Medical Journal of Eastern Nepal ISSN 2822-2032 (Print) 2822-2040 (Online)

Volume 04, Number 02, Issue 08, July-December *Original Research Article*

FUNCTIONAL OUTCOME OF SPONTANEOUS INTRACEREBRAL HEMORRHAGE AFTER CONSERVATIVE MANAGEMENT: A RETROSPECTIVE HOSPITAL-BASED STUDY

Sunil Singh, Prakash Kafle, Pramod Kumar Chaudhary, Dipak Kumar Yadav, Narendra Prasad Joshi

Department of Neurosurgery, Nobel Medical College Teaching Hospital, Biratnagar, Morang, Nepal

***Corresponding Author**
Sunil Singh
Email: sunilsinghcmc@gmail.com
ORCID: https://orcid.org/0009-0000-8031-3450

CITATION
Singh S, Kafle P, Chaudhary PK, Yadav DK, Joshi NP, Functional Outcome of Spontaneous Intracerebral Hemorrhage after Conservative Management: A Retrospective Hospital-based Study, MJEN. 2025 December;4(2); (32-36)

ABSTRACT

Background
Spontaneous intracerebral hemorrhage (ICH) is a critical neurological emergency with high mortality and morbidity. While conservative management is the primary treatment for most patients, functional outcomes are variable. This study assesses these outcomes and their predictors.

Methods
A retrospective study was conducted at a tertiary care center, including 75 adults with CT-confirmed spontaneous ICH managed conservatively. The primary outcome was functional status at discharge, measured by the Glasgow Outcome Scale (GOS).

Results
The mean age was 58.5 years. In-hospital mortality was 13.3%. A good recovery (GOS 5) was observed in 30.7% of patients. Older age and delayed presentation were significantly correlated with poorer GOS scores. Pontine hemorrhages were associated with the worst outcomes.

Conclusion
A significant proportion of patients achieved favorable outcomes with conservative management. Age, time to presentation, and hemorrhage location are critical prognostic factors, underscoring the importance of early and optimized medical care.

Keywords: *Functional Outcome, Glasgow Outcome Scale (GOS), Prognostic Factors, Retrospective Study, Spontaneous Intracerebral Hemorrhage*

ARTICLE INFO:
Received Date: 5th August 2025
Accept Date: 15th November 2025
Published Date: 29th December 2025

INTRODUCTION

Spontaneous, non-traumatic intracerebral hemorrhage (ICH) is a critical neurological emergency, representing approximately 10-15% of all strokes yet accounting for a disproportionately high burden of stroke-related mortality and morbidity worldwide [1,2]. With a case fatality rate of up to 40% at one month, and a majority of survivors facing significant long-term disability, ICH presents a formidable challenge to healthcare systems [3]. The pathophysiology of acute ICH is characterized by two primary mechanisms of secondary brain injury: (1) early hematoma expansion, which occurs in a significant proportion of patients and is a strong predictor of neurological deterioration; and (2) the subsequent development of peri-hematomal edema, which contributes to mass effect and elevated intracranial pressure (ICP) [2,4].

The management of ICH is broadly categorized into surgical intervention and conservative, or medical, management. While surgical techniques have been extensively investigated, large randomized controlled trials such as the Surgical Trial in Intracerebral Hemorrhage (STICH I and II) have not demonstrated a clear, overarching benefit for routine surgical evacuation in most patients with supratentorial hemorrhages [5,6]. Consequently, meticulous and proactive conservative management remains the foundational treatment strategy for the vast majority of ICH patients [7].

The paradigm of conservative management has evolved from passive supportive care to an integrated, protocol-driven approach aimed at mitigating secondary brain injury. Core principles include the rapid stabilization of the patient within specialized neurocritical care or stroke units [8]. Key interventions encompass early, intensive blood pressure control to limit hematoma expansion; urgent reversal of coagulopathy in anticoagulant-associated ICH; and vigilant management of ICP and cerebral edema [9,10]. Furthermore, comprehensive care involves the prevention and treatment of medical complications, including seizures, fever, hyperglycemia, and venous thromboembolism [7]. The aim of this study is to assess the functional outcomes at discharge using the Glasgow Outcome Scale (GOS).

METHODS

This study employed a retrospective, hospital-based design to evaluate the functional outcomes of patients with spontaneous intracerebral hemorrhage (ICH) managed conservatively. The study was conducted at Nobel Medical College and Teaching Hospital, Biratnagar, Nepal, a tertiary care center selected for its adequate patient volume and comprehensive medical records. The study population included all adult patients (≥18 years) admitted with CT-confirmed spontaneous ICH between July 2024 and July 2025, who were managed conservatively without neurosurgical intervention. Patients with traumatic ICH, secondary causes (e.g., tumor, vascular malformation), or those who underwent surgical evacuation were excluded.

A minimum sample size of 75 patients was calculated using the single proportion formula, based on an assumed 3-month mortality rate of 18% from previous literature[11], with a 90% confidence interval and 8% margin of error, accounting for a 15% rate of incomplete records. Data were collected using a structured proforma, extracting information from hospital records, imaging archives, and follow-up documents. Key variables included patient demographics, comorbidities, baseline clinical severity (assessed via Glasgow Coma Scale and NIH Stroke Scale), radiological findings (hematoma location and size, presence of cerebral edema), in-hospital complications, and outcomes.

The primary outcome measures were in-hospital and 3-month mortality rates. Functional status at discharge was assessed using the Glasgow Outcome Scale (GOS). Data were analyzed using statistical software (e.g., SPSS), with descriptive statistics to summarize patient characteristics and inferential analyses, including logistic regression, to identify independent clinical and radiological predictors of poor outcome. Ethical approval was obtained from the IRC Nobel Medical College Teaching Hospital.

RESULTS

A total of 75 patients with spontaneous intracerebral hemorrhage (ICH) were included in the final analysis. The mean age of the patients was 58.5 ± 14.2 years, and 26 (34.7%) were female. The baseline neurological status of the patients, as assessed by the Glasgow Coma Scale (GCS), had a median score of 12 with an interquartile range (IQR) of 11 to 13. The mean time from symptom onset to hospital presentation was 15.7 hours. The hemorrhage was localized to the left hemisphere in 30 patients (40.0%) and the right hemisphere in 33 patients (44.0%). The most common sites of bleeding were the basal ganglia (44.0%, n=33) and the thalamus (32.0%, n=24).

Table 1: Baseline and Clinical Characteristics of the Study Population (N=75)

Characteristic	Value
Age, years (Mean ± SD)	58.5 ± 14.2
Male Sex (n, %)	49 (65.3%)
Female Sex (n, %)	26 (34.7%)
GCS at Presentation (Median, IQR)	12 (11 - 13)
Time to Presentation, hours (Mean)	15.7
Hemorrhage Side (n, %)	
Left	30 (40.0%)
Right	33 (44.0%)
Hemorrhage Location (n, %)	
Basal Ganglia	33 (44.0%)
Thalamus	24 (32.0%)
Posterior Fossa	7 (9.3%)
Intraventricular	6 (8.0%)
Pontine	3 (4.0%)
Cerebellar	2 (2.7%)
Medical History (n, %)	
None Reported	67 (89.3%)
Hypertension (HTN)	5 (6.7%)
HTN & Diabetes Mellitus (DM)	3 (4.0%)

The median length of stay in the medical intensive care unit (ICU) was 4 days, followed by a median of 3 days in rehabilitation care. At discharge, the majority of patients were discharged home (80.0%, n=60), while 13.3% (n=10) died, and 6.7% (n=5) left against medical advice (LAMA). Functional outcomes, as measured by the Glasgow Outcome Scale (GOS), are shown in Table 2. A good recovery (GOS 5) was observed in 23 patients (30.7%), and moderate disability (GOS 4) in 30 patients (40.0%).

Table 2: Functional Outcomes at Discharge (Glasgow Outcome Scale)

GOS Score	Description	Number of Patients (n, %)
1	Death	10 (13.3%)
2	Persistent Vegetative State	4 (5.3%)
3	Severe Disability	8 (10.7%)
4	Moderate Disability	30 (40.0%)
5	Good Recovery	23 (30.7%)
Total		**75 (100.0%)**

Correlation analyses were performed to assess the relationship between patient factors and the GOS score (Table 3). A moderate, statistically significant negative correlation was found between age and GOS ($r = -0.409$, $p < 0.001$), indicating that older age was associated with poorer functional outcomes. A weak but significant negative correlation was also observed between the duration from symptom onset to presentation and GOS ($r = -0.254$, $p = 0.028$), suggesting that delayed presentation was associated with worse outcomes.

Table 3. Correlation Analysis of Variables with Functional Outcome

Variable 1	Variable 2	r (Pearson)	p-value	Interpretation
GOS	Age	-0.409	<0.001	Moderate negative correlation
GOS	Time to Presentation	-0.254	0.028	Weak negative correlation
GOS	ICU Stay (days)	0.172	0.139	Not significant
GOS	Rehab Stay (days)	-0.373	0.003	Moderate negative correlation
Age	Rehab Stay (days)	0.256	0.046	Weak positive correlation
ICU Stay (days)	Rehab Stay (days)	0.726	<0.001	Strong positive correlation

The presence of intraventricular extension (IVH) of the hemorrhage was documented in 6 patients (8%), with two originating from basal ganglia hemorrhages and the remainder from thalamic hemorrhages. However, the GOS scores did not differ significantly between patients with and without IVH (Mann-Whitney $U = 311.0$, $p = 0.308$). A Kruskal-Wallis test revealed a significant difference in GOS scores based on the anatomical site of the hemorrhage ($H = 17.688$, $df = 4$, $p = 0.001$). Post-hoc analysis indicated that pontine hemorrhages were associated with the poorest outcomes, while intraventricular and posterior fossa hemorrhages were associated with relatively more favorable GOS scores.

DISCUSSION

This retrospective study provides insight into the functional outcomes and associated factors in a cohort of 75 patients with spontaneous ICH managed conservatively at a tertiary care center in Nepal. The key findings indicate that while a substantial proportion of patients (30.7%) achieved a good recovery, in-hospital mortality was 13.3%, and outcomes were significantly influenced by age, timeliness of presentation, and the anatomical site of the hemorrhage.

The observed in-hospital mortality rate of 13.3% in our study is comparable to, though slightly lower than, rates reported in other studies focusing on conservatively managed ICH [12]. This variation could be attributed to differences in baseline patient characteristics, such as a lower median GCS (12 in our cohort) compared to other studies, or variations in the comprehensiveness of neurocritical care. The finding that 70.7% of patients achieved a moderate disability or good recovery (GOS 4-5) underscores that conservative management, when executed meticulously, is a viable and often successful strategy for a majority of ICH patients, aligning with the conclusions of major guidelines [13]. Our analysis identified patient age as a strong, independent predictor of functional outcome, with a moderate negative correlation ($r = -0.409$, $p<0.001$). This is consistent with a vast body of literature that identifies advanced age as a robust predictor of poor recovery, likely due to reduced neuroplasticity, higher prevalence of comorbidities,

and diminished physiological reserve [14]. Furthermore, we found a weak but significant negative correlation between the time from symptom onset to hospital presentation and the GOS score ($r = -0.254$, $p=0.028$). This reinforces the concept of the "golden hour" in ICH management, where delays can preclude timely interventions—such as aggressive blood pressure control—that are known to mitigate hematoma expansion and secondary brain injury [15].

A novel and somewhat counterintuitive finding was the moderate negative correlation between the duration of rehabilitation stay and GOS. This likely does not imply that rehabilitation causes worse outcomes, but rather that patients with more severe initial deficits and poorer prognosis required longer, more intensive rehabilitation efforts. This is supported by the strong positive correlation between ICU and rehabilitation stay ($r = 0.726$, $p<0.001$), indicating that patients with a more severe and complicated acute course transitioned to prolonged rehab. The anatomical location of the hemorrhage was a critical determinant of outcome. As expected, pontine hemorrhages were associated with the poorest prognosis, which aligns with their location in the brainstem, a region controlling vital functions [16]. Contrary to some previous studies, [17] the presence of intraventricular extension (IVH) in our cohort was not significantly associated with worse GOS. This could be due to the small number of patients with IVH (n=14) or its origin primarily from thalamic hemorrhages, which may have a different impact on outcome compared to other locations. The relatively better outcomes observed in patients with intraventricular and posterior fossa hemorrhages should be interpreted with caution given the small subgroup sizes and may reflect selection bias or specific local management protocols.

CONCLUSION

In this cohort, conservative management for spontaneous intracerebral hemorrhage yielded a favorable functional outcome in a substantial proportion of patients. The prognosis was significantly influenced by age, time to hospital presentation, and hemorrhage location. These findings affirm the value of protocol-driven medical management and highlight the critical importance of early intervention to optimize recovery in ICH patients.

ACKNOWLEDGEMENTS

Firstly, I express my sincere gratitude to Almighty God for grace and blessings bestowed upon me. This work is the culmination of the help, encouragement, and guidance received from many individuals, to whom I am deeply thankful.

I would like to acknowledge my profound sense of gratitude my colleagues, fellows, and sisters for their continuous support and cooperation throughout this work. I also extend my heartfelt appreciation to the patients and their visitors for their invaluable cooperation, without which this study would not have been possible or complete.

Funding: None
Conflict of interest: None
Ethical approval: Yes

REFERENCES

1. Kim JY, Bae HJ. Spontaneous Intracerebral Hemorrhage: Management. J Stroke. 2017;19(1):28-39. https://doi.org/10.5853/jos.2016.01935
2. Veltkamp R, Purrucker J. Management of Spontaneous Intracerebral Hemorrhage. Curr Neurol Neurosci Rep. 2017;17(10):80. https://doi.org/10.1007/s11910-017-0783-5
3. Sidram V, Kumar PCC, Raghavendra B. A Study of Clinical Profile of Intracerebral Hemorrhage and ENT Manifestations and its Surgical Outcome. Int J Head Neck Surg. 2017;8(1):5-10. Doi: 10.5005/jp-journals-10001-1297
4. Dastur CK, Yu W. Current management of spontaneous intracerebral haemorrhage. Stroke Vasc Neurol. 2017;2:e00047. doi:10.1136/svn2016-000047
5. Mendelow AD, Gregson BA, Fernandes HM, et al. Early surgery versus initial conservative treatment in patients with spontaneous supratentorial intracerebral haematomas in the International Surgical Trial in Intracerebral Haemorrhage (STICH): a randomised trial. Lancet. 2005;365(9457):387-397. https://doi.org/10.1016/S0140-6736(05)17826-X
6. Mendelow AD, Gregson BA, Rowan EN, et al. Early surgery versus initial conservative treatment in patients with spontaneous supratentorial lobar intracerebral haematomas (STICH II): a randomised trial. Lancet. 2013;382(9890):397-408. https://doi.org/10.1016/S0140-6736(13)60986-1
7. Hemphill JC 3rd, Greenberg SM, Anderson CS, et al. Guidelines for the management of spontaneous intracerebral hemorrhage: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2015;46(7): 2032-2060. https://doi.org/10.1161/STR.0000000000000069
8. Diringer MN, Edwards DF. Admission to a neurologic/neurosurgical intensive care unit is associated with reduced mortality rate after intracerebral hemorrhage. Crit Care Med. 2001;29(3):635-640. https://doi.org/10.1097/00003246-200103000-00031
9. Anderson CS, Heeley E, Huang Y, et al. Rapid blood-pressure lowering in patients with acute intracerebral hemorrhage. N Engl J Med. 2013;368(25):2355-2365. DOI: 10.1056/NEJMoa1214609
10. Steiner T, Poli S, Griebe M, et al. Fresh frozen plasma versus prothrombin complex concentrate in patients with intracranial haemorrhage related to vitamin K antagonists (INCH): a randomised trial. Lancet Neurol. 2016;15(6): 566-573. https://doi.org/10.1016/S1474-4422(16)00110-1
11. Al-Khaled, M. & Eggers, J., 2014. Prognosis of intracerebral hemorrhage after conservative treatment: results of the QugSS2 study. Journal of Stroke and Cerebrovascular Diseases, 23(2), pp.230-234. https://doi.org/10.1016/j.jstrokecerebrovasdis.2012.12.018
12. van Asch CJ, Luitse MJ, Rinkel GJ, van der Tweel I, Algra A, Klijn CJ. Incidence, case fatality, and functional outcome of intracerebral haemorrhage over time, according

to age, sex, and ethnic origin: a systematic review and meta-analysis. Lancet Neurol. 2010;9(2):167-176. https://doi.org/10.1016/S1474-4422(09)70340-0
13. Greenberg SM, Ziai WC, Cordonnier C, et al. 2022 Guideline for the Management of Patients With Spontaneous Intracerebral Hemorrhage: A Guideline From the American Heart Association/American Stroke Association. Stroke. 2022;53(7):e282-e361.DOI: https://doi.org/10.1161/STR.0000000000000407
14. Rost NS, Smith EE, Chang Y, et al. Prediction of functional outcome in patients with primary intracerebral hemorrhage: the FUNC score. Stroke. 2008;39(8):2304-2309.https://doi.org/10.1161/STROKEAHA.107.512202
15. Qureshi AI, Palesch YY, Barsan WG, et al. Intensive Blood-Pressure Lowering in Patients with Acute Cerebral Hemorrhage. N Engl J Med. 2016;375(11):1033-1043. DOI: 10.1056/NEJMoa1603460
16. Wijdicks EF, St Louis E. Clinical profiles predictive of outcome in pontine hemorrhage. Neurology. 1997;49(5):1342-1346. https://doi.org/10.1212/WNL.49.5.1342
17. Hallevi H, Dar NS, Barreto AD, et al. The IVH score: a novel tool for estimating intraventricular hemorrhage volume: clinical and research implications. Crit Care Med. 2009;37(3):969-974. DOI: 10.1097/CCM.0b013e318198683a