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Anatomical Patterns and Clinical Characteristics of Acute Ischaemic Stroke: A Hospital-Based Study from Myanmar

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Abstract

Background: *Acute ischaemic stroke is a major cause of morbidity and mortality worldwide. Knowledge of the anatomical distribution of cerebral infarctions is important for understanding clinical presentation and guiding management.*

Objective: To describe the anatomical distribution of acute ischaemic stroke lesions and associated demographic and clinical characteristics among patients admitted to a tertiary military hospital.

Methods: *A hospital-based, retrospective descriptive study was conducted using computed tomography (CT) head scan records of patients admitted with acute ischaemic stroke to No. (2) Military Hospital (500-Bedded), Yangon, between January and December 2015. Patients with haemorrhagic stroke were excluded. Demographic data, admission clinical parameters, and CT-confirmed lesion locations were analysed.*

Results: *A total of 44 patients were included. Multifocal cerebral infarctions were the most common finding (50%), followed by parietal lobe infarctions (25%) and internal capsule involvement (18.2%). Infarctions of the frontal lobe, temporal lobe, and brainstem were each observed in 2.3% of cases. The majority of patients were male (88.6%) and aged 41 to 60 years (68.2%). Most patients presented with normal body temperature, elevated blood pressure, and a Glasgow Coma Scale score of 15. No statistically significant association was found between anatomical distribution and demographic or clinical variables ($p > 0.05$).*

Conclusion: *Multifocal cerebral infarction was the most frequent anatomical pattern among acute ischaemic stroke patients in this hospital. Larger studies are needed to further explore associations between lesion distribution and clinical characteristics.*

Keywords: *acute ischaemic stroke; anatomical distribution; computed tomography*

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Introduction

Stroke remains one of the leading causes of mortality and long-term disability worldwide and continues to impose a substantial burden on individuals, healthcare systems, and societies. Despite significant advances in preventive strategies and acute stroke management, the global incidence and prevalence of stroke continue to rise, particularly in low- and middle-income countries. Acute ischaemic stroke (AIS), resulting from occlusion of cerebral arteries and subsequent interruption of blood flow to brain tissue, accounts for approximately 80–85% of all stroke cases globally and is the predominant contributor to stroke-related disability (Feigin et al., 2021).

Recent findings from the Global Burden of Disease Study demonstrate a sustained increase in the absolute number of stroke cases, deaths, and disability-adjusted life years attributable to stroke between 1990 and 2021. This increase is largely driven by population ageing, population growth, and the persistence of modifiable vascular risk factors (Feigin et al., 2024). Although age-standardised stroke mortality rates have declined in some high-income regions, the overall global burden of stroke remains substantial, with disproportionate impacts observed in resource-limited settings.

AIS is strongly associated with several modifiable risk factors, including hypertension, diabetes mellitus, dyslipidaemia, smoking, obesity, and atrial fibrillation. Among these, elevated blood pressure has been identified as the most important contributor to stroke risk worldwide (O'Donnell et al., 2021). Epidemiological data also highlight important sex-related differences in stroke incidence and outcomes. Men generally experience higher stroke incidence at younger ages, whereas women tend to have a higher lifetime risk of stroke due to longer life expectancy and differences in biological and social determinants of health (Benjamin et al., 2019). Understanding demographic and clinical characteristics of stroke populations is therefore critical for targeted prevention and effective clinical management.

Early and accurate diagnosis of AIS is essential for minimizing neuronal injury and improving clinical outcomes. Neuroimaging plays a central role in the acute evaluation of suspected stroke. Non-contrast computed tomography (CT) remains the most widely used first-line imaging modality, particularly in emergency and resource-limited settings, due to its rapid acquisition, widespread availability, and ability to reliably exclude intracranial haemorrhage (Powers et al., 2019). In addition to differentiating ischaemic from haemorrhagic stroke, CT provides valuable information regarding infarct location and extent, which has important implications for acute treatment decisions and prognostication. Advances in CT-based imaging, including CT angiography and CT perfusion, have further improved assessment of vascular occlusion and cerebral tissue viability (Frias et al., 2024).

The anatomical distribution of cerebral infarctions is a key determinant of clinical presentation, functional outcome, and rehabilitation needs. Infarctions involving the middle cerebral artery territory are most frequently encountered and are commonly associated with motor weakness, sensory deficits, and language impairment, whereas subcortical infarctions often reflect small vessel disease and present with lacunar syndromes (Feigin et al., 2021). Multifocal cerebral infarctions may suggest embolic mechanisms or diffuse vascular pathology and are often associated with increased stroke severity and complexity (Hart et al., 2017).

Despite extensive international research on stroke epidemiology and imaging patterns, region-specific data on the anatomical distribution of AIS remain limited in many low- and middle-income countries, including Myanmar. Furthermore, military hospital settings represent a unique clinical environment with distinct patient demographics, referral pathways, and risk-factor profiles, yet they are underrepresented in the stroke literature. This study therefore aimed to describe the anatomical distribution of CT-confirmed acute ischaemic stroke lesions and to examine their associations with demographic and clinical characteristics among patients admitted to No. (2) Military Hospital (500-Bedded), Yangon.

Methods

Study Design and Setting

This study employed a hospital-based, retrospective descriptive design. It was conducted in the neuro-medical unit of No. (2) Military Hospital (500-Bedded), a tertiary referral military hospital located in Yangon, Myanmar.

Study Period

Data were collected over a one-year period, from 1 January to 31 December 2015.

Study Population

The study population consisted of patients admitted to the neuro-medical unit with a diagnosis of acute ischaemic stroke during the study period. A total of 44 patients met the inclusion criteria and were included in the analysis.

Inclusion and Exclusion Criteria

Patients were included if they:

- Had a clinical diagnosis of acute stroke, and
- Had computed tomography (CT) of the brain confirming ischaemic stroke.

Patients were excluded if CT imaging demonstrated:

- Intracerebral haemorrhage, or
- Subarachnoid haemorrhage.

Data Collection

Data were retrospectively obtained from medical records and CT head scan reports. All CT images were reviewed and interpreted by a qualified radiologist.

The following variables were collected:

- Demographic characteristics: age and sex
- Admission clinical parameters such as Body temperature, Systolic and diastolic blood pressure, Heart rate and Glasgow Coma Scale (GCS) score
- Anatomical distribution of infarction as identified on CT imaging

Classification of Anatomical Distribution

Based on CT findings, infarct locations were categorized into the following anatomical regions such as Frontal lobe, Temporal lobe, Parietal lobe, Occipital lobe, Cerebellum, Brainstem, Internal capsule, Multifocal infarction (involvement of more than one anatomical region).

Outcome Measures

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The primary outcome measure was the frequency and percentage distribution of anatomical infarct locations. Secondary outcomes included the association between anatomical distribution and demographic variables (age and sex) as well as admission clinical characteristics.

Statistical Analysis
Data analysis was performed using the Statistical Package for the Social Sciences (SPSS), version 17. Descriptive statistics were used to summarize demographic data, clinical characteristics, and anatomical distributions. Categorical variables were expressed as frequencies and percentages.

Associations between anatomical distribution and demographic or clinical variables were assessed using appropriate statistical tests. A p value < 0.05 was considered statistically significant.

Ethical Considerations
Approval to conduct the study was obtained from the Ethical Board of Defence Services Medical Academy. As this was a retrospective review of existing medical records and imaging data, individual patient consent was not required. Patient confidentiality and anonymity were maintained throughout the study.

Results

Study Population
A total of 44 patients with CT-confirmed acute ischaemic stroke were included in the analysis.

Anatomical Distribution of Infarction
Multifocal cerebral infarction was the most frequently observed pattern, occurring in 22 patients (50.0%). Parietal lobe infarction was the most common single-region involvement (25.0%), followed by internal capsule infarction (18.2%). Infarctions involving the frontal lobe, temporal lobe, and brainstem were rare (2.3% each). No infarctions were identified in the occipital lobe or cerebellum.

Table 1. Anatomical Distribution of Acute Ischaemic Stroke Lesions (n = 44)

Anatomical Region	Number (n)	Percent (%)
Frontal lobe	1	2.3
Temporal lobe	1	2.3
Parietal lobe	11	25.0
Occipital lobe	0	0.0
Cerebellum	0	0.0
Brainstem	1	2.3
Internal capsule	8	18.2
Multifocal	22	50.0

Demographic Characteristics
The mean age of patients was 54.1 ± 11.2 years, ranging from 30 to 75 years. The majority of patients were aged 41–60 years (68.2%), while 11.4% were younger than 40 years. Male patients predominated, accounting for 88.6% of cases.

Table 2. Demographic Characteristics of Patients with Acute Ischaemic Stroke (n = 44)

Variable	Category	Number (n)	Percent (%)
Age (years)	< 40	5	11.4
	41–60	30	68.2
	61–80	9	20.5
Sex	Male	39	88.6
	Female	5	11.4

Admission Clinical Characteristics
At admission, five patients (11.4%) had elevated body temperature, while the remainder were normothermic. The mean heart rate was 94.5 ± 17.5 beats/min, with most patients (43.2%) having heart rates between 81 and 100 beats/min.

The mean systolic blood pressure was 161.7 ± 25.6 mmHg, and the mean diastolic blood pressure was 92.2 ± 11.3 mmHg. Elevated systolic (≥151 mmHg) and diastolic (≥80 mmHg) blood pressures were common at presentation.

Most patients had a Glasgow Coma Scale (GCS) score of 15 (59.1%), while 29.5% had scores between 9 and 14.

Table 3. Admission Clinical Characteristics of Patients with Acute Ischaemic Stroke (n = 44)

Parameter	Category	Number (n)	Percent (%)
Temperature	Elevated	5	11.4
	Normal	39	88.6
Heart rate (beats/min)	≤ 60	2	4.5
	61–80	7	15.9
	81–100	19	43.2
	101–120	16	36.4
Systolic BP (mmHg)	< 90	1	2.3
	91–120	1	2.3
	121–150	15	34.1
	151–180	18	40.9
	181–220	9	20.5
Diastolic BP (mmHg)	< 60	1	2.3
	61–80	3	6.8
	81–110	40	90.9
GCS	3–8	5	11.4
	9–14	13	29.5
	15	26	59.1

Association Between Anatomical Distribution and Clinical Variables
No statistically significant associations were found between anatomical distribution of infarction and demographic variables (age, sex) or admission clinical characteristics (body temperature, heart rate, systolic blood pressure, diastolic blood pressure, and GCS score) ($p > 0.05$ for all comparisons).

Discussion

Stroke remains one of the leading causes of mortality and long-term disability worldwide and continues to impose a substantial burden

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Limitations

Several limitations should be considered when interpreting these findings. The retrospective design limited the availability of detailed clinical and etiological data, such as stroke subtype classification and cardiac investigations. The relatively small sample size reduced the ability to detect statistically significant associations. Additionally, reliance on non-contrast CT imaging may have underestimated small cortical or posterior circulation infarctions compared with magnetic resonance imaging.

Implications and Future Directions

Despite these limitations, this study provides valuable baseline data on the anatomical distribution of acute ischaemic stroke in a military hospital setting in Myanmar, where published data are scarce. Future studies with larger sample sizes, prospective designs, and incorporation of advanced imaging modalities are warranted to better elucidate the relationships between infarct location, stroke mechanism, and clinical outcomes.

Conclusion

This study provides insight into the anatomical distribution of acute ischaemic stroke among patients admitted to a tertiary military hospital in Myanmar. Multifocal cerebral infarction was the most common pattern observed, followed by parietal lobe and internal capsule involvement. The predominance of multifocal infarctions suggests an important contribution of embolic and large-vessel mechanisms in this patient population.

Most patients were middle-aged men and presented with elevated blood pressure but preserved levels of consciousness. No significant associations were identified between anatomical distribution and demographic or admission clinical characteristics, likely reflecting the limited sample size and retrospective study design.

Despite these limitations, the findings contribute valuable baseline data in a setting where published evidence is scarce. Future prospective studies with larger sample sizes, comprehensive stroke subtype classification, and advanced neuroimaging are needed to further clarify the relationships between infarct location, stroke mechanisms, and clinical outcomes. Such research may support improved diagnostic strategies and optimized stroke care in similar healthcare environments.

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