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Func score a better predictor of mortality in acute intracerebral hemorrhage within 30 days.

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Abstract

Background: Intracerebral hemorrhage (ICH) refers to primary, spontaneous, non-traumatic bleeding occurring in the brain parenchyma. ICH accounts for 10 to 20 % of all cerebrovascular events. Older age, hypertension, cerebral amyloid angiopathy and oral anticoagulant treatment are the most important risk factors for ICH. Primary brain damage in the acute phase of ICH is caused by mechanical mass effect of the hematoma, leading to increased intracranial pressure (ICP) and consequent reduced cerebral perfusion and possible herniation. The clinical presentation of ICH include decreased level of consciousness, vomiting, headache, seizures and limb weakness. Non-contrast computerized tomography (NCCT), CT Angiography (CTA) and Magnetic resonance imaging are the techniques with excellent sensitivity for identifying acute ICH. The intracerebral hemorrhage (ICH) score is a commonly used prognostic model for 30-day mortality in ICH, based on five independent predictors (ICH volume, location, Glasgow Coma Scale, age, and intraventricular extension). The FUNC SCORE 11, enables prediction of the likelihood of recovering functional independence for patients with primary ICH.

Objectives: To compare ICH and FUNC score as the predictors of outcome in Acute intracerebral hemorrhage within 30 days.

Methodology: 120 patients were included in the study. This study was conducted in ESIC MC & PGIMSR. ICH patient included and ICH score & FUNC score calculated for patients and comparison of two score done, suggesting 30 days mortality and morbidity.

Results: FUNC score and ICH both exhibited a sensitivity of 100%. FUNC score exhibited a specificity of 78% while that of the ICH score it was 45.8%.

Conclusion

1. ICH & FUNC score strongly correlates with Glasgow Coma Scale.

2. FUNC score was better at diagnostic performance as compared to the ICH score and better in explaining mortality

Keywords: ICH, FUNC, MRI, NCCT, ICP, CTA.

Introduction

Intracerebral hemorrhage (ICH) refers to primary, spontaneous, non-traumatic bleeding occurring in the brain parenchyma. ICH accounts for 10 to 20 % of all cerebrovascular events and is the deadliest type of stroke, with 30-day mortality up to 40% and severe disability in the majority of survivors[1].

Older age, hypertension (HTN), cerebral amyloid angiopathy (CAA) and oral anticoagulant treatment (OAT) are the most important risk factors for ICH[2,3,4]. Primary brain damage in the acute phase of ICH is caused by mechanical mass effect of the hematoma, leading to increased intracranial pressure (ICP) and consequent reduced cerebral perfusion and possible herniation[5]. Intraventricular extension of the hemorrhage (IVH) occurs in up to 40 % of ICH cases and is another important determinant of clinical deterioration and in dependent predictor of mortality [6].

The clinical presentation of ICH and ischemic stroke is similar, typically consisting of abrupt onset of a focal neurologic deficit. Decreased level of consciousness, vomiting, headache, seizures, limb weakness and very high blood pressure might suggest the intra cerebral hemorrhage. (ICH) score is a commonly used prognostic model for 30-day mortality in ICH, based on five independent predictors (ICH volume, location, Glasgow Coma Scale, age, and intraventricular extension).

The FUNC SCORE enables prediction of the likelihood of recovering functional independence for patients with primary ICH. Tools such as the FUNC score calculator can be useful in guiding decisions about aggressiveness of care, but their precision remains to be proved. FUNC score has a total of 11, higher the score more the good prognosis. Patients with FUNC score < 4 never achieve Functional independence.

Objectives

1. To compare ICH and FUNC score as the predictors of outcome in acute intracerebral hemorrhage.

Methodology

The hospital based prospective study was conducted on 120 patients admitted in General Medicine wards and Triage wards of ESIC MC and PGIMSR Model Hospital Bengaluru during the study period from March 2021 to August 2022. After obtaining approval and clearance from the institutional ethics committee, the patients fulfilling the inclusion criteria will be enrolled for the study after obtaining informed consent. Diagnosis of ICH is made on the clinical basis and on the basis of CT Brain and MRI Brain.

A thorough clinical evaluation will be carried out and recorded in the protocol. Vital signs: Temperature, Pulse rate, Respiratory rate, Blood pressure. Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE). Relevant laboratory investigations: CBC, Coagulation Profile, RBS, RFT, LFT, S. Electrolytes, NCCT Brain, MRI Brain, MR Angiography Brain. The patients will be followed up after 30 days and their outcome will be assessed by Modified Rankin score and ICH score and FUNC score will be calculated.

Results

Table 1: Summary of Basic details

Basic details	Mean ± SD || Median (IQR) || Min-Max || Frequency (%)
Age (Years)	58.00 ± 16.81 || 56.50 (45.00-67.75) || 27.00 - 96.00
Age	

Basic details	Mean ± SD || Median (IQR) || Min-Max || Frequency (%)
21-30 Years	2 (1.6%)
31-40 Years	21 (17.2%)
41-50 Years	22 (18.0%)
51-60 Years	27 (22.1%)
61-70 Years	25 (20.5%)
71-80 Years	10 (8.2%)
81-90 Years	9 (7.4%)
>90 Years	6 (4.9%)
Gender	
Male	81 (66.4%)
Female	41 (33.6%)
Time to Presentation	
0-6 Hours	34 (27.9%)
6-12 Hours	8 (6.6%)
12-24 Hours	47 (38.5%)
24-48 Hours	29 (23.8%)
>48 Hours	4 (3.3%)
Education	
Uneducated	27 (22.1%)
Primary	15 (12.3%)
Secondary	25 (20.5%)
Degree	55 (45.1%)

Figure 1: Summary of Symptoms

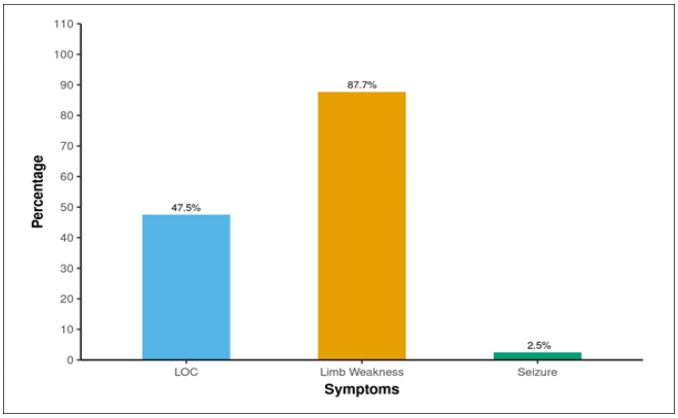

Table 2: Summary of Examination

Examination	Mean ± SD || Median (IQR) || Min-Max || Frequency (%)
Systolic BP (mmHg)	181.72 ± 23.90 || 180.00 (160.00-200.00) || 130.00 - 220.00
Diastolic BP (mmHg)	108.36 ± 12.69 || 100.00 (100.00-110.00) || 70.00 - 140.00
Symptoms Noticed First	
Rest	59 (48.4%)
Work	41 (33.6%)
Awakening	19 (15.6%)
Sleep	3 (2.5%)
GCS	8.44 ± 3.68 || 8.00 (6.00-12.00) || 3.00 - 15.00
NIHSS	
11-15	46 (37.7%)
16-22	65 (53.3%)
>22	11 (9.0%)

Distribution of the Participants in Terms of 'Precognitive Impairment'

Figure 2: Distribution of Precognitive Impairment.

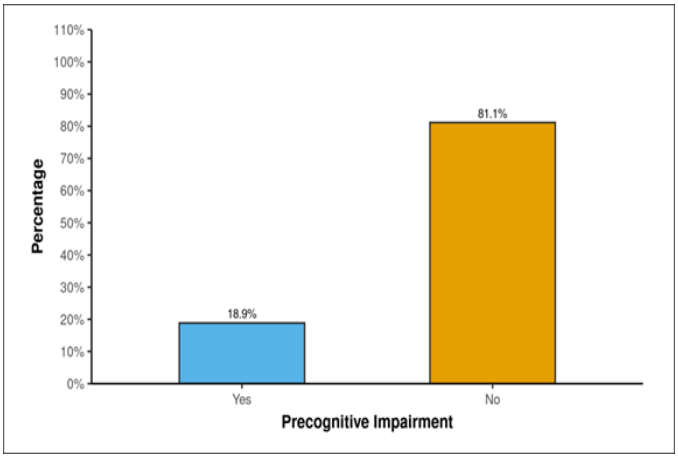

Table 3: Performance of Study Parameters for Predicting Mortality: Yes, vs No Description of Variables

Variable	Category(s)Suggesting Outcome Present	Category (s)Suggesting Outcome Absent	Total Positives	True Positives	True Negatives	False Positives	False Negatives
Mortality	Yes	No	4 (3.3%)	-	-	-	-
FUNC Score Cutoff: 5 by ROC)	<=5	>5	30 (24.6%)	4 (3%)	92 (75%)	26 (21%)	0 (0%)
ICH Score (Cutoff: 2 by ROC)	>=2	<2	68 (55.7%)	4 (3%)	54 (44%)	64 (52%)	0 (0%)

Table 4: Primary Diagnostic Parameters

Variable	Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
FUNC Score (Cutoff: 5 by ROC)	100.0% (40-100)	78.0% (69-85)	13.3% (4-31)	100.0% (96-100)	78.7% (70-86)
ICH Score (Cutoff: 2 by ROC)	100.0% (40-100)	45.8% (37-55)	5.9% (2-14)	100.0% (93-100)	47.5% (38-57)

Table 5: Other Diagnostic Parameters

Variable	LR+	LR-	Yuden Index	Odds Ratio	Kappa	P Value
FUNC Score (Cutoff: 5 by ROC)	4.54 (3.23-6.37)	0 (0-NaN)	78.0	Inf (NaN-Inf)	0.19	<0.001
ICH Score (Cutoff: 2 by ROC)	1.84 (1.56-2.18)	0 (0-NaN)	45.8	Inf (NaN-Inf)	0.05	0.070

Table 6: Ranking of Primary Diagnostic Parameters

Variable	Sensitivity	Specificity	PPV	NPV	Diag. Accuracy
FUNC Score (Cutoff: 5 by ROC)	1	1	1	1	1
ICH Score (Cutoff: 2 by ROC)	1	2	2	1	2

Discussion

The mean age of the participants in the present study was 58.00 ± 16.81 years. Majority (22.1%) participants belonged to the age group of 51-60 years followed by 20.5% belonging to 61-70 years.

A statistically significant male predominance was noted in the current study with 66.4% males and 33.6% females. 48.4% of the participants first noticed the symptoms when they were taking rest, 33.6% while working, 15.6% while waking up and 2.5% during sleep. 47.5% of the participants presented with LOC, 87.7% had limb Weakness while 2.5% had seizures.

The mean Systolic BP (mSBP) (mmHg) in the current study was 181.72 ± 23.90 while the mean Diastolic BP (mDBP) (mmHg) was 108.36 ± 12.69.

The mean GCS in the current study was 8.44 ± 3.68. It was observed that mortality, elderly age, increased time interval presentation of symptoms to admission was found to be significantly associated with low GCS score on admission.

The NIHSS score was initially validated for assessing the severity of ischemic stroke, and it has since been used to attempt to predict ICH outcomes[7]. The NIHSS score in the current study of 11-15 was noticed in 37.7% of the participants while 53.3% has a score between 16-22 and 9% >22. A statistically significant relationship was present between the NIHSS score and mortality.

Hypertension is a major risk factor for ICH. Other risk factors of diabetes mellitus, prior CVA and alcoholism is also present. High blood sugar levels at admission may worsen cerebral oedema and damage, which is thought to be a factor in poor outcomes.

The term "lobar ICH" refers to ICH that originates in the cortex or cortico-subcortical junction of the brain. The term "nonlobar ICH" refers to ICH with a deep, cerebellar, or brainstem origin. The basal ganglia, thalamus, internal capsule, and deep periventricular white matter were all involved in deep ICH.

Conclusion

1. ICH & FUNC score strongly correlates with Glasgow Coma Scale.

2. FUNC score was better at diagnostic performance as compared to the ICH score and better in explaining mortality.

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