

# INTRACEREBRAL HEMORRHAGE: PRESENTATION, EARLY MORBIDITY AND MORTALITY

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## ABSTRACT

**Objectives:** To study the mode of presentation, risk factors, early morbidity and mortality of patients presenting with intracerebral hemorrhage (ICH) to a General Neurology Unit

**Material and Methods:** This study was conducted at Lady Reading Hospital from January 2001 up to December 2001 on patients with confirmed ICH. Traumatic bleed was excluded from the study. After initial clinical assessment Glasgow coma scoring was done in all patients and the morbidity was assessed by modified ranking scale (MRS). Patient's MRS was recorded at the time of discharge and at one month follows up.

**Results:** Out 74 patients (46 male and 25 female) 33 patients presented with headache and 30 patients had vomiting. Twenty patients had GCS  $\leq 9$  and 54 patients had GCS of  $\geq 10$ . Five patient developed obstructive hydrocephalus which needed surgical intervention. Thirty nine patients had severe disability at the time of discharge. After a follow up of one month, 32 patients had improved, 17 patients were in status queue while two patients had deteriorated. Six patients died in the hospital and 04 patients died at home while 13 patients were lost to follow-up. High mortality was seen in patients with GCS  $\leq 9$  or hematoma size more than 60 cm.<sup>3</sup>

**Conclusion:** Headache, vomiting and loss of consciousness are the common presentations of ICH. Short term outcome of ICH was satisfactory. GCS  $\leq 9$  and hematoma size more than 60 cm<sup>3</sup> were associated with higher mortality rate.

**Key words:** Intracerebral Hemorrhage, Stroke, Risk Factors, Morbidity, Mortality, Outcome, GCS, Haematoma.

## INTRODUCTION

Stroke and heart disease are the two leading causes of mortality in adults and the fourth and third leading causes of disease burden (as measured in disability-adjusted life years [DALYs]).<sup>1</sup> Mortality for stroke is estimated to be 5.5 millions annually.<sup>2</sup> Even in developed countries, among stroke survivors about 30% remain permanently disabled.<sup>3</sup> Hemorrhagic stroke carries a high risk of mortality than ischemic stroke.<sup>4</sup> Hemorrhagic stroke accounts for 10 to 13% of all strokes in western countries.<sup>5-7</sup> Although epidemiological data on stroke especially in low-income and middle-income countries is scarce,<sup>8</sup> the incidence of hemorrhagic stroke has been reported to be 21 to 33 % in Asian countries probably reflecting high rates of small vessel disease, hypertension and genetic factors.<sup>9,10</sup> The incidence of hemorrhagic stroke is still higher in the range

of 24 to 46 % reported in different studies from Pakistan.<sup>11-15</sup>

There is a great variability in the outcome of stroke due to lack of effective treatment for intracerebral hemorrhage (ICH). Numerous clinical variables have been shown to be predictors of survival and outcome of hemorrhagic stroke. The extent and site of brain damage, age of the patients, ventricular extension of the bleed, pre stroke health status, proper therapeutic intervention and the management in an established stroke unit alters the outcome of stroke.<sup>16-18</sup>

Hemorrhagic stroke which is commonly being attributed to uncontrolled hypertension is a common problem of our population. The purpose of our study was to see the presentation, risk factor, morbidity and early mortality in patients with hemorrhagic stroke presenting to a general Neurology Unit.

MODIFIED RANKIN SCALE<sup>20</sup>

Score	Description
0	No symptoms at all
1	No significant disability despite symptoms; able to carry out all usual duties and activities
2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention
6	Dead

Table 1

## MATERIAL AND METHODS

The study was conducted at Department of Neurology, Postgraduate Medical Institute, Lady Reading Hospital Peshawar from January 2001 up to December 2001. All the patients with age 14 years or above who presented with hemorrhagic stroke confirmed by CT/MRI scan were included in the study. Subarachnoid hemorrhage, subdural haematoma and traumatic bleed were excluded from the study. A detailed history was taken and thorough physical examination was performed and recorded on a proforma already designed. Hemorrhagic stroke was confirmed by CT/MRI scan in all patients and haematoma size was calculated by simply multiplying the three axes (x,y,z) in cm and dividing by two, approximating an ellipsoid<sup>19</sup>. *Glasgow coma score* (GCS) at presentation was calculated for all patients. Risk factors for hemorrhagic stroke were looked for. Blood sugar, bleeding profile and lipid profile was checked in all patients. Patient's disability was assessed by *Modified Rankin Scale*<sup>20</sup> (Table 1), at the time of discharge and at one month follow up.

## RESULTS

Out of total 174 patients with stroke during the given time period, 74 patients had intracerebral hemorrhage confirmed by CT or MRI Scan. Age range was from 14 to 90 years with most of the patients between 30 and 75 years age (Table 2). Out of 74 patients with ICH, 46 patients were male and 28 were female.

Thirty three (44.6%) patients presented with headache, 30 (40.5%) patients had vomiting

## AGE DISTRIBUTION

Age group (years)	Frequency n=74	Percentage
< 30	2	2.7
31-45	15	20.3
46-60	26	35.1
61-75	29	39.2
> 75	2	2.7

Table 2

while 19 (25.7%) patients had both headache and vomiting. Thirteen patients had GCS less than nine. At the time of presentation, 36 patients had GCS of 9-14 while 15 patients had a GCS of 15 (Table 3). Forty four (59.4%) patients presented within 48 hours, 19 (25.7%) patients presented with 3 to 7 days while 11 (14.9%) patients presented seven days after acute event.

Risk factors for ICH are given in Table 4. Forty three patients had hypertension, 6 patients were diabetic and 11 patients were smokers. Cholesterol was normal in 32 patients low in 27 patients and high in 15 patients. Alcohol/Drug abuse was not found in any patient. Majority of patients had thalamic, lobar or confluent supratentorial bleed (Table 5). Fourteen patients had extension of bleed into the ventricles while 5 patients had extension into subarachnoid space. Five patients developed obstructive hydrocephalus which needed surgical intervention.

At the time of discharge, 39 patients had severe disability (Table 6). After a follow up of one month, 32 patients had improved 17 patients were in status quo while two patients had deteriorated (Tables 7 & 8). Mortality was 13.5% (n=10/74). Six patients died in the hospital and four patients were reported to have died at home while 13 patients were lost for follow up. High mortality was seen in patients with hematoma size more than 60 cm<sup>3</sup> (Fig. 1) and patients with GCS ≤ 9 at presentation (Fig. 2).

## DISCUSSION

Stroke, the acute "brain attack" is a

GLASGOW  
COMA SCALE (GCS) AT PRESENTATION

GCS Score	Frequency n=74	Percentage
< 9	20	27
10-14	29	39.2
15	25	33.8

Table 3

### RISK FACTOR FOR INTRACEREBRAL HEMORRHAGE

Risk factor	Frequency n=74	Percentage
Hypertension	43	58.1
Tobacco	22	29.7
Cholesterol	20	27
Diabetes	6	8.1

Table 4

medical emergency and requires same attention and care as "heart attack". Population based studies of stroke recovery have shown that the time taken to achieve best functional performance for mild, moderate, and severe strokes averages 8, 13, and 17 weeks respectively.<sup>21</sup> Intracerebral hemorrhage although much less common than cerebral infarction, is more than twice as common as subarachnoid hemorrhage (SAH) and is much more likely to result in death or major disability than cerebral infarction or SAH.<sup>22</sup>

Advancing age and hypertension are the most important risk factors for ICH.<sup>23</sup> In our study more than 2/3<sup>rd</sup> of the patients (77%) were above the age of 45 years and around 42% were above 60 years of age. Hypertension was the most common (58.1%) risk factor of ICH in our study. Alcohol and drug abuse were not seen as major risk factors of ICH in our study. Reported incidence rates of ICH among Asian populations are higher than developed world probably due to uncontrolled hypertension.<sup>10,24</sup> Management of hypertension in ICH is very controversial. The theoretical rationale for lowering blood pressure is to decrease the risk of ongoing bleeding from ruptured small arteries and arterioles. Conversely, overaggressive treatment of blood pressure may decrease cerebral perfusion pressure and theoretically worsen brain injury, particularly in the setting of increased intracranial pressure.<sup>25</sup> In general, recommendations for treatment of

blood pressure in patients with ICH are more aggressive than those for patients with ischemic stroke.<sup>26</sup> Markedly elevated blood pressure on admission and persistent inadequate blood pressure control adversely affect the prognosis in hypertensive intracerebral hemorrhage.<sup>27</sup>

In our study, majority of patients had headache and vomiting at presentation. Headache and vomiting are more common in ICH than cerebral infarction.<sup>28</sup> Headache occurs in 40% of elevated patients with ICH, compared with 17% of patients with ischemic stroke.<sup>29</sup> In the Harvard Stroke Registry, 49% of persons with a supratentorial ICH vomited compared with 2% of patients with ischemia in the carotid territory.<sup>30</sup>

Various clinical and radiologic variables have been shown to be associated with survival and functional recovery following ICH. These include patient age and gender, lesion size and location, initial level of consciousness, presence of intraventricular haemorrhage, hydrocephalus, and mass effect.<sup>31</sup> In our study, at the time of presentation 27 % patients had GCS of  $\leq 9$  and 73% patients had a GCS of 10 or above. In patients with GCS 10 or above, no mortality was observed at 30 days. While in patients having GCS  $\leq 9$ , around 50% died within 30 days. All cases of ICH who died in our study had GCS  $\leq 9$ . Our findings support the findings of Broderick JP et al<sup>19</sup> who showed a 30 day mortality of 91% in cases with GCS of  $\leq 8$ . An early decrease in level of consciousness is seen in 50% of patients with ICH, an uncommon early finding in patients with ischemic stroke.<sup>30</sup> Low score of GCS has been shown to be inversely related to mortality in stroke patients.<sup>32</sup>

Another important outcome variable in our study is the size of haematoma. There was no mortality in patients with size of haematoma  $< 30$  cm.<sup>3</sup> In patients with haematoma size 30-60 ml,

### SITE OF INTRACEREBRAL HEMORRHAGE (ICH) ON CT SCAN

Site of ICH	Frequency n=74	Percentage
Confluent supratentorial	23	31.1
Thalamic	20	27
Lobar	13	17.6
Putamen	5	6.8
Internal capsule	3	4.1
Cerebellar	3	4.1
Brainstem	3	4.1
Caudate	2	2.7
External capsule	2	2.7

Table 5

### MODIFIED RANKIN SCALE (MRS) AT DISCHARGE FROM HOSPITAL

MRS	Frequency n=74	Percentage
0	0	0
1	0	0
2	4	5.4
3	6	8.1
4	19	25.7
5	39	52.7
6	6	8.1

Table 6

**MODIFIED RANKIN SCALE (MRS) AT ONE MONTH AFTER DISCHARGE FROM HOSPITAL**

MRS	Frequency n=61/74*	Percentage
0	0	0
1	3	4.9
2	5	8.2
3	15	24.6
4	17	27.9
5	11	18
6	10	16.4

\*13 cases lost to follow up

Table 7

mortality rate was 10.5%. In patients with hematoma size of > 60 cm<sup>3</sup>, mortality rate was 21.6%. Out of 10 cases that died, 80% had hematoma size of > 60 cm<sup>3</sup>. Broderick JP et al<sup>19</sup> showed that in patients with an ICH volume of 60 cm<sup>3</sup> or greater on initial CT scan there is a 30 days mortality of 91%. The volume of the hematoma is a critical determinant of mortality and functional outcome after intracerebral hemorrhage,<sup>18,19</sup> and early hematoma growth is an important cause of neurologic deterioration.<sup>33</sup> An increase in volume of more than 33 percent is detectable on repeated computed tomography (CT) in 38 percent of patients initially scanned within three hours after onset; in two thirds of cases with growth in volume, this increase is evident within one hour.<sup>34</sup> Recombinant factor VIIa has been used to arrest continued bleeding in patients with or without coagulopathy.<sup>35</sup> Treatment with Recombinant factor VIIa within four hours after

**MORBIDITY AND MORTALITY AT 30 DAYS BASED ON MODIFIED RANKIN SCALE**

Outcome	Frequency n=74	Percentage
Improved	32	43.2
Same condition	17	23
Deteriorated	02	2.7
Died	10	13.5
Died in hospital	6	8.1
Died at home	4	5.4
Lost to follow up	13	17.6

Table 8

the onset of intracerebral hemorrhage limits the growth of the hematoma, reduces mortality, and improves functional outcomes at 90 days, despite a small increase in the frequency of thromboembolic adverse events.<sup>36</sup>

In majority of our patients (31.1%), site of haematoma was confluent supratentorial followed by thalamic (27%) and lobar (17.6%). Basal ganglia and thalamus are the most common sites for hypertensive ICH. Lobar hemorrhage, on the other hand, is associated with hypertension in roughly 50% of cases.<sup>37</sup> Site of hematoma has got significant prognostic value. Poor outcome has been reported with infratentorial location of ICH and intraventricular extension of hemorrhage.<sup>18</sup> In pontine ICH, the outcome is often catastrophic and is highly dependent on the size of the hematoma within a very confined area.<sup>27</sup>

In our study, overall 43.2% patients with

**MORTALITY ACCORDING TO SIZE OF HAEMATOMA**

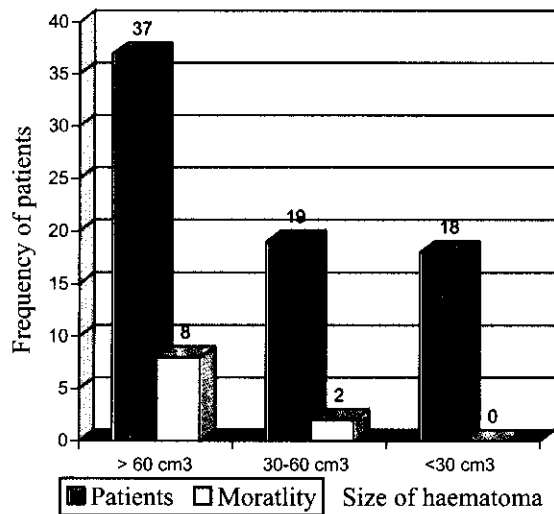


Figure 1

**MORTALITY ACCORDING TO GLASGOW COMA SCALE (GCS) AT PRESENTATION**

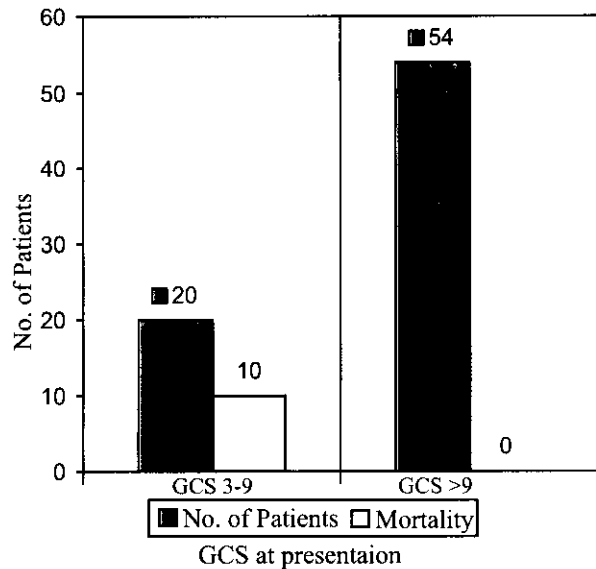


Figure 2

ICH improved, 2.7% deteriorated and 23% were in static condition. During the 30 days follow up, 17.6% patients were lost to follow up and mortality was 13.5%. Outcome of ICH has been shown to be favourable in about 30% of patients.<sup>38</sup> The mortality rate of I.C.H. is 52% at 30 days, 62% at 1 year and 70% at five year.<sup>39</sup> Overall ICH mortality has been reported to be about 50%.<sup>40</sup> Low mortality in our study may be due to the fact that we lost 13 patients for follow up which might have contributed to the death toll in our study group. Other contributory factors for low mortality may be that in majority of our patients the ICH was supratentorial and GCS at presentation was >9 in about 73% cases. The mortality rate of lobar ICH is lower than in haematomas in other location and the long term functional outcome may be better as well. It is difficult to predict favourable or adverse outcome in ICH on physician's assessment of clinical parameters. A scoring system (*Essen Intracerebral Haemorrhage Score*),<sup>38</sup> based on, age, *National Institutes of Health stroke scale (NIH-SS)* level of consciousness and NIH-SS total score has been developed and validated to predict mortality and complete recovery in patients with ICH. Further validation of this scoring system in our population is required.

## CONCLUSION

Headache, vomiting and loss of consciousness are the common presentations of ICH. Hypertension and advanced age are the most common risk factors of ICH and confluent supratentorial & thalamus are the common sites of ICH. Short term outcome of ICH was satisfactory and mortality was 13.5% with 17.6% patients lost to follow up. GCS  $\leq$  9 and hematoma size more than 60 cm<sup>3</sup> were associated with higher mortality rate. Large scale studies based on multivariate analysis are required to identify important clinical variables for the prediction of favourable outcome in ICH.

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