangehttps: / / www.koreatimes.co.kr / www / nation / 2020 / 04 / 205_288464.html
7. https: / / www.thejakartapost.com / news / 2019 / 07 / 05 / stray-bullet-wounds-pasuruan-womankontras-points-to a military-civilian-agrarian-tensions.html
8. Farrugia A, Raul JS, Géraut A, Ludes B. Ricochet of a bullet in the spinal canal: a case report and review of the literature on bullet migration. J Forensic Sci 2010; 55:1371-4.
9. Castillo-Rangel C, Reyes-Soto G, Mendizábal-Guerra Cranio-thoracic bullet migration over aperiod of 27 years: case report. Neurocirugia (Astur) 2010; 21:326-9.
10. Fujimoto Y, Cabrera HT, Pahl FH, de Andrade AF, Marino JR. Spontaneous migration of a bullet in the cerebellum--case report. Neurol Med Chir (Tokyo) 2001; 41:499-501.
11. Mehmet ARSLAN, Metehan ESEOĞLU, Burhan Oral GÜDÜ, İsmail DEMİR, Abdul Baki KOZAN.
12. Spontaneous migration of a retained bullet within the brain: a case report. Turkish Journal of Trauma & Emergency Surgery. 2012;18 (5):449-452
13. Liebesind AL, Anderson RD, Schechter MM. Spontaneous movement of an intracranial missile. Neuroradiol 1973; 5:129-32.
14. Milhorat TH, Elowitz EH, Johnson RW, Miller JI. Spontaneous Movement of Bullets in the Brain Case Report. Neurosurg 1993; 32:142-4.
15. Umredkar AA, Mohindra S. Intracranial moving bullet syndrome. Neurol India [serial online] 2010; 58:151-2.
16. Arasil E, Taşçioğlu AO. Spontaneous migration of an intracranial bullet to the cervical spinal canalcausing Lhermitte's sign. Case report. J Neurosurg. 1982;56(1):158-159.
17. Vilvandre G. Morgan JD. Movements of foreign bodies in the brain. Arch Radiol Electrother 1916: 21: 22-27.
18. Liebesind AL, Anderson RD, Schechter MM. Spontaneous movement of an intracranial missile. Neuroradiol 1973; 5:129-32.
19. Milhorat TH, Elowitz EH, Johnson RW, Miller JI. Spontaneous Movement of Bullets in the Brain Case Report. Neurosurg 1993; 32:142-4.
20. Rengachary SS, Carey M, Templer J. The sinking bullet. Neurosurgery 1992; 30: 291-5.
21. Ratilal Bernardo, Vara Luiz Carlos. Moving bullet syndrome. Neurology India September 2004 Vol 52 Issue 3
22. Prabhakar H, Ali Z, Sharma MS. Valsalva's manoeuvre to assist delivery of a neurocysticercosis cyst from the fourth ventricle. Anesth Analg 2008; 107:731.