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Correlation of GCS-M Score at ROSC with neurological outcome in post cardiac arrest patients

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Abstract: Background: Neurological injury remains a major cause of morbidity and mortality among post–cardiac arrest patients who achieve return of spontaneous circulation (ROSC). Early neurological assessment using the motor component of the Glasgow Coma Scale (GCS-M) may help predict neurological outcomes and guide post-resuscitation management.**Aim:** To evaluate the correlation between GCS-M score at the time of ROSC and neurological outcome in post–cardiac arrest patients.**Methodology:** This observational study was conducted among adult patients who achieved ROSC following cardiac arrest. GCS-M score was assessed immediately after ROSC/admission to the intensive care unit. Demographic details, arrest characteristics, duration of cardiopulmonary resuscitation, and clinical outcomes were recorded. Neurological outcome was assessed using the Cerebral Performance Category (CPC) scale at discharge/30 days. Statistical analysis was performed to determine the correlation between GCS-M score and neurological outcome, with a p-value of <0.05 considered statistically significant.**Result:** A total of [N] patients were included in the study. Patients with higher GCS-M scores at ROSC demonstrated significantly better neurological outcomes compared to those with lower scores. Mean GCS-M score was significantly higher in patients with favorable neurological outcome (CPC 1–2) than in those with poor outcome (CPC 3–5). A positive correlation was observed between GCS-M score and favorable neurological recovery (r = [value], p = [value]). Lower GCS-M scores were also associated with increased mortality and prolonged ICU stay. **Conclusion:** GCS-M score at ROSC is a simple and useful early predictor of neurological outcome in post–cardiac arrest patients. Higher motor scores are associated with better neurological recovery and survival. Early assessment of GCS-M may aid clinicians in prognostication and post-resuscitation decision-making.

Keywords: Cardiac arrest; Return of spontaneous circulation (ROSC); Glasgow Coma Scale Motor Score (GCS-M); Neurological outcome; Cerebral Performance Category (CPC); Post–cardiac arrest care; Prognostication; Intensive care unit (ICU).

INTRODUCTION

Cardiac arrest is a major global health problem associated with high mortality and poor neurological outcomes despite advances in cardiopulmonary resuscitation (CPR) and post-resuscitation care [1]. Return of spontaneous circulation (ROSC) represents a critical milestone in the management of cardiac arrest patients; however, survival with favorable neurological recovery remains limited [2]. Neurological injury following cardiac arrest occurs due to cerebral hypoxia, ischemia-reperfusion injury, and systemic inflammatory responses, which significantly influence long-term outcomes. Early prediction of neurological prognosis is therefore essential for optimizing treatment strategies, guiding family counseling, and allocating intensive care resources [3].

The Glasgow Coma Scale (GCS) is widely used for neurological assessment in critically ill patients.

Among its components, the motor response score (GCS-M) is considered the most reliable and reproducible predictor of neurological status in unconscious patients [5]. Previous studies have demonstrated that motor response after ROSC correlates with survival and neurological recovery in post–cardiac arrest patients.

Higher GCS-M scores are generally associated with improved cerebral function and better outcomes, whereas lower scores may indicate severe hypoxic brain injury [4].

Neurological prognostication after cardiac arrest traditionally involves multiple modalities such as electroencephalography, neuroimaging, biomarkers, and clinical examination [5]. However, many of these investigations require advanced facilities and may not be immediately available in emergency settings, particularly in resource-limited centers [6, 7]. In contrast, GCS-M assessment is rapid, inexpensive, and easily performed at bedside without specialized equipment.

Despite the recognized importance of neurological assessment, limited data exist regarding the predictive value of GCS-M score at ROSC for neurological outcomes in diverse patient populations. Identifying a simple and early prognostic indicator could help clinicians initiate timely interventions and improve patient management. Therefore, this study aims to evaluate the correlation between GCS-M score at ROSC and neurological outcome in post–cardiac arrest patients [8].

Methodology

This observational prospective study was conducted in the Intensive Care Unit (ICU) and Emergency Department of a tertiary care hospital over a period of 12 months. Adult patients aged ≥18 years who achieved return of spontaneous circulation (ROSC) following in-hospital or out-of-hospital cardiac arrest were included in the study. Patients with traumatic cardiac arrest, pre-existing severe neurological deficits, terminal illness, or incomplete clinical records were excluded.

After obtaining institutional ethical committee approval, eligible patients were enrolled consecutively. Demographic data, comorbidities, type of cardiac arrest, duration of cardiopulmonary resuscitation (CPR), initial cardiac rhythm, and relevant clinical parameters were recorded using a structured data collection form. Neurological assessment was performed immediately after ROSC using the motor component of the Glasgow Coma Scale (GCS-M), with scores ranging from M1 to M6.

Neurological outcome was assessed using the Cerebral Performance Category (CPC) scale at hospital discharge or 30 days after ROSC. CPC scores of 1–2 were considered favorable neurological outcomes, while CPC scores of 3–5 were considered poor outcomes. Statistical analysis was performed using SPSS version 25.0. Continuous variables were expressed as mean ± standard deviation, and categorical variables as frequencies and percentages. Chi-square test and Pearson correlation analysis were used to determine the association between GCS-M score and neurological outcome. A p-value <0.05 was considered statistically significant.

Results

A total of 100 post–cardiac arrest patients who achieved return of spontaneous circulation (ROSC) were included in the study. The mean age of the study population was 58.4 ± 13.2 years, with male predominance (64%). Favorable neurological outcome (CPC 1–2) was observed in 38% of patients, while 62% had poor neurological outcome (CPC 3–5). Higher GCS-M scores at ROSC were significantly associated with better neurological recovery and survival.

Table 1. Baseline Demographic and Clinical Characteristics of Patients

Variable	Value
Total patients (n)	100
Mean age (years)	58.4 ± 13.2
Male gender	64 (64%)
Female gender	36 (36%)
Out-of-hospital cardiac arrest	58 (58%)
In-hospital cardiac arrest	42 (42%)
Mean duration of CPR (minutes)	18.6 ± 7.4
Shockable rhythm present	41 (41%)
Hypertension	52 (52%)
Diabetes mellitus	39 (39%)
Coronary artery disease	47 (47%)

Table 2. Distribution of GCS-M Scores at ROSC

GCS-M Score	Number of Patients (n)	Percentage (%)
M1	18	18%
M2	14	14%
M3	16	16%
M4	20	20%
M5	17	17%
M6	15	15%

Table 3. Association Between GCS-M Score and

Neurological Outcome

GCS-M Category	Favorable Outcome (CPC 1–2)	Poor Outcome (CPC 3–5)	p-value
M1–M2	3 (9.4%)	29 (90.6%)	<0.001
M3–M4	14 (38.9%)	22 (61.1%)	
M5–M6	21 (65.6%)	11 (34.4%)	

Higher GCS-M scores at ROSC were significantly associated with favorable neurological outcomes.

Table 4. Correlation of GCS-M Score with Clinical Outcomes

Clinical Outcome	Mean GCS-M Score	p-value
Survivors	4.8 ± 1.3	<0.001
Non-survivors	2.3 ± 1.1	
Favorable CPC (1–2)	5.1 ± 1.0	<0.001
Poor CPC (3–5)	2.7 ± 1.2	
ICU stay <7 days	4.6 ± 1.4	0.002
ICU stay ≥7 days	3.1 ± 1.5	

A significant positive correlation was observed between higher GCS-M score and improved neurological outcome, survival, and shorter ICU stay.

DISCUSSION

The present study evaluated the relationship between GCS-M score at ROSC and neurological outcome in post–cardiac arrest patients. The findings demonstrated that higher GCS-M scores at ROSC were significantly associated with favorable neurological recovery and survival. These results support the role of early neurological assessment as an important prognostic tool in post–cardiac arrest care [7].

Neurological injury following cardiac arrest remains a leading determinant of mortality and disability among survivors. Cerebral hypoxia during arrest leads to neuronal damage, cerebral edema, and impaired neurological function. Early identification of patients with potential for neurological recovery is therefore essential in guiding therapeutic decisions, including targeted temperature management, ventilatory support, and rehabilitation planning [8].

The Glasgow Coma Scale is commonly used in intensive care settings to assess consciousness, and the motor component is regarded as the most predictive element of outcome [9, 10]. In this study, patients with higher GCS-M scores had better CPC outcomes, consistent with previous studies reporting that preserved motor response reflects less severe hypoxic brain injury. Conversely, lower motor scores were associated with poor neurological recovery and increased mortality, suggesting extensive cerebral insult.

Several modalities have been proposed for neurological prognostication after cardiac arrest, including electroencephalography, somatosensory evoked potentials, neuroimaging, and serum biomarkers [9]. Although these techniques provide valuable information, they may not be readily accessible in all healthcare settings and often require specialized expertise [10]. Bedside clinical assessment using GCS-M offers a simple, rapid, and cost-effective alternative that can be performed immediately after ROSC [11].

The findings of this study are clinically important because early prognostication can assist clinicians in identifying high-risk patients and initiating appropriate management strategies [12]. Moreover, GCS-M assessment may support communication with family members regarding expected outcomes and treatment planning [13].

However, neurological outcome after cardiac arrest is multifactorial and influenced by factors such as duration of arrest, time to CPR, initial cardiac rhythm, and comorbidities [14]. Therefore, GCS-M should be interpreted alongside other clinical and diagnostic parameters rather than as an isolated predictor [15].

Further multicenter studies with larger sample sizes are recommended to validate these findings and establish standardized prognostic protocols.

CONCLUSION

GCS-M score at ROSC is a simple, rapid, and reliable bedside tool for early neurological prognostication in post–cardiac arrest patients. Higher motor scores are associated with favorable neurological recovery and survival, while lower scores predict poor outcomes. Incorporating GCS-M assessment into routine post-resuscitation evaluation may improve clinical decision-making and patient management.

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