



TCD PROFILE OF PATIENTS WITH ACUTE MCA STROKE AND CORRELATION WITH OUTCOME

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ABSTRACT The aims of this study are to assess the transcranial doppler profile of patients presenting with acute middle cerebral artery territory stroke and look for any correlation between doppler findings and outcome at one month. We recruited 25 patients. According to doppler findings, patients were classified as having no lesion, middle cerebral artery lesion, internal carotid lesion, extracranial lesion and combined intracranial and extracranial lesions. Good outcome was defined as atleast a 4 point improvement in the NIH score at 1 month. We found that 8 patients had no evidence of arterial occlusion on doppler and 17 had atleast 1 occlusion. There was a trend towards better outcome in the group with no arterial occlusion. Patients with combined intracranial and extracranial occlusion had a poor outcome. This suggests that TCD could potentially be used as a tool to predict outcome after MCA territory stroke and to predict in- hospital worsening. However at this stage the numbers are not sufficient to reach statistical significance.

KEYWORDS : Transcranial Doppler (TCD), Acute stroke, Prognosis.

Introduction :

Assessment of the cerebral circulation can be done noninvasively by using transcranial Doppler (TCD) ultrasound. TCD can be used to determine the stroke pathogenic mechanism and to guide patient management. Bedside TCD examination has a satisfactory agreement with brain CT angiography(1). TCD can provide real-time flow findings that are complementary to information provided by CTA. TCD can potentially be used to prognosticate patients with acute stroke(2). Vasomotor reactivity testing with TCD can be used to assess collateral circulation.

AIMS AND OBJECTIVES:

1. To assess the TCD profile of acute MCA territory infarction
2. To find out any correlation between the TCD profile and prognosis

MATERIALS AND METHODS:

STUDY PROTOCOL:

Patients presenting to Government Rajaji Hospital with acute MCA territory ischemic stroke were recruited from the Medicine and Neurology wards. NIH stroke scale and Modified Rankin Scale will be applied at the time of admission. Conventional management including initiation of antiplatelets and statin after plain CT Brain were carried out according to existing procedure. Transcranial Doppler and MRI Brain with MR angiogram were done after the patient's general condition was stabilised. Antihypertensives, diabetic medications, physiotherapy and other nursing care were continued according to existing standard of care.

The patient was clinically reassessed and the NIH and Modified Rankin scales again applied at 2 and 4 weeks from the onset of stroke.

The following arteries were examined by transcranial Doppler

1. Right and Left middle cerebral artery
2. Right and Left anterior cerebral artery
3. Right and Left posterior cerebral artery
4. Right and Left siphon internal carotid artery
5. Right and Left extracranial internal carotid artery
6. Basilar artery

According to the results of TCD and carotid doppler, patients were classified as

1. No vascular lesion,
2. MCA lesion (intracranial)
3. Distal Internal carotid/ ICA siphon lesion (intracranial)
3. Extracranial carotid lesion
4. Both intracranial and extracranial lesions.

The outcome at 1 month was classified as 1. Good outcome, 2. Poor outcome, 3. Death. Good outcome was defined as a greater than 4 point improvement in the NIH stroke scale or achievement of 0-1 MRS by

the end of 1 month. Poor outcome was defined as not satisfying criteria for good outcome but does not result in death.

Inclusion criteria:

1. Age more than 18 years
2. Diagnosed to have acute middle cerebral artery territory ischemic stroke
3. Onset within 1 week
4. Stable cardiopulmonary status

Exclusion criteria:

1. Age less than 18 years
2. Haemorrhagic stroke
3. Patient on inotropes or ventilator support
4. Atrial fibrillation

Methods

TCD windows

Four windows were used - temporal, orbital, suboccipital, and submandibular. Middle cerebral artery (MCA), anterior cerebral artery (ACA), posterior cerebral artery (PCA), and posterior communicating artery (PCOM) were assessed through transtemporal window. The ophthalmic artery and the internal carotid artery (ICA) siphons were assessed through the transorbital window. The vertebral and basilar arteries (VA, BA) were insonated through the suboccipital window(3, 4).

Focal stenosis was diagnosed based on velocity criteria and the presence of turbulence, which is seen as a symmetrical artifact around the baseline, the sonological equivalent of a bruit. A trial evaluating the performance of TCD against conventional invasive angiography demonstrated that TCD can reliably exclude intracranial stenosis (NPV >80%)(5).

The NIH Stroke Scale

The NIH stroke scale is a graded neurological assessment of the consciousness, extra ocular movements, fields, motor and sensory deficits, incoordination, speech, cognition and attention. It was originally developed as a communication tool. The NIHSS is the most frequently used deficit scale for stroke. The advantages include simplicity and good inter-rater reliability(6). Similarly, the scale has good validity, and can predict discharge and 3 month outcomes.(7, 8)

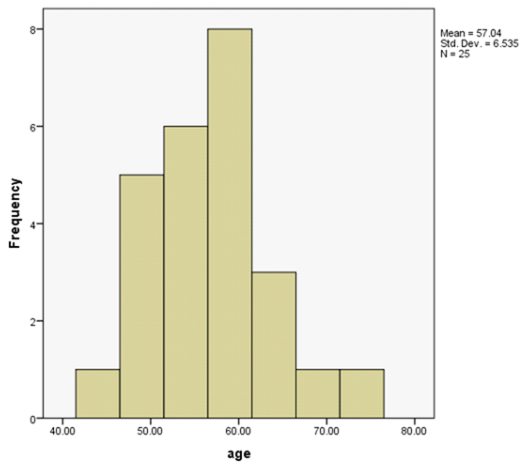
Results

Thirty two patients were screened for the study and 7 patients with suboptimal TCD study were excluded. Twenty five patients were analysed.

Age distribution:

Most of the patients were between ages 50 to 60 years. Three fourth were males.

Risk



Risk factors:

Out of twenty five patients, 10 (40%) had diabetes, 19 (76%) had hypertension and 18 (72%) were smokers.

NIH score:

The mean NIH score at admission was 11.72 (range 6 to 20). The mean NIH score at discharge was 8.4 (range 4 to 20)

Site of occlusion:

Out of twenty five patients, 8 (32%) patients had normal TCD study and were classified as 'No lesion'. Eight patients (32%) were diagnosed as extracranial internal carotid artery stenosis. Six (24%) were diagnosed as Internal Carotid stenosis (intracranial). Three (12%) were diagnosed as combined intracranial and extracranial disease.

Outcome:

Thus overall 8 patients had no arterial occlusion on TCD examination and 17 had atleast 1 occlusion. Out of 8 patients with no occlusion, 6 had a good outcome and only 2 had poor outcome. Out of 17 patients with atleast one occlusion, 7 had good outcome and 10 had a poor outcome.

LARGE ARTERY OCCLUSION ' OUTCOME Crosstabulation

Count		OUTCOME		Total
		GOOD OUT	POOR OUT	
LARGE ARTERY OCCLUSION	ABSENT	6	2	8
	PRESENT	7	10	17
Total		13	12	25

Transcranial Doppler and prognosis

Previous studies have shown correlation between extent of atherosclerotic disease and prognosis. A case series by Alexandrov et al demonstrated that among patients with similar severity of hemiplegia, those with normal TCD findings within 24 hours have dramatically better short term recovery(9). A 1996 Italian study showed that the transcranial doppler findings were predictive of 30 days outcome in acute non-haemorrhagic anterior circulation strokes(10). A Chinese study has shown that patients with more number of occluded intracranial vessels have a higher incidence of recurrent stroke and death at 6 months(11). Another study showed that documented intracranial occlusion and interhemispheric asymmetry pattern was associated with poor outcome(12). Our study has shown a trend towards favourable outcome among patients with a normal TCD study and poorer outcome in the group with atleast one occlusion. Hence TCD appears to be promising tool in the prognostication of patients with acute stroke.

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