Journal of Neuroscience and Neurodevelopmental Disorders (JNDD)

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Mini Review

# Understanding Intracerebral Hemorrhage Beyond the Surface

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**Citation:** Goetzke R, Silent Rupture: Understanding Intracerebral Hemorrhage Beyond the Surface. V1(3),2025



**Received date:** October 28, 2025: **Accepted date:** October 30, 2025: **Published date**: November 03,2025

**Keywords:** intracranial pressure, ischemic strokes, Cerebral amyloid angiopathy, arteriovenous malformations, CT angiography

## Abstract

Intracerebral Hemorrhage (ICH) is a life-threatening neurological emergency characterized by bleeding directly into the brain parenchyma. It accounts for a significant proportion of stroke-related morbidity and mortality worldwide. Unlike ischemic strokes, ICH leads to rapid neurological deterioration due to mass effect, increased intracranial pressure, and toxic effects of blood components on neural tissue. This article explores the etiology, pathophysiology, clinical features, diagnostic approaches, and management strategies of intracerebral hemorrhage. Emphasis is placed on early recognition and timely intervention to improve outcomes and reduce long-term disability.

## Introduction

Intracerebral hemorrhage is a subtype of hemorrhagic stroke resulting from the rupture of blood vessels within the brain. It is a medical emergency requiring immediate attention. ICH contributes to approximately 10–15% of all strokes but carries a disproportionately high mortality rate compared to ischemic stroke.

## Etiology (Causes)

The causes of intracerebral hemorrhage can be broadly categorized into primary and secondary:

## Primary Causes

- **Hypertension (most common):** Chronic high blood pressure weakens small arteries, making them prone to rupture.
- **Cerebral amyloid angiopathy:** Common in elderly individuals, leading to fragile vessel walls

## Secondary Causes

- Vascular malformations (e.g., arteriovenous malformations)
- Brain tumors
- Anticoagulant therapy
- Trauma
- Coagulopathies
- Substance abuse (e.g., cocaine, alcohol)
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## Pathophysiology

The pathophysiology of ICH involves several critical steps:

1. **Vessel rupture:** Due to structural weakness or external factors.
2. **Hematoma formation:** Blood accumulates within brain tissue.
3. **Mass effect:** The expanding hematoma compresses surrounding brain structures.
4. **Increased intracranial pressure (ICP):** Leads to reduced cerebral perfusion.
5. **Secondary injury:** Breakdown of blood releases toxic substances, causing inflammation, edema, and neuronal damage.

This cascade results in rapid neurological decline if not managed promptly

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## Clinical Features

Symptoms of intracerebral hemorrhage typically appear suddenly and may worsen rapidly:

- Severe headache ("worst headache of life")
- Nausea and vomiting
- Altered consciousness or coma
- Focal neurological deficits (e.g., weakness, speech difficulty)
- Seizures
- Vision disturbances

The presentation depends on the location and size of the hemorrhage.

## Emergency Management

- Stabilization of airway, breathing, and circulation (ABC)
- Blood pressure control
- Management of intracranial pressure
- Reversal of anticoagulation if applicable

## Medical Treatment

- Osmotic agents (e.g., mannitol) to reduce ICP
- Antiepileptic drugs for seizure control
- Careful fluid and electrolyte balance

## Surgical Intervention

- Hematoma evacuation in selected cases
- Decompression to relieve pressure

## ComplicationS

- Brain herniation
- Hydrocephalus
- Seizures
- Long-term neurological deficits
- Death

## Prevention

- Effective control of hypertension
- Avoidance of smoking and excessive alcohol use
- Careful use of anticoagulant medications
- Regular health check-ups

## Conclusion

Intracerebral hemorrhage is a devastating condition requiring rapid diagnosis and intervention

Understanding its underlying mechanisms and risk factors is essential for improving patient outcomes. Advances in neuroimaging and critical care management continue to enhance survival, but prevention remains the most effective strategy.

## Reference

1. Gong, Y.; Li, H.; Cui, H.; Gong, Y. Microglial Mechanisms and Therapeutic Potential in Brain Injury Post-Intracerebral Hemorrhage. J. Inflamm. Res. 2025, 18, 2955–2973.
2. Xu, H.; Song, X.; Su, X.D. Calcium-dependent oligomerization of scavenger receptor CD163 facilitates the endocytosis of ligands. Nat. Commun. 2025, 16, 6679.
3. yang, G.; Fan, X.; Mazhar, M.; Guo, W.; Zou, Y.; Dechsupa, N.; Wang, L. Neuroinflammation of microglia polarization in intracerebral hemorrhage and its potential targets for intervention. Front. Mol. Neurosci. 2022, 15, 1013706
4. Zhou, Y.; Gou, Z.; Huang, L.; Fan, Y.; Zhang, F.; Lu, L. Inhibition of immunoproteasome subunit low molecular mass polypeptide 7 with ONX-0914 improves hypoxic-ischemic brain damage via PI3K/Akt signaling. Neuroreport 2021, 32, 1206–1215.
5. Zhuang J., Peng Y., Gu C., Chen H., Lin Z., Zhou H., et al. (2021). Wogonin accelerates hematoma clearance and improves neurological outcome via the PPAR-γ pathway after intracerebral hemorrhage. Transl. Stroke Res. 12, 660–675

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