

# Clinical characteristics of patients with acute thalamic hemorrhage at Bach Mai neurology center

Truong Thanh Thuy<sup>1</sup>, Phan Van Toan<sup>1✉</sup>, Tran Bao Ngoc<sup>4</sup>

Ha Huu Quy<sup>1</sup>, Vo Hong Khoi<sup>1,2,3</sup>

<sup>1</sup> Neurology Center – Bach Mai hospital

<sup>2</sup> Hanoi Medical University

<sup>3</sup> VNU University of Medicine and Pharmacy

<sup>4</sup> 19–8 hospital

## Correspondence to

Phan Van Toan

Neurology Center – Bach Mai hospital

Email: phantoan.a5k39.pbc@gmail.com

Manuscripts submission: 15/1/2025

Peer Review: 28/2/2025

Manuscripts accepted: 21/3/2025

## ABSTRACT

**Objective:** To describe the clinical characteristics of patients with acute thalamic hemorrhage admitted to the Neurology Center of Bach Mai Hospital.

**Subjects:** 140 patients diagnosed with acute thalamic hemorrhage admitted to Bach Mai Hospital from June 2022 to June 2023.

**Methods:** Cross-sectional descriptive study.

**Results:** Male predominance (64.29%, male-to-female ratio 1.8:1), mean age  $63.64 \pm 10.71$  years. Hypertension was the leading risk factor (71.43%), followed by smoking (20.71%) and prior stroke (19.29%). Most patients (70%) presented within 24 hours of symptom onset, with sudden neurological deficits (90.71%). Elevated systolic ( $159.89 \pm 22.56$  mmHg) and diastolic blood pressure ( $95.79 \pm 15.62$  mmHg) were observed. Severe consciousness impairment (GCS  $\leq 8$ ) occurred in 10.71%, while 68.57% retained intact consciousness (GCS 13-15). Motor deficits affected 95% of patients.

**Conclusion:** This cohort had an average age of  $63.64 \pm 10.71$  years, with 47.14% aged  $\geq 65$  and a male-to-female ratio of 1.8:1. Hypertension was the most common condition (71.43%), followed by diabetes (16.43%) and prior stroke (19.29%). Alcohol abuse and smoking were reported in 15.71% and 20.71% of patients, respectively. Most patients (70%) were admitted within the first day, with sudden onset in 90.71% and severe consciousness disturbances in 10.71%. Common symptoms included hemiplegia (95%), sensory issues (49.29%), abnormal pupils (12.14%), abnormal light reflexes (14.29%) and meningeal signs (30%).

**Keywords:** Thalamic hemorrhage, intracerebral hemorrhage, clinical characteristics, hypertension.

## I. INTRODUCTION

Cerebral stroke represents a critical global health challenge with substantial mortality and disability rates, creating significant socioeconomic burdens. It ranks as the second leading cause of death worldwide and primary cause of disability, with increasing incidence correlating with population aging trends.<sup>1</sup>

The disease manifests in two principal categories: cerebral infarction and hemorrhage. Despite representing only 10-20% of cases, cerebral hemorrhage exhibits disproportionately higher mortality. Thalamic hemorrhage (8.3-15% of hemorrhagic cases) presents distinct clinical challenges due to the thalamus's central neuroanatomical positioning and ventricular system proximity, frequently resulting in intraventricular extension and complex neurological manifestations.<sup>1</sup>

Current management protocols lack specific pharmacological interventions, focusing instead on physiological stabilization, risk factor modification, and rehabilitative approaches. Early intervention remains the critical determinant of clinical outcomes.

While international research has established hemorrhage localization as a significant prognostic factor, comprehensive studies examining thalamic hemorrhage in Vietnamese populations remain limited. This research deficit prompted our investigation: "Clinical characteristics of patients with acute thalamic hemorrhage at Bach Mai Hospital" with the following objective "Describe the clinical characteristics of patients with acute thalamic hemorrhage admitted to the Neurology Center of Bach Mai Hospital".

## II. SUBJECTS AND METHODS

### 1. Study Subjects

We selected 140 patients diagnosed with

spontaneous intracerebral hemorrhage who were admitted for examination and inpatient treatment at the Neurology Department, Bach Mai Hospital, from June 2022 to June 2023.

### 2. Study Population

**a. Inclusion Criteria:** Patients meeting the following criteria were enrolled:

- **Clinical criteria:** Age  $\geq 18$  years, diagnosed with intracerebral hemorrhage (ICH) based on the World Health Organization (WHO) stroke diagnostic criteria (1989), characterized by sudden-onset neurological deficits persisting  $>24$  hours or leading to death within 24 hours, with non-traumatic etiology.

- **Neuroimaging criteria:** Non-contrast cranial computed tomography (CT) confirming acute thalamic hemorrhage.

- **Time criteria:** Hospital admission within 72 hours of symptom onset.

**b. Exclusion Criteria:** Patients were excluded if they met any of the following

- Declined participation in the study (patient or family refusal).

- Secondary thalamic hemorrhage due to vascular malformations (e.g., arteriovenous malformations, aneurysms), coagulopathy (INR  $>1.4$  or platelet count  $<100,000/\text{mm}^3$ ), severe organ dysfunction (hepatic failure, renal failure with creatinine  $>2.0$  mg/dL, or NYHA class III-IV heart failure), traumatic brain injury, substance abuse, hemorrhagic transformation of cerebral infarction, or tumor-associated hemorrhage.

- Incomplete medical records or lack of inpatient monitoring during hospitalization.

### 3. Research Methodology

A prospective cross-sectional descriptive study.

## III. RESULTS

### 1. Gender Characteristics

Gender	Number of Patients	Percentage (%)
Male	90	64.29
Female	50	35.71
Total	140	100

Among the 140 study patients, the majority were male, accounting for 64.29% of the participants, with a male-to-female ratio of 1.80.

2. Hospital Admission Time

Admission Time	Number of Patients	Percentage (%)
≤ 24 hours	98	70.00
24-48 hours	26	18.57
48-72 hours	16	11.43
Total	140	100

Most patients (70%) were admitted within the first 24 hours after symptom onset, 18.57% on the second day and 11.43% on the third day.

3. Risk Factors

Risk Factor	Number of Patients	Percentage (%)
Hypertension	100	71.43
Diabetes	23	16.43
Alcoholism	22	15.71
Smoking	29	20.71
Previous Stroke	27	19.29

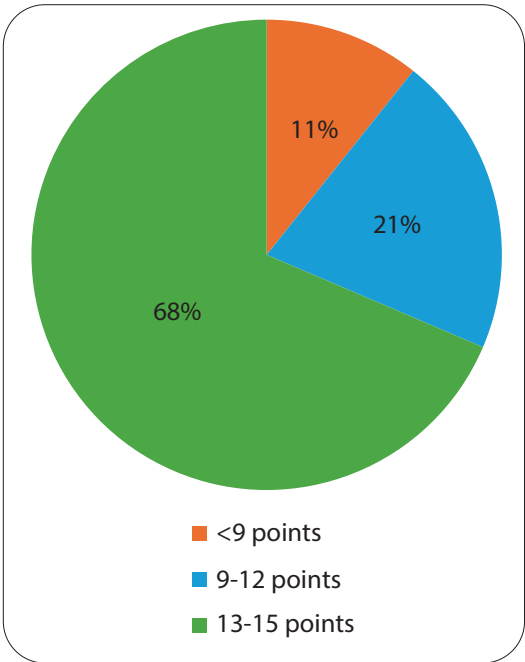
Hypertension was the most common risk factor, found in 71.43% of patients. Diabetes was present in 16.43%, prior stroke in 19.29%, alcoholism in 15.71% and smoking in 20.71%.

4. Vital Signs Upon Admission

Vital Sign	Mean ± SD
Heart Rate (beats/min)	86.12 ± 10.10
Systolic BP (mmHg)	159.89 ± 22.56
Diastolic BP (mmHg)	95.79 ± 15.62
Temperature (°C)	36.99 ± 0.49

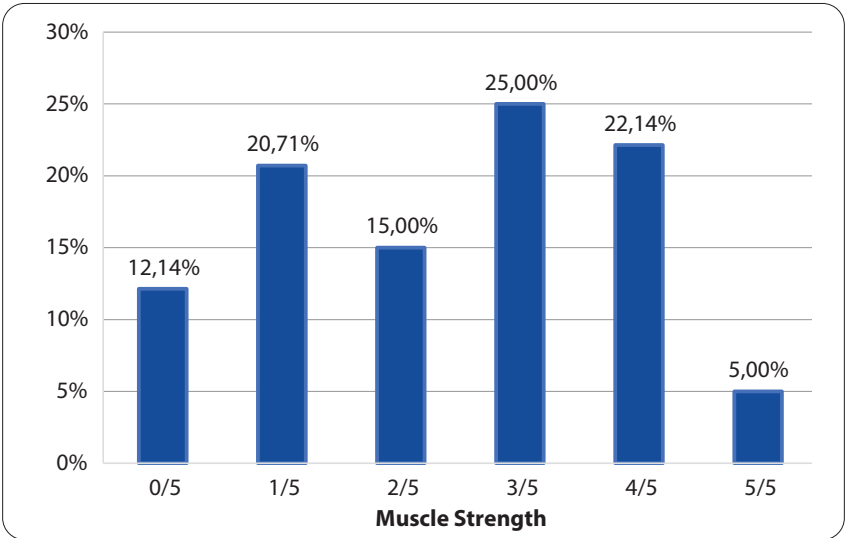
The study group’s vital signs were: heart rate of 86.12 ± 10.10 beats/min, systolic blood pressure of 159.89 ± 22.56 mmHg, diastolic blood pressure of 95.79 ± 15.62 mmHg and body temperature of 36.99 ± 0.49°C.

5. Consciousness Disorder (Glasgow Coma Scale - GCS)



Only 10.71% of patients had severe consciousness impairment (GCS ≤8). The majority (68.57%) had a GCS score of 13-15.

7. Muscle Strength of Study Participants Upon Admission



Only 5% of patients had no paralysis, while 95% had varying degrees of weakness. Specifically, 22.14% had a muscle strength score of 4/5, 25% had 3/5, 15% had 2/5, 20.71% had 1/5, and 12.14% had 0/5.

IV. DISCUSSION

The study conducted on 140 patients with acute thalamic hemorrhage at Bach Mai Hospital’s Neurology Center from June 2022 to June 2023 provides valuable insights into the demographic, clinical, and risk factor profiles of this patient population. The findings are consistent with previous research, both domestically and internationally, and contribute to a deeper understanding of thalamic hemorrhage.

Gender Distribution:

The male-to-female ratio in our study was 1.8:1, with males accounting for 64.29% of the patients. This aligns with findings from Brandon L. Neisewander’s study, which reported a similar ratio of 1.8:1 in 168 patients with thalamic hemorrhage. Other studies, such as those by Dinh Thi Hai Ha and Lee, also reported a higher prevalence of thalamic hemorrhage in males, with ratios of 76.2%:23.8% and 1.2:1, respectively.

The higher incidence of thalamic hemorrhage in males can be attributed to lifestyle factors such as smoking, alcohol consumption, irregular eating habits, and work-related stress, which are more prevalent among men. These behaviors contribute to a higher incidence of metabolic disorders, such as dyslipidemia and hypertension, which are significant risk factors for cerebral hemorrhage. Additionally, studies have shown that women generally have a lower prevalence of hypertension, which may explain the reduced risk of cerebral hemorrhage in females.<sup>1,2,3</sup>

Age Distribution:

The average age of the patients in our study was 63.64 ± 10.71 years, with a higher incidence observed in patients aged 55 and above, particularly those over 65 years (47.14%). This finding is consistent with other studies. For instance, Dinh Thi Hai Ha reported an average age of 63.72 ± 10.31 years, with the highest prevalence in the 55-64 age group. Similarly, Phạm Thị Hải Lý found that the 60-69 age group had the highest incidence of cerebral hemorrhage (32.3%). International studies, such as those by Lee, Taek Min Nam, and Arboix, also reported similar average ages for patients with thalamic

hemorrhage. The increased risk of hemorrhage in older individuals is likely due to age-related changes such as arterial stiffness, reduced elasticity, and the accumulation of lipids, which contribute to atherosclerosis. These factors make the elderly more susceptible to hypertension and subsequent cerebral hemorrhage.<sup>2,3,7</sup>

## Clinical Presentation

### Risk Factors:

- **Hypertension:** Hypertension is the most significant risk factor for thalamic hemorrhage, as demonstrated by numerous studies. In our study, 71.43% of patients had a history of hypertension, which is consistent with findings from Taek Min Nam (67.8%) and Pham Thi Hai Ly (60.8%). The American Heart Association and American Stroke Association's 2015 guidelines emphasize the importance of blood pressure control in preventing cerebral hemorrhage. However, in Asian populations, where blood pressure control is often suboptimal, the risk of cerebral hemorrhage remains high. Uncontrolled hypertension leads to chronic arterial stress, weakening the vessel walls and increasing the risk of rupture during sudden blood pressure spikes.<sup>2,3</sup>

- **Diabetes Mellitus:** The role of diabetes in cerebral hemorrhage remains controversial. In our study, 16.43% of patients had a history of diabetes, which is higher than the 11.1% reported in the INTERACT2 study. The prevalence of diabetes in thalamic hemorrhage varies across studies, ranging from 10.2% to 26.2%. While some studies suggest a modest association between diabetes and cerebral hemorrhage, the exact mechanism remains unclear.

- **History of Stroke:** A history of stroke was present in 19.29% of our patients, similar to the 17.6% reported in the INTERACT2 study. Patients with a history of stroke are at a higher risk of recurrent stroke, with a cumulative incidence of 14.2% over 10 years. Risk factors for recurrent

hemorrhage include a history of ischemic stroke, diabetes, and the use of aspirin.

- **Alcohol and Tobacco Use:** In our study, 15.71% of patients had a history of alcohol abuse, and 20.71% were smokers. Both alcohol and tobacco use are modifiable risk factors for cerebral hemorrhage. Alcohol abuse increases the risk of hemorrhage by 1.67 times, likely due to its effects on liver function, coagulation, and platelet count. Smoking, on the other hand, contributes to secondary hypertension by increasing cardiac output and peripheral resistance, leading to arterial damage and an increased risk of small vessel rupture in the brain.

### Vital Signs and Clinical Features

**Blood Pressure on Admission:** The average systolic and diastolic blood pressures on admission were  $159.89 \pm 22.56$  mmHg and  $95.79 \pm 15.62$  mmHg, respectively. Elevated blood pressure is common after stroke onset, particularly in patients with cerebral hemorrhage. While hypertension may increase cerebral blood flow in ischemic stroke, it offers no benefit in hemorrhagic stroke and may exacerbate the condition by increasing hematoma volume, cerebral edema, and intracranial pressure.

**Pulse and Temperature:** The average pulse rate and temperature were  $86.12 \pm 10.10$  beats per minute and  $36.99 \pm 0.49^\circ\text{C}$ , respectively. Thalamic hemorrhage often leads to an elevated pulse rate due to the involvement of the hypothalamus, which regulates heart rate and blood pressure. Additionally, a rapid pulse may reflect underlying physiological stress, such as dehydration, anemia, or comorbid cardiovascular conditions.

**Consciousness Level (Glasgow Coma Scale):** In our study, 68.57% of patients had no or minimal impairment of consciousness (Glasgow Coma Scale [GCS] 13-15), while 20.71% had moderate impairment (GCS 9-12), and 10.71% had severe impairment (GCS 3-8). The proportion

of patients with severe impairment was lower than in studies by Nam (40.3%), Dinh Thi Hai Ha (26.7%), and Kumral (56%). This may be due to the smaller hematoma size in our cohort, as larger hematomas are more likely to cause significant mass effect and impaired consciousness.

**Motor Deficits:** Motor deficits were observed in 47.85% of patients, with severe weakness (muscle strength 0/5-2/5) being the most common. The thalamus is adjacent to the internal capsule, and hemorrhage in this region can compress or cause edema in the capsule, leading to varying degrees of motor impairment.

**Sensory Disturbances:** Sensory disturbances were present in 49.29% of patients. However, this assessment was limited to patients who were conscious and able to communicate. In patients with severe impairment of consciousness, sensory deficits could not be accurately assessed, which may explain the variability in reported rates across studies.

**Pupillary Abnormalities and Meningeal Signs:** Pupillary abnormalities and impaired light reflexes were observed in 12.14% and 14.29% of patients, respectively. These findings were less frequent than in studies by Đinh Thị Hải Hà and Nam. Pupillary changes in thalamic hemorrhage can vary depending on the extent and location of the hemorrhage, with both constricted and dilated pupils being possible. Meningeal signs were present in 30% of patients, likely reflecting intraventricular extension of the hemorrhage. However, these signs are less reliable in comatose or semi-comatose patients.<sup>6,7</sup>

## V. CONCLUSION

This cohort highlights that the average age of patients was  $63.64 \pm 10.71$  years, with the most frequently affected age group being  $\geq 65$  years, representing 47.14% of cases. The male-to-female ratio was 1.8:1. Hypertension was the

most common pre-existing condition, present in 71.43% of patients, followed by diabetes mellitus (16.43%) and a history of previous stroke (19.29%). Alcohol abuse and smoking were reported in 15.71% and 20.71% of patients, respectively. A majority of patients (70%) were admitted within the first day of symptom onset, with sudden onset observed in 90.71% of cases. Severe disturbances in consciousness were noted in 10.71% of patients. The most prevalent clinical symptoms included hemiplegia (95%), sensory disturbances (49.29%), abnormal pupils (12.14%), abnormal light reflexes (14.29%) and meningeal signs (30%).

## REFERENCES

1. Katan M, Luft A. Global Burden of Stroke. *Semin Neurol*. 2018;38(2): 208-211.
2. Neisewander BL, Hu K, Tan Z, et al. Location of Thalamic Hemorrhage Impacts Prognosis. *World Neurosurg*. 2018;116:e525-e533
3. Lee SH, Park KJ, Kang SH, Jung YG, Park JY, Park DH. *Prognostic Factors of Clinical Outcomes in Patients with Spontaneous Thalamic Hemorrhage*. *Med Sci Monit*. 2015;21:2638-2646.
4. Đinh Thị Hải Hà. Đặc điểm lâm sàng, hình ảnh cắt lớp vi tính não và một số yếu tố tiên lượng ở bệnh nhân chảy máu đồi thị có máu tràn vào não thất. *Tạp chí y dược học lâm sàng* 108, số 11/2016, tr.101-106.
5. Osawa A, Maeshima S. Aphasia and unilateral spatial neglect due to acute thalamic hemorrhage: clinical correlations and outcomes. *Neurol Sci*. 2016;37(4):565-572.
6. Nam TM, Jang JH, Kim SH, Kim KH, Kim YZ. Comparative Analysis of the Patients with Spontaneous Thalamic Hemorrhage with Concurrent Intraventricular Hemorrhage and Those without Intraventricular Hemorrhage. *J Korean Med Sci*. 2020;36(1):e4.
7. Phạm Thị Hải Lý. Đặc điểm lâm sàng, hình ảnh cắt lớp vi tính sọ não và một số yếu tố tiên lượng của chảy máu não bán cầu giai đoạn cấp. *Luận văn tốt nghiệp bác sĩ chuyên khoa cấp II, đại học Y Hà Nội*. 2019