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Use of Toast Classification as a Prognostic Tool in Acute Ischemic Stroke: A Prospective Study in Tertiary Care Center in South India

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I. INTRODUCTION

The classification of stroke in the past was based on risk factors, clinical features, findings on the brain imaging studies. [1] Physician usually determines subtypes of ischemic stroke based on clinical features and results of diagnostic studies, this non standardized approach may be acceptable for clinical practice but not for studies.

TOAST (Trial of Org 10172 in Acute Stroke Treatment) classification of subtype of acute ischemic stroke was introduced to produce uniformity. The TOAST classification (Table 1) system is a straight forward and follows a logical progression[1] .There are only a few studies done on evaluating the usefulness of TOAST classification in predicting the clinical outcome following a acute ischemic stroke, hence we would like to evaluate its use in predicting clinical outcome.

Table 1

TOAST CLASSIFICATION
1) Large artery atherosclerosis 2) Cardioembolism 3) Small artery occlusion 4) Stroke of other determined etiology 5) Stroke of undetermined etiology

II. METHOD OF STUDY

Patients presented to Emergency Medicine Department of Travancore Medicity Medical College Hospital during April 2020 – April 2021 with acute ischemic stroke were studied. Those patients presenting within 7 days of onset of stroke and age >18 years were included. Those patients with intracranial hemorrhages were excluded from the study .

Patients included in the study were evaluated and initial NIHSS Score was noted. All patients were subjected to MRI to diagnose acute ischemic stroke. MRA was done to look for any large vessel disease. Patients were subjected to Electrocardiogram, Echocardiography, Holter monitoring for evaluation of any potential cardioembolic source for stroke.

Patients were reassessed for neurological worsening after 48 hrs and by the end of 5th day. Neurological worsening was defined as an increase in NIHSS score by 2 points from the baseline, as used in various other studies[2,3,4].NIHSS Scoring was used in the study for neurological evaluation and assessing neurological worsening as it has good reliability[5,6]. Patients were then divided into two groups

1) Neurological worsening group or Progressive group
2) Stable group.

All patients were classified according to

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TOAST classification system. Statistical analysis was then done between the progressive and stable group.

III. STATISTICAL ANALYSIS

1. Percentage of stroke cases with neurological worsening was computed.
2. To compare categorical variables Chi square test was applied. The p-Value <0.05 was considered as statistically significant.

Statistical analysis was done using IBM SPSS Statistics 20

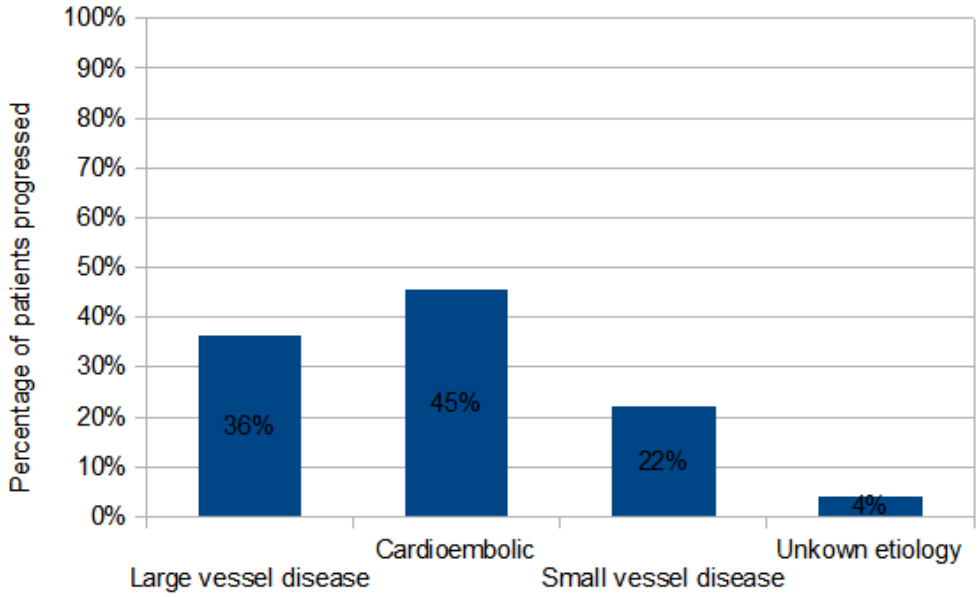
IV. RESULTS

Total study population was 66, composed of 52 males (78.8%) and 14 females (21.2%). Neurological worsening was seen in 16(24.2%) patients. The study population was categorized based on the TOAST classification system.

Table 2

	Large Vessel Disease	**Cardioembolic**	**Small Vessel Disease**	**Unknown etiology**	Total
Progressive Group	8 (36.3%)	5(45.4%)	2 (22.5%)	1 (4.1%)	16(24.2 %)
Stable Group	14 (63.7%)	6 (54.6%)	7 (77.5%)	23 (95.9%)	50 (75.8%)
Study Population	22	11	9	24	66
p-Value	0.21				

In our study population of 66 patients we found that 22 patients had large vessel disease, 11 patients had cardioembolic source, 9 patients had small vessel disease and etiology of 24 patients where unknown. 8 patients (36.3%) with large vessel disease, 5 (45.4%)patients with cardioembolic source , 2(22.5%) patients with small vessel disease and 1 patient with unknown etiology had neurological worsening(Table 2). The p-value was 0.021, which is statistically significant.



Graph 1 : TOAST classification among progressive group

V. DISCUSSION

In our prospective study, neurological deterioration was seen in 24.2% of total patients which is comparable to other studies [2,3,10] .

Our study also showed that patients with large vessel disease (36.3%) and cardioembolic source (45.4%) are at a great risk for early neurological deterioration when compared to stroke

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due to small vessel disease(22.5%) and unknown etiology(4.1%). The p value of classification stroke subtypes based on TOAST classification was 0.021, which shows the statistical significance.

Our study clearly shows that patients with large vessel disease and cardioembolic source are at a great risk of neurological worsening warranting the need for intravenous thrombolysis or endovascular intervention. Intravenous fibronolytic therapy for acute stroke is now widely accepted and approved by US FDA[7]. AHA Stroke Guidelines recommends to thrombolyse patients with only measurable neurological deficits, they also recommend to avoid thrombolysis in patients with minor stroke (NIHSS ≤4)[7].

But patients with gait disturbance, isolated aphasia or isolated hemianopia may have potentially disabling symptoms although their NIHSS score is 2. Eric et al has shown that in patients with mild or improving stroke in whom IV tPA was not administrated was associated with poor outcome[8]. . Steven et al has demonstrated that the term RISS, should be reserved for those who improve to mild deficit,specifically in whom it is perceived to be non disabling[9]. Steven et al also have shown that large artery occlusion on imaging, despite minor symptoms or clinical improvement, may identify patients at high risk of neurological deterioration[9].

Krasen et al in his study demonstrated that patients with persisting proximal vessel occlusion were 7 times more likely to have an unfavorable outcome at 3 months[11]. Krasen et al has demonstrated that thrombolysis in selected group of patients with mild or rapidly improving stroke is justified and have a favorable outcome[11]. This warrants the need for early neurovascular (CTA/MRA) imaging in the emergency department itself and consideration of IV thrombolysis in all patients with large vessel disease even when the NIHSS score ≤4 with disabling symptoms. Further studies are needed regarding the use of IV tPA in patients with minor stroke.

In our study we demonstrated that patients with large vessel disease has greater chance of early neurological worsening, stressing the importance of thrombolysis in patients with large vessel disease even when they present with minor stroke (NIHSS≤4) with disabling symptoms . The actual percentage of patients developing neurological worsening is even higher than demonstrated by us, since our center is tertiary care where most of our patients are referred at a later stage. Further studies are required to understand the benefits of thrombolysis in minor stroke.

VI. CONCLUSION

TOAST classification is a simple tool which classifies the patient based on the etiology. It is not only a useful classification system for studies alone, but also can be used for predicting the prognosis of patient presenting with acute ischemic stroke. We also found that patients with large vessel disease and cardioembolic source is associated with early neurological deterioration. We also suggest to consider IV tPA even in patients with minor stroke with disabling symptoms.

LIMITATION

- The sample size of our study is small, even though we could demonstrate with statistical significance that TOAST classification is a simple classification based on etiology and can predict the prognosis based on the TOAST sub category.
- Those patients who worsened prior to presenting to our center was not excluded in the study, this means that actual number of patients developing neurological worsening is even more.

ABBREVIATIONS

- TOAST : Trial of Org 10172 in Acute Stroke Treatment
- NIHSS : National Institute of Health Science Score
- CT : Computerised Tomography
- MRI : Magnetic Resonance Imaging
- CTA : Computerised Tomography Angiography
- MRA : Magnetic Resonance Angiography
- ASA : American Stroke Association
- tPA : Tissue Plasminogen Activator
- RISS : Rapidly Improving Stroke Symptoms

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