

Abnormal Findings of MR perfusion in the Putamen or Corona Radiata Predicts More Severe Neurological Impairment in Patients with the Acute Ischemic Stroke



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Introduction

Magnetic Resonance (MR) perfusion demonstrates abnormal findings in ischemic lesions in some patients suffering from the acute ischemic stroke involving small arteries.

Hypothesis

Abnormal findings of MR perfusion in the putamen or corona radiata poor neurological outcome in patients without occlusion of the middle cerebral arteries predict.

Methods

We included in our analysis acute ischemic stroke patients

- 1) who were admitted from April 2014 to May 2018 due to acute ischemic stroke in the putamen and corona radiata,
- 2) who underwent MR perfusion and MR
- 3) whose MR angiography showed neither stenosis nor occlusion of the M1 segment of the middle cerebral artery (MCA) or the internal carotid artery (ICA) in the affected side,
- 4) whose modified Rankin Scale (mRS) before admission was from 0 to 3.

Evaluated items

- patient's baseline characteristics
- abnormal findings of MR perfusion
- maximum lesion's diameter (MLD) in the axial diffusion weighted images (DWI) on admission
- NIHSS(on admission, at discharge)
- upper limb score of NIHSS (on admission, at discharge)

We investigated differences of these items between patients with and without abnormalities of MR perfusion.

Results: Differences of evaluated items between patients with and without abnormalities of MR perfusion.

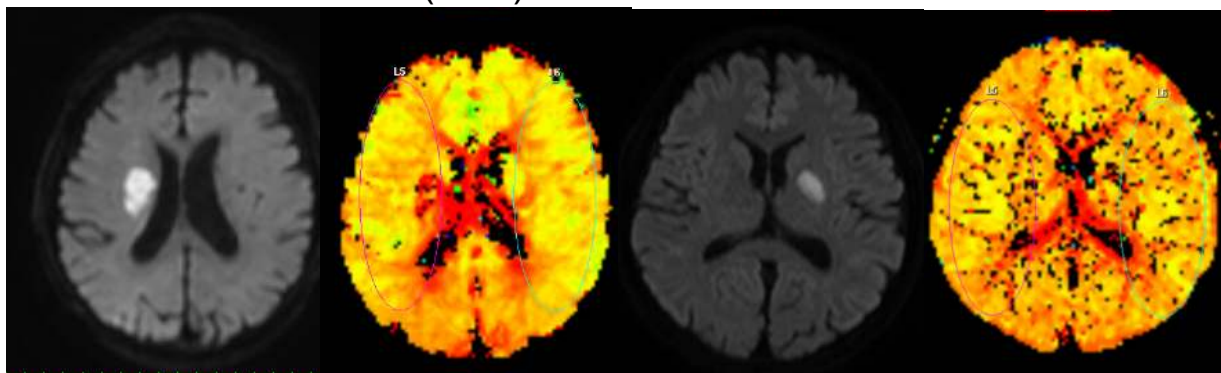
	With perfusion abnormalities	Without perfusion abnormalities	p
Patients matched to criteria (no)	30	41	
Age, median, (y.o.)	75	75	N.S.
Prevalence of hypertension (%)	93	95	N.S.
Prevalence of diabetes (%)	20	41	N.S.

	With perfusion abnormalities	Without perfusion abnormalities	p
MLD, median, (mm) (IQR)	20.5 (13-26.5)	14 (9-16.5)	<0.01
NIHSS on admission median, (IQR)	5 (1.75-7)	3 (2-4)	0.07
percentage of patients with upper limb score of NIHSS >=3 on admission (%)	10	0	0.07
NIHSS at discharge median, (IQR)	3.5 (1-8.75)	2 (1-4)	0.09
upper limb score of NIHSS at discharge median, (IQR)	0.5 (0-3)	0 (0-1)	0.07

Abnormalities of MR perfusion

Delayed perfusion or perfusion defect at the stroke lesion

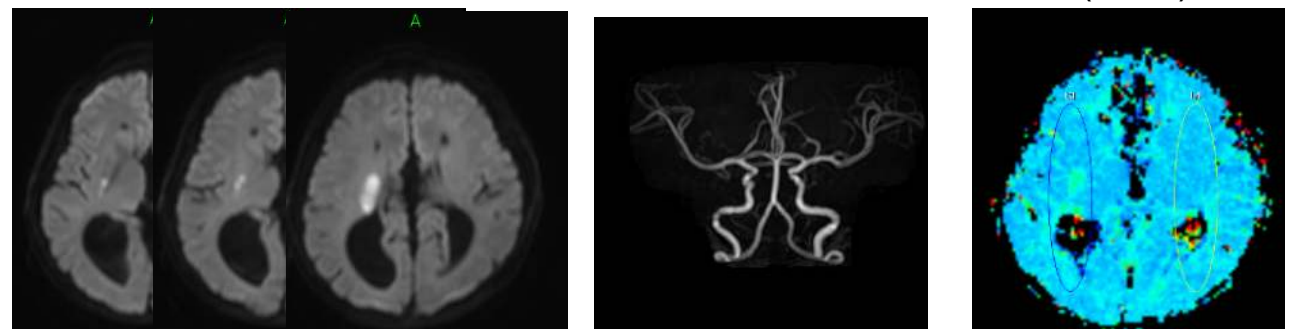
DWI time to peak (TTP) DWI TTP



Illustrative case: 53 y.o. female

mRS before stroke: 0, lesion diameter **24mm**
Right ICA~M1 occlusion(-), MR perfusion abnormalities (+)

DWI MRA mean transit time (MTT)

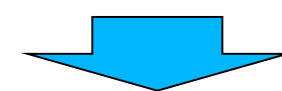


On admission → at discharge

NIHSS **7→8**
NIHSS score of upper limb : **2→3**
NIHSS score of lower limb: **2→2**

Conclusions

In spite of no occlusion of M1 or ICA, MR perfusion abnormalities in the putamen and corona radiata



Larger lesion diameter on admission
Higher NIHSS score on admission and at discharge

Results: patient's baseline characteristics

Numbers (No) of patients who met our inclusion criteria	71
Age, median (y.o.) (interquartile range(IQR))	75 (66-82)
MLD on admission, median, mm	35

	On admission	At discharge
NIHSS, median (IQR)	3(2-6)	2(1-7)
Upper limb score of NIHSS, median (IQR)	1(0-1)	0(0-2)
Lower limb score of NIHSS, median (IQR)	1(0-1)	0(0-2)
Upper limb score of NIHSS>=3 (no) (%)	3(4)	15(21)
Lower limb score of NIHSS>=3 (no) (%)	6(8)	15(21)