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A Study of Clinical and Radiological Profile of Non-Traumatic Intracerebral Haemorrhage in Adult Patients Along with Assessment of Risk Factors and Prognostic Factors in Emergency Medicine Department

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Abstract

Background: Among all the strokes the intracerebral haemorrhage comprises of about 8-13% and carries a significant morbidity and mortality. This study aimed to analyse risk factors, Neuroimaging, clinical profile, prognostic factors and outcome. ***Materials and Methodology:*** This study was carried out in the Emergency medicine Department, B. J. medical college and civil Hospital, Ahmedabad. After obtained informed consent, 200 Patients were evaluated by history, clinical examination, presenting signs and symptoms. The onset stroke severity was assessed by GCS and NIHS Scale. CT scan or MRI brain was reviewed for intracerebral haemorrhage location, volume and intraventricular extention. The final outcome at discharge was evaluated by GOS and MRS. ***Results:*** The most important factors predicting the final outcome were size, location of haematoma, NIHSS, GCS and ICH score. High ICH score, NIHSS and low GCS at the time of admission were significantly associated with poor clinical outcome($p<0.05$). 125(62.5%) patients had good outcome and 75(37.5%) had poor outcome with GOS Score <4. According to MRS Scale, 122(61%) patients had good outcome and 78(39%) had poor outcome with MRS Scale >4. ***Conclusion:*** All the patients were prognosticated on the basis of GCS, NIHSS, ICH, MRS, GOS Scores calculated on admission and discharge. The mean age was 56.8 years. Hypertension was the most common risk factor. Both the outcome score values were almost similar in this study, validating the scoring system for prognostication.

Keywords: ***spontaneous Intracerebral Haemorrhage(sICH), Glasgow Coma Scale (GCS), National institutes of health stroke scale (NIHSS), Modified rankins scale (MRS), Glasgow outcome score (GOS), Intracerebral haemorrhage (ICH) score.***

Introduction

World Health Organisation defined the word stroke is a clinical syndrome of presumed vascular origin, typified by rapidly developing signs of focal or global disturbance of cerebral functions lasting more than 24 hours or leading to death. It affects between 174 and 216 people per 100,000 population in the UK each year (Mant et al 2004), and accounts for 11% of all deaths in England and Wales [1].

Cerebral infarction accounts for 69% of strokes, primary haemorrhage for 13%, subarachnoid haemorrhage for 6%, and 12% are of uncertain type. The risk of recurrent stroke within five years of a first stroke is between 30% and 43% [1]. Among all the strokes the intra cerebral haemorrhage comprises of about 8-13%. The INTERSTROKE study, an international case-control study of 6,000 individuals in 22 countries worldwide, showed that hypertension, smoking, waist-to-hip ratio, diet, and high alcohol intake were major risk factors for ICH, and these modifiable risk factors accounted for 88.1% of the population-attributable risk [2].

Modifiable risk factors include hypertension, cigarette smoking, excessive alcohol consumption, decreased low-density lipoprotein cholesterol, low triglycerides and drugs including anticoagulant, antithrombotic agent, and sympathomimetics. Non-modifiable risk factors include old age, male sex, CAA, and Asian

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ethnicity (**Table 1**). Hypertension accounts for majority about 50 % of cases. Identifying definite risk factors, designing and implementing policies to contain them, making prompt and accurate diagnosis, stratifying patients according to outcome predictors, and thereby ensuring prompt referral of deserving critical patients to tertiary centers for intensive management, may be the need of the hour as we wait to embrace the newer advances into our management protocols.

Table 1: Risk factors of intracerebral haemorrhage

Non-Modifiable risk factors	Modifiable risk factors
Old age	Hypertension
Male sex	Alcohol consumption
Asian ethnicity	Decreased low density lipoprotein cholesterol, low triglycerides, diabetes
Cerebral amyloid angiopathy	Smoking
Intracranial tumors, arterio-venous malformation, vasculitis, aneurysm	Use of Anti platelet agent
Cerebral microbleeds	Anticoagulation therapy
Chronic kidney disease	Sympathomimetic drugs (Cocaine, heroin, amphetamine, Phenylpropanolamine and ephedrine)

The usual manifestation is acute onset neurological deficit. This is usually associated with headache of raised intra cranial tension type, nausea, vomiting, decline in the sensorium, seizure, difficulty in speech, limb weakness and increase in blood pressure.

CT is optimal for demonstrating haemorrhage extension into the ventricles, whereas MRI is superior for demonstrating underlying structural lesions. Either modality is considered acceptable as the initial study for diagnosing intracerebral haemorrhage. Widespread availability of CT and its short scan time make a non-contrast CT the initial study of choice in most EDs. The addition of contrast may allow identification of masses or aneurysms [3]. Cerebral angiography may be useful in selected patients in stable condition who do not require urgent surgery, particularly those in whom no obvious cause of bleeding is identified and those younger than 45 years of age without hypertension [4].

Poor prognostic factors of intracerebral haemorrhage [5]:

- Large volume of bleed - more than 30 mL
- Infra-tentorial origin of Intracerebral haemorrhage
- Age more than 80 years
- Blood pressure - mean arterial blood pressure more than 130 mmHg at the onset of symptoms,
- Higher NIHS score
- Low score of Glasgow coma scale
- Association of intra ventricular extension
- Advanced white matter lesions
- Hyperglycaemia

All these parameters are also the predictors of lethal outcome at 30 days. The expansion of haematoma is an important predictor independent of other factors in producing poorer outcomes. To identify the patients with a potential worse outcome would enable the treating team to anticipate and triage patients for stratifying care and prognosticate for the sake of clinical research and explaining the situation to the family.

Materials and Methodology

The Prospective Observational study was carried out in July 2023 to July 2024 in the wards of the Emergency medicine Department, B. J. medical college and civil Hospital, Ahmedabad. Patients with spontaneous intracerebral haemorrhage confirmed by CT or MRI were selected in this study. A total of 200 patients were included as per the selection criteria.

Inclusion Criteria

- Patients having intracerebral haemorrhage due to non-traumatic cause.
- Participants > 18 years of age.
- Participants able to provide written consent.

Exclusion Criteria

- Patients with traumatic intracerebral haemorrhage.
- Patients with coagulation disorders.
- Intra cerebral haemorrhage of more than 14 days duration on presentation to ED and who was managed surgically.
- Patients on thrombolytic, anti-coagulants.
- Intracerebral haemorrhage not proven by CT or MRI.

The onset stroke severity was assessed by Glasgow coma scale and neurological deficit on admission by NIH stroke Scale based on detailed neurological evaluation. CT scan plain was done and reviewed. The following aspects of intra cerebral bleed were noted. Its location whether supratentorial or infra tentorial and specific location as well like capsuloganglionic region, cerebellum, brain stem, lobe location and multiple lobe involvement. Any presence of intraventricular extension. All the patients were followed up until discharge from hospital or in hospital death. The final outcome at discharge was evaluated by Glasgow outcome score (GOS) as well as by the modified Rankin scale (MRS). The data thus obtained were analysed with the help of Microsoft Excel and the statistical analysis using Statistics Package for Social Sciences.

Results

Highest number of participants belonged to age group 51 to 70 years followed by 31 to 50 years respectively. Mean age was 56.8 years.

- Male: female ratio was 1:0.6.
- Hemiparesis / hemiplegia (81%) was the most common chief complain followed by speech defect (57%) & vomiting (56%) noted among the study participants.
- Hypertension (43%) was the most common risk factor followed by alcohol consumption (33%) noted among the study participants, smoking, and aneurysm were less prominent risk factors in the present study. Present study found that hypertension (43%) was the most common comorbidity followed by Diabetes (7%) noted among the study participants.
- Basal ganglion (42%) was the most common site of ICH followed by lobar (29%) & cerebellum (8%) noted among the study participants.
- 56.5% patients belonged to GCS class 13 to 15 followed by 5 to 12 (22.5%) which is significantly co-related with outcome ($p<0.05$).
- Present study found that highest number of participants (34.5%) belonged to GOS score- 5 (good recovery), followed by 28% score 4 (moderate disability) and 27%

score 1 (Dead). 125 Patients having GOS>-4 (62.5%) had good outcome and 75 patients having GOS<4 (37.5%) had poor outcome which is statastically significant with MRS Score (p<0.05).

- Highest number of participants (32%) belonged to ICH score 'one' followed by 'five' (17%) & 'two' (15%).
- Highest number of participants (27%) belonged to MRS score 'six' followed by 'two'(21.5%) & 'one' (17%). 61% patients (MRS<-4) had good outcome and 39% patients (MRS>4) had poor outcome.
- Highest number of participants (66%) belonged to NIHS score class 16 to 20 followed by 5 to 15 (19%).
- Almost 80% study participants belonged to supratentorial and 20% to infratentorial division. Highest number of participants belonged to ICH volume class by <30 cumm (42%) followed by 30-60 cumm (38%).
- Incidence of IVH noted in 32% cases which is statistically not significantly co-related with outcome (p>0.05).
- Almost 73% cases survived & discharged successfully. Mortality noted in 27% cases.

Discussion

The most important factors predicting the final outcome was the size of haematoma, location of haematoma, NIHS Score, GCS score and ICH score. These results indicated that high ICH score, high NIHSS, low GCS score at the time of admission were significantly associated with poor clinical outcome in this study (p<0.05). These results are similar to other studies done by Nag C et al [6], Hemphill JC et al.[7], Siddaganga et al.,[8] and Suthar NN *et al*.,[9] (**Table-4**).

There were 126 males and 74 females in this cohort. The Age of patients varied from 18 years to 90 years. The mean age was 56.8 years. In this study 54 patients died and 146 patients survived. Hypertension (43%) was the most common risk factor followed by alcohol consumption (33%). 125 (62.5%) patients had good outcome with GOS Score more than or equal to 4 and 75 patients (37.5%) had poor outcome with GOS Score less than 4 (**Table-3**). According to MRS Scale 122 patients (61%) had good outcome and 78 patients (39%) had poor outcome with MRS Scale more than 4 (**Table-2**). Both the outcome score values were almost similar in this study, validating the scoring system for prognostication.

Table 2: Association Between Risk and Prognostic Factors and MRS outcome Score

Parameter		MRS		P Value
		≤4(Good)	>4 (Poor)	
AGE	<50 YEARS >50 YEARS	52 70	40 38	0.29
HTN	YES NO	32 90	54 24	**0.001**
DM	YES NO	6 116	8 70	0.55
ALCOHOL	YES NO	17 105	52 26	**0.001**
SMOKING	YES NO	17 105	33 45	**0.001**
SBP (mmhg)	<160 >160	69 53	33 45	**0.001**
NIHS SCORE	<16 16-24 >24	48 74 0	6 62 10	**0.0001**
GCS SCORE	3-4 5-12 13-15	0 13 109	30 32 16	**0.001**
LOCATION OF BLEEDING	SUPRATENTORIAL INFRATENTORIAL	111 11	49 29	**0.001**
VOLUME OF ICH (cumm)	<30 30-60 >60	74 47 1	10 29 39	**0.001**
IVH ASSOCIATION	YES NO	34 88	30 48	0.08
ICH SCORE	<-3 >3	109 13	15 63	**0.001**
GOS SCORE	<4 >-4	1 121	74 4	**0.001**

Table 2 shows that HTN, Alcohol, Smoking, SBP>160 mmhg, NIHSS Score, GCS Score, Location of bleeding, Volume of ICH, ICH Score, GOS Score were statistically significantly associated with Outcome of patients, MRS score (p<0.05) and Age, Diabetes and Association of IVH were significantly not associated with outcome MRS score (p>0.05).

Table 3: Association Between Risk and Prognostic Factors and Glasgow outcome Score

Parameter		GOS		P Value
		>-4(Good)	<4 (Poor)	
AGE	<50 YEARS >50 YEARS	53 72	39 36	0.24

HTN	YES NO	31 94	55 20	**0.001**
DM	YES NO	6 119	8 67	0.19
ALCOHOL	YES NO	17 108	49 26	**0.001**
SMOKING	YES NO	16 109	34 41	**0.001**
SBP (mm hg)	<160 >160	72 53	30 45	**0.02**
NIHS SCORE	<16 16-24 >24	50 75 0	4 61 10	**0.0001**
GCS SCORE	3-4 5-12 13-15	0 14 111	30 31 14	**0.001**
LOCATION OF BLEEDING	SUPRATENTORIAL INFRATENTORIAL	115 10	45 30	**0.001**
VOLUME OF ICH (cubic mm)	<30 30-60 >60	78 46 1	6 30 39	**0.001**
IVH ASSOCIATION	YES NO	35 90	29 46	0.15
ICH SCORE	<-3 >3	101 24	23 52	**0.001**

Table 3 shows that HTN, Alcohol, Smoking, SBP>160 mmhg, NIHSS Score, GCS Score, Location of bleeding, Volume of ICH, ICH Score were statistically significantly associated with Outcome of patients, GOS score ($p<0.05$) and Age, Diabetes and Association of IVH were significantly not associated with outcome GOS score ($p>0.05$).

Table 4: Comparison of Parameters of Present Study with Other Similar Studies

Parameter	Present Study	Siddaganga Et Al [8]	Suthar NN Et Al [9]
Mean Age (In Year)	56.8	51.5	55.2
Male (%)	63	62	62
Most Common Symptom	Hemiparesis / Hemiplegia (81%)	Hemiparesis / Hemiplegia (78%)	Headache (41%)
Most Common Risk Factor	HTN (43%) Alcohol (33%)	Alcohol (32%)	HTN (88%)
Most Common Site of ICH	Basal Ganglia (42%)	Basal Ganglia (42%)	Basal Ganglia (49%)
Number Of Cases In GCS Score	13-15 (56.5%) 5-12 (22.5%)	>8 Scale (74%)	>8 Scale (64%)
Poor ICH Score (>3)	38% Cases	12% Cases	4% Cases
Poor MRS Score (>4)	39% Cases	-	42% Cases
IVH	32% Cases	-	27% Cases
Mortality Rate	27%	28%	41%

Disclosures

Ethical Approval

The study was approved by Institutional Ethics Committee, B. J. Medical College & Civil Hospital, Ahmedabad vide no. EC/Approval/48/2024.

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Conflict of Interest Statement

No conflict of interest

Author contributions statement

CP: Conceptualisation (lead), Writing (review and editing) (supporting)

JG: Methodology (lead), Writing (review and editing) (lead), Data analysis (supporting)

SK: Data acquisition, data analysis and software (lead), Writing original draft (lead), Writing (editing and review) (lead)

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