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Initial Infarct location of Acute Stroke in Middle Cerebral Artery Circulation and Its Clinical Outcome using modified rank in scale

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Abstract

Introduction: *Functional outcome after ischemic stroke is influenced by a variety of factors such as injured brain regions, extend and volume of the infarct. This study aim to correlate the infarct location and functional outcome of the patient.*

Materials and Method: *This is a Prospective study done at MES Medical College, between December 2020 to June 2022, total 44 patients were admitted and taken MRI with a diagnosis of acute middle circulation ischemic stroke within 48 hours of symptom onset. Location of infarct is correlated with clinical outcome using a modified Rankin score taken at 45 days follow up.*

Results: *Most of the infarct were located in the right hemisphere. A considerably high impact on functional outcome was found at the insula and surrounding opercular cortex.*

Introduction

Prognosis of functional outcome after ischemic stroke is influenced by a variety of factors. Brain imaging in the early phase after stroke onset provides valuable information related to individual functional recovery. MRI identifies injured brain regions and allows for assessment of extent and location and influence and predict functional outcome.

The modified Rankin Scale is a measure of global disability that has been widely used to assess outcome after stroke. The scale consists of six grades from 0 (no symptoms) to 5 (severe disability); 6 indicates death.

In this study, we examined stroke lesion pattern from early MRI to identify lesion locations that influence clinical outcome measured by the modified Rankin Scale after 45 days. Different lesion locations would characterize individual contribution to functional outcome depending on hemisphere side.

Materials and Methods

The study was approved by the institutional review board and written informed consent was obtained from all participants. **Study type** is a Prospective type with **Sample size** of 44 done at MES Medical College, between December 2020 to June 2022.

Patient presenting with acute ischemic stroke within 48 hours in the middle cerebral artery circulation territory is selected and Fluid-

attenuated inversion recovery (FLAIR) and diffusion weighted imaging data were acquired on 1.5 tesla Siemens machine. Volume of the infarct and location of the infarct are assessed. volume is measured using med synapse pacs .initial NIHSS SCORE and 45 days follow up modified rank in score are also assessed to access the clinical condition of the patient.

In present study conducted at MES Medical College, between December 2020 to June 2022, total 44patients were admitted and taken MRI with a diagnosis of acute middle circulation ischemic stroke within 48 hours of symptom onset. It is found that Group 1 [mRS 0 – 2] (n=22) patients has 56% right sided and 44% left sided. And group 2 [mRS 3 – 6] (n=22) patients has 59% righted sided and 40% left sided.

Results

| Characteristics		Group 1 [mRS 0 – 2] (n=22)	Group 2 [mRS 3 – 6] (n=22)	P-value [Group 1 v Group 2]
Location of infarct[#]	Right	14 (56.0)	13 (59.1)	0.999 (NS)
	Left	8 (44.0)	9 (40.9)	
Volume of Infarct (ml)[§]	Median (Min-Max)	3.0 (1.0 – 33.0)	103.5 (30.0 – 399.0)	0.001***
Volume of Infarct (ml)[#]	0 – 30	23 (92.0)	0	0.001***
	30 – 70	2 (8.0)	6 (27.3)	
	70 – 100	0	3 (13.6)	
	>100	0	13 (59.1)	
NIHSS Score[§]	Median (Min - Max)	5.0 (1.0 – 13.0)	16.5 (8.0 – 28.0)	0.001***
NIHSS Score[#]	<=5	15 (60.0)	0	0.001***
	6 – 14	10 (40.0)	8 (36.4)	
	15 – 24	0	11 (50.0)	
	>2	0	3 (13.6)	

The distribution of side of infarct did not differ significantly across two groups of mRS score (P-value>0.05).

Region	Mean Z Score	Median Z Score	SD
Central opercular cortex	4.4	4.4	1.1
Corona radiata (posterior part)	4.3	3.9	1.3
Corona radiata (superior part)	4.2	4.0	1
Capsula externa	4.1	4.2	1.3
Capsula interna (posterior limb)	3.6	3.5	0.7
Insular cortex	3.3	3.2	1.4

A considerably high impact on functional outcome was also found at the insula and surrounding opercular cortex.
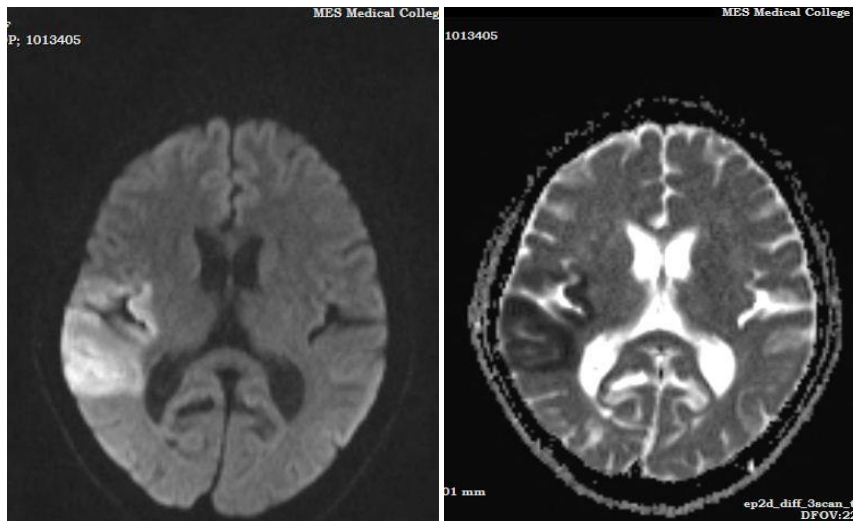
A 54 year-old woman presented with left hemiparesis (NIHSS-8) since 24 hours. DWI, ADC respectively shows acute non haemorrhagic infarct in right frontal and temporal region. The initial DWI lesion volume was 17 ml.45 days later, herm RS -2.
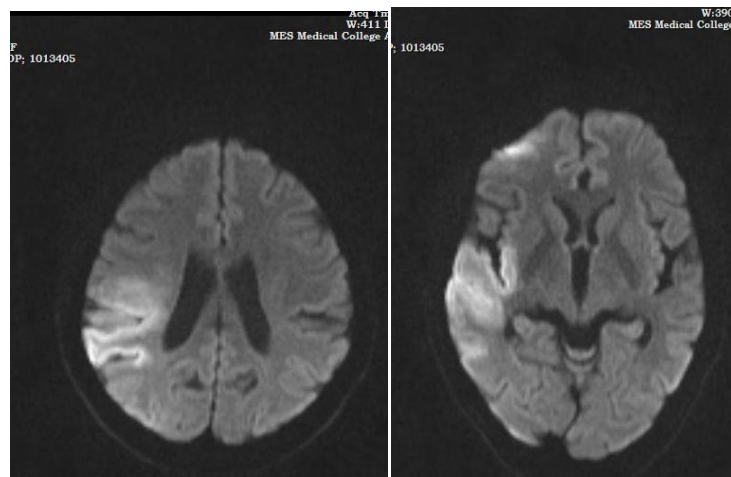
A 46-year-old female presented with drowsy, aphasia and left hemiplegia (NIHSS-17) since 12 hours. Pretreatment DWI shows large acute non haemorrhagic infarct in right frontal temporal and parietal region. The initial DWI lesion volume was 165 ml.45 days later, her mRS -5.

Discussion

Functional outcome after ischemic stroke is influenced by a variety of factors such as initial infarct volume and location of infarct. Here I examined the influence of lesion localization from early MRI on functional outcome as assessed by the modified Rankin score after 45 days. Lesions were distributed throughout the MCA territory. Most of the infarct were located in the right hemisphere.

A considerably high impact on functional outcome was found at the insula and surrounding opercular cortex. insular lesions are common in nonlacunar strokes and have found in up to half of all patients with MCA infarct. insular involvement often occurs in proximal occlusion of MCA causing large infarct volumes and damage to the lenticulostriate subcortical territory of the MCA, both of which result in severe motor deficits and low functional outcome.

Conclusion

Worst functional outcome was seen in patients with middle cerebral artery infarct involving insula and surrounding opercular area.

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