

## CASE REPORT

# Craniocerebral gunshot injury with no neurological deficit: the trending neurosurgical challenge

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## ABSTRACT

*Penetrating brain injury is a traumatic brain injury caused by high-velocity projectiles or low-velocity sharp objects. A wound in which the projectile breaches the cranium but does not exit is referred to as a penetrating wound. A large number of these patients who survive their initial wound will nevertheless expire shortly after admission to the hospital.<sup>1</sup> Here we discuss a case of penetrating bullet injury in a civilian, who presented with no neurological deficit and the management of the case along with a short discussion on the various presentation of the case and their respective neurosurgical management.*

**Keywords:** Penetrating brain injury; civilian bullet injury; neurosurgery; neurology

## INTRODUCTION

Penetrating brain injury (PBI) is a type of traumatic brain injury (TBI) defined as brain trauma in which a low-velocity sharp object, such as a knife, or a high-velocity projectile, such as a bullet, penetrates the skull but does not exit it.<sup>2</sup> Craniocerebral gunshot injuries (CGI) are currently increasingly encountered in civilian setting. Although less prevalent than closed head trauma, penetrating brain injury carries a grim prognosis.<sup>3</sup> CGI are the most lethal of all firearm injuries, with reported survival rates of only 7% to 15%.<sup>4</sup> This study reports an interesting case of CGI with no residual neurological defect.

## CASE STUDY

A 14 year old male presented with a history of homicidal penetrating bullet injury to brain with facial soft tissue injury. The GCS (Glasgow Coma Scale) on presentation was E<sub>4</sub>V<sub>5</sub>M<sub>6</sub> with an entry wound seen at 4 cm above the right eyebrow with no exit wound. CT (computed tomography) showed a foreign body in the right parietal region with surrounding cerebral edema and hematoma formations in the track of the bullet (**Figure 1** and **2**). Triple intravenous antibiotics, anti epileptics and osmotic diuresis were started. He had no neurological or motor deficit.

Right parietal curvilinear incision deepened and temporalis muscle retracted. Craniotomy done a pellet of 4 mm diameter is retrieved using bayonet forceps and continuous saline irrigation (**Figure 3**). Homeostasis achieved, duramater was not closed and bone flap repositioned. Post operative period was uneventful and case is in follow-up.

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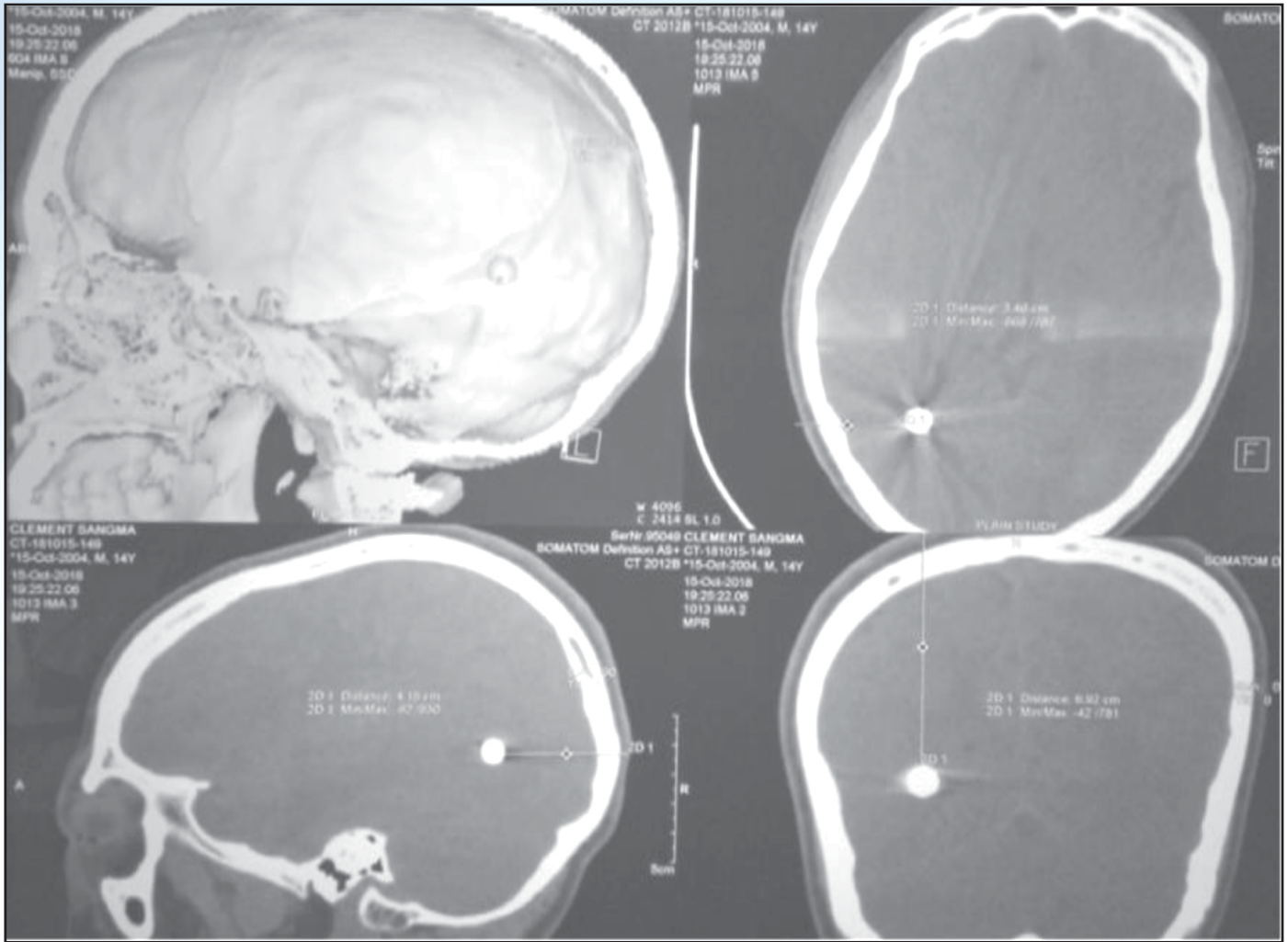
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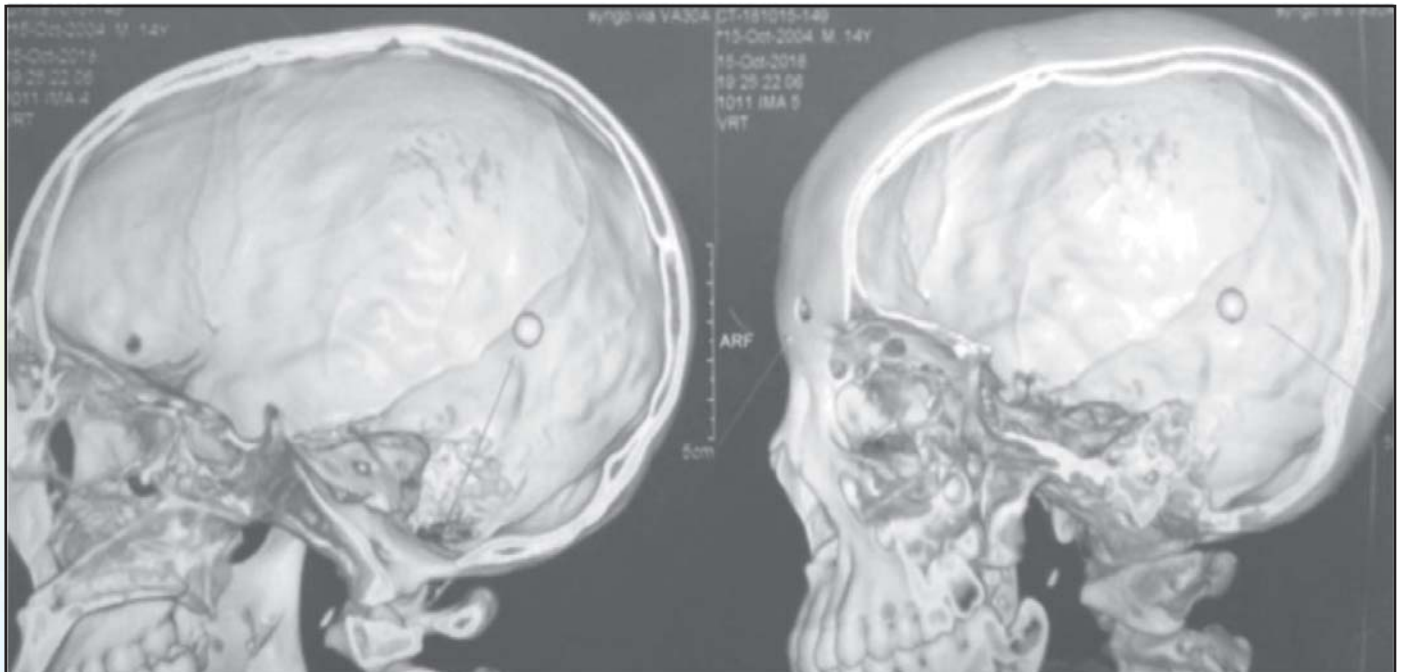
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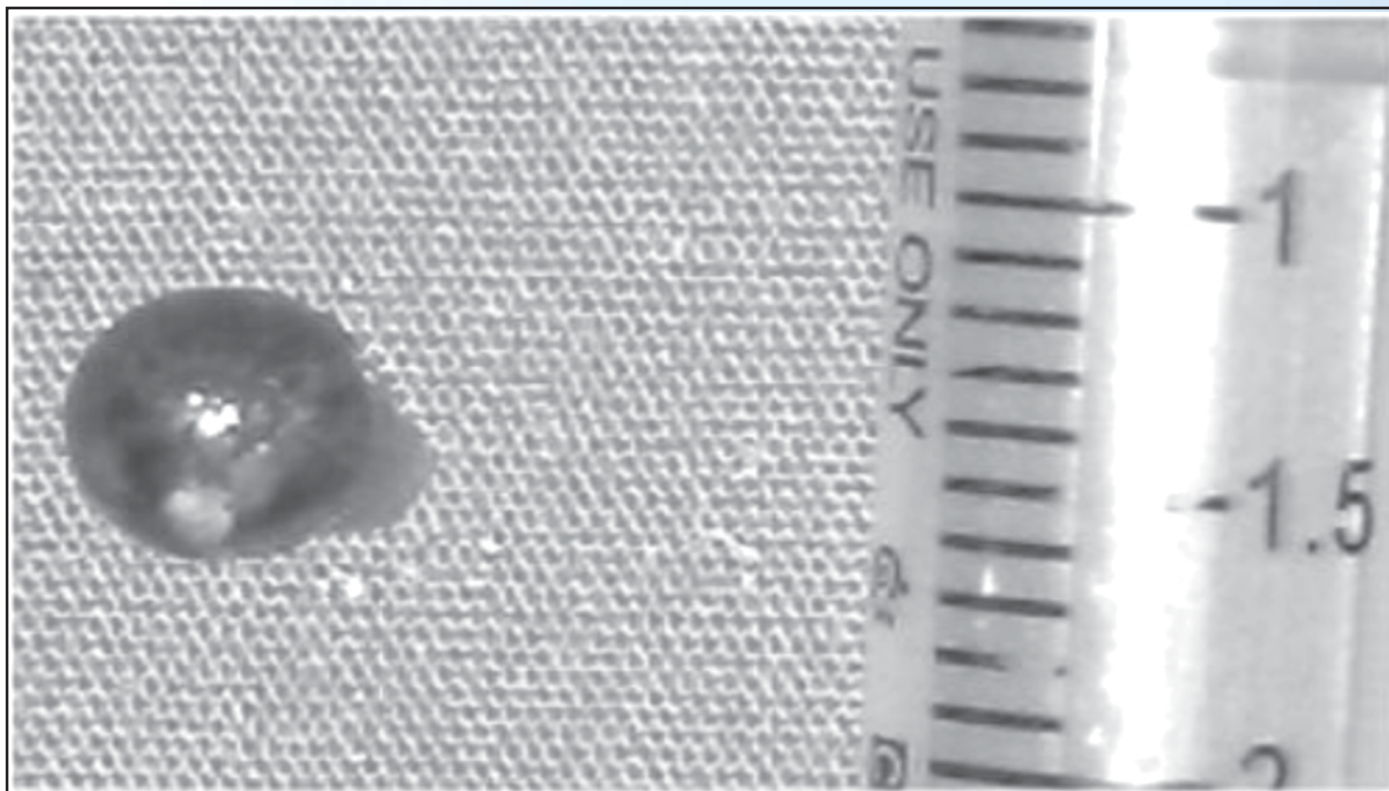
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**Figure 1** CT scan showing the bullet position and bullet track



**Figure 2** Scan showing the entry wound the bullet lodged in parietal lobe



**Figure 3** The pellet in comparison to scale

## DISCUSSION

The introduction of Guidelines for the Management of Penetrating Brain Injury has revolutionized the management of PBI during the last decade. There has been a paradigm shift toward a less aggressive debridement of deep seated fragments and a more aggressive antibiotic prophylaxis to improve outcomes.<sup>5</sup> We started with ceftriaxone + tazobactam, amikacin and metronidazole. CT (brain) scanning is the neuroradiologic modality of choice. Guidelines for the Management of Penetrating Brain Injury recommends the treatment of small entrance bullet wounds to the head with no significant intracranial pathology, with local wound care and closure. More extensive wounds with nonviable scalp, bone, or dura should be debrided more extensively before primary closure or grafting to secure a watertight wound is to be done if possible within 12 hours of the injury. When the trajectory of the missile violates an open air sinus, a water tight closure of the dura should be done as the literature suggests that it may decrease the risk of abscess formation and CSF fistulas.<sup>6</sup> Advanced age, suicide attempts, associated coagulopathy, Glasgow coma scale score of 3 with bilaterally fixed and dilated pupils, and high initial intracranial pressure have been correlated with worse outcomes in PBI patients.

## CONCLUSION

PBI, though less prevalent than closed head trauma, carries a worse prognosis. The publication of Guidelines for the

Management of Penetrating Brain Injury in 2001, attempted to standardize the management of PBI. A precise medical and surgical management of these inimitable injuries present a significant challenge. A better and standardized study has to be undertaken to bring in lime light the best modality of treatment of such cases in our infrastructure.

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