

# Traumatic bilateral (mirror image) basal ganglia bleed

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**Abstract:** Bilateral traumatic hemorrhage of the basal ganglia is an extremely rare neuropathologic entity. Hematomas of the basal ganglia in head injury have long been recognized with an interest but their mechanism has not been revealed clearly. It is presumed to be secondary to rupture of the lenticulostriate or anterior choroidal artery by shearing as a result of acceleration/deceleration forces. Outcome of traumatic basal ganglia haemorrhage (TBGH) appears favourable unless it is large or associated with coagulation disorders or when it is associated with other intracranial injuries such as diffuse axonal injury, cerebral contusion etc. We present a rare case of 42 yrs old male with isolated bilateral (mirror-image) traumatic basal ganglia bleed. Mechanism, clinical features and management is discussed and available literature reviewed.

**Keywords:** basal ganglia; contusion; head injury; hemorrhage; traumatic brain injury

## INTRODUCTION

Traumatic basal ganglia hematoma (TBGH) is a rare entity defined as a hemorrhagic lesion located in the basal ganglia or neighbouring structures such as the internal capsule and the thalamus<sup>1</sup>. Its incidence is about 3% after a closed head injury. However autopsy series indicate a higher incidence ranging between 10%-12%<sup>2,3,4,5,6</sup>. Basal ganglia hematomas were infrequently described before the CT era. The mechanism of TBGH is unclear but is thought to be due to shearing of lenticulostriate or anterior choroidal blood vessels due to the violent acceleration deceleration brought about by a high velocity injury<sup>2,5</sup>. TBGH can occur as isolated lesion or with associated intracranial injury such as diffuse axonal injury, cerebral contusion, and subdural or extradural hematoma. Isolated TBGHs show good outcome<sup>3</sup>.

## CASE REPORT

A 42-year-old male was hospitalized after few hours of road traffic accident. He was unconscious with GCS of 5 with pupils bilaterally 3mm reacting to light. Pulse was 90 per minute with blood pressure 136/88 mm of Hg. CT brain showed haemorrhages in the bilateral basal ganglia (Fig 1). MRI of brain done on 5<sup>th</sup> day of injury was suggestive of acute to subacute blood in bilateral basal ganglia region (Fig 2). CT angiogram did not reveal any vascular abnormalities (Fig 3). Laboratory investigations including complete blood cell counts,

bleeding time, clotting time prothrombin time, activated partial thromboplastin time, liver function tests, serum

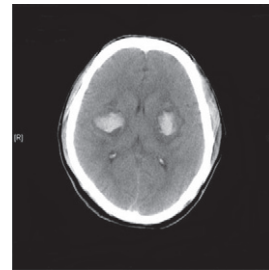


Fig 1: Non contrast CT scan of head (Day 1) showing bilateral basal ganglia hematomas with surrounding edema.

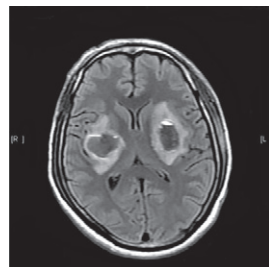


Fig 2: MRI brain T1W image (Day 5) showing the acute to subacute hematomas in the bilateral lenticular nucleus and external capsule relatively sparing the internal capsule.

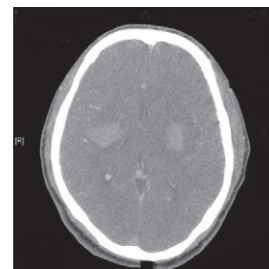


Fig 3: CT Angiogram of brain (Day 5) shows no evidence of any abnormal vessels.

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electrolytes and blood glucose level were within normal range. Patient regained consciousness on 3<sup>rd</sup> day. He was discharged on 14<sup>th</sup> day in a conscious state with 4/5 power in right shoulder and hip and right grip 80%. Power in the left shoulder and hip was 2/5 with left grip 40%.

## DISCUSSION

TBGH is a rare but serious complication of head injury<sup>7</sup>. TBGH are usually small and located in the zone of lenticular nucleus and external capsule on one or both sides. In contrast, spontaneous haemorrhage is solitary and located in the region of thalamus and internal capsule. Adams et al reported 63 patients with basal ganglia hematomas in an autopsy series of 635 fatal non-missile head injuries<sup>2</sup>. Bilateral occurrence of the TBGH with mirror image is extremely rare there is only one such report of two cases by Yanaka et al<sup>8</sup>.

The mechanism of TBGH has not been clear, but, it is believed to arise from a shear strain in the ganglionic region. Mosberg and Lindenberg demonstrated a traumatic tear of a pallidal branch of anterior choroidal artery as the origin of pallidal hematoma in an autopsy case<sup>7</sup>. TBGH is caused by shearing injury of the lenticulostriate or anterior choroidal artery as a result of acceleration/deceleration forces<sup>2,4,7</sup>. When the strong impact is applied to the vertex, forehead, or occipital area and directed toward the tentorium, there would be a shift of the brain through the tentorial notch with stretching and tearing of vessels by shearing forces, resulting in haemorrhages in the basal ganglia region<sup>1,7,9</sup>. Although the mechanisms of contusions remain poorly understood, which might result from ischemia by the compression of vessels irrigating the basal ganglia region as a result of shearing injury<sup>7</sup>. Basal ganglia haemorrhages of our patient are classified as "large" haemorrhage because they measure more than 2 cm in diameter<sup>2</sup>. The final prognosis of patients with TBGH is strongly related to the existence of associated injuries such as diffuse axonal injury<sup>3</sup>.

Various surgical options have been used for these patients including open surgery, CT guided stereotactic aspiration and ultrasonography guided aspiration<sup>1,4, 6,10</sup>. Except few case reports<sup>1,2,3,5,6,10</sup> most of them experienced poor outcomes in these surgically treated patients. However, the patients with increasing size of hematoma with deteriorating neurological condition should be subjected to surgery without delay. In addition, medical and supportive treatments including ICP monitoring and elective ventilation are extremely important for better outcomes in these patients.

Since the basal ganglia is a region predisposed to hypertensive haemorrhage, when head injury and hematoma are simultaneously present, it may be difficult to reach a definitive conclusion as if we are dealing with spontaneous hypertensive bleed or TBGH. For this reason, differential diagnosis of traumatic or spontaneous basal ganglia hematomas can be a crucial medico legal issue. Therefore, a very careful evaluation of past and present medical histories and physical examination, along with imaging study is mandatory for correct diagnosis and proper management.

## CONCLUSION

The prognosis of TBGH is favourable if not associated with other disorders like hypertension, diabetes mellitus, coagulation disorders or diffuse axonal injury. The hemorrhages in the basal ganglia seems to be hemorrhagic contusions as a result of a shearing injury after an accelerating /decelerating impact.

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