Clinical Implications of Basilar Artery Plaques in the Pontine Infarction: A High-Resolution MRI Study

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Background and Purpose: Recent studies have shown that high-resolution MRI can be useful for identifying atheromatous plaques in intracranial arteries, even in cases of normal findings on MRA. Using this technique, we investigated the impact of basilar artery plaques that were not detected by MRA on functional outcomes in acute pontine infarction.

Methods: A total of 40 patients (median age; 67.5 years, M:F=27:13) with acute pontine infarction and normal basilar findings on MRA prospectively underwent HR-MRI for detection of basilar artery plaques. A relevant plaque was defined as one on dorsal side of basilar artery, same side and same axial slices of ischemic lesion. We analyzed the relationship between relevant basilar artery plaques and functional outcomes at 3 months.

Results:

Presence of basilar artery plaques; Patients with basilar artery plaques were significantly older than those without (73.0 [46.0–89.0] versus 64.0 [49.0–74.0], P = 0.031). There were no significant intergroup differences in sex, vascular risk factors, prior antiplatelet agent or statin use, and laboratory findings. High-grade periventricular white matter hyperintensity (83.3% versus 37.5%, P = 0.003) and concomitant intracranial stenosis (70.8% versus 12.5%, P < 0.001) were more frequently found in patients with basilar artery plaques than in those without (Figure 1).

Relevance of basilar artery plaques; Compared with the NP group, higher NIHSS scores on admission (3.5 [1.0–11.0] versus 2.0 [0.0–4.0], P = 0.012] and the 7th day (5.5 [0.0–12.0] versus 2.0 [0.0–6.0], P = 0.008) were observed in the RP group. The incidences of neurological deterioration (42.9% versus 6.3%, P = 0.031) and unfavorable functional outcome at 3 months (71.4% versus 12.5%, P = 0.001) were also higher in the RP group than in the NP group. The intergroup difference in ischemic lesion volume measured on DWI did not reach statistical significance, while on HR-MRI the RP group had larger ischemic lesion volume than the NP group (1236.0 [376.0–2412.0] versus 540.0 [138.0–1386.0], P = 0.002)..

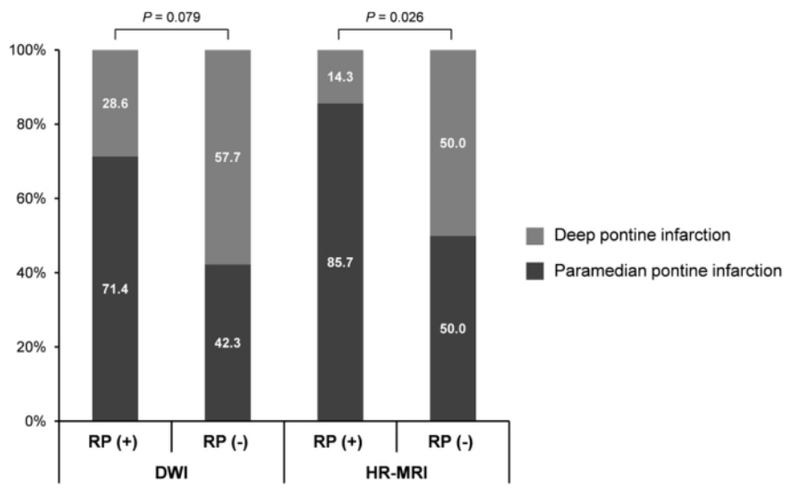
There were no statistically significant differences in functional outcome and ischemic lesion volume between the IP and NP groups

Ischemic lesion location; On DWI, there was no significant difference in the proportion of relevant basilar artery plaques between paramedian and deep pontine infarctions, whereas HR-MRI showed that paramedian pontine infarction occurred more frequently in patients with relevant basilar artery plaques than in those without (85.7% versus 50.0%, P = 0.026) (Figure 2).

In the arterial territory involved on DWI, the only significant difference between patients with and without relevant basilar artery plaque was anterolateral group involvement in those with relevant basilar artery plaque (71.4% versus 38.5%, P = 0.047). However, on HR-MRI, the patients with relevant basilar artery plaques had a higher rate of lateral group involvement than those without (64.3% versus 15.4%, P = 0.004).

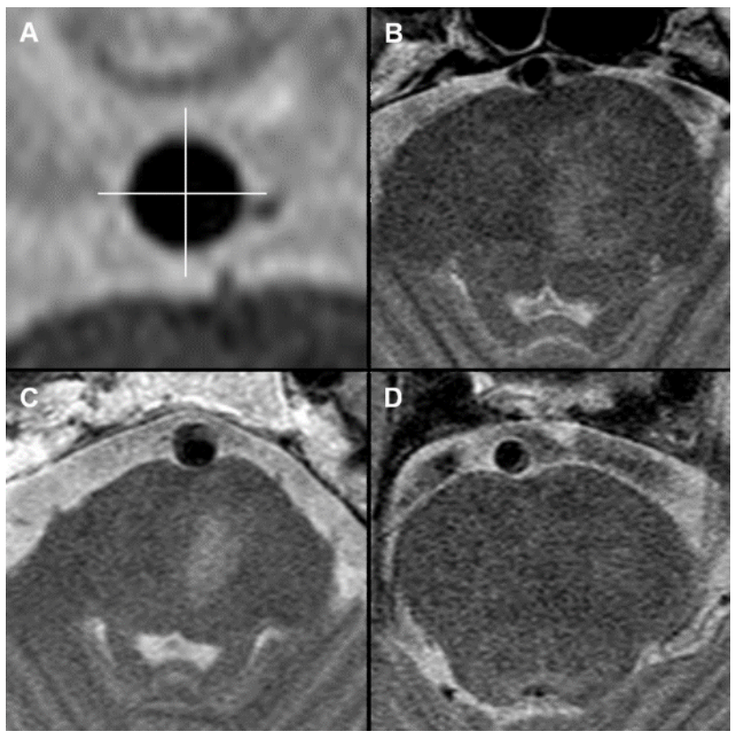
Conclusions: This study showed that the presence of a relevant basilar artery plaque was closely related with an increased risk of severe initial clinical symptoms, neurological deterioration, and subsequent unfavorable functional outcome in patients with acute pontine infarction even if normal basilar findings on MRA.

Fig 2. Ischemic lesion location according to the presence of RP



	Univariate analysis		Multivariate analysis	
	OR (95% CI)	P value	OR (95% CI)	P value
Male	0.361 (0.092-1.417)	0.144	0.661 (0.103-4.224)	0.661
Age, years	1.087 (1.008-1.173)	0.031*	1.061 (0.970-1.160)	0.195
NIHSS score on admission	1.757 (1.148-2.691)	0.009*	1.492 (0.917-2.427)	0.107
Relevant basilar artery plaque	10.500 (2.308-47.777)	0.002*	6.662 (1.117-39.735)	0.037*

Fig 1. The relevance of basilar artery plaque



	RP (N = 14)	IP (N = 10)	NP (N = 16)	P value	
				RP vs. NP	IP vs. NP
Male	8 (57.1)	8 (80.0)	11 (68.8)	0.510	0.668
Age, years	73.0 [50.0-82.0]	75.0 [46.0-89.0]	64.0 [49.0-74.0]	0.064	0.077
Time, hours					
From onset to arrival	16.4 [5.8-45.5]	15.5 [1.3-28.0]	19.2 [2.0-37.0]	0.835	0.329
From onset to DWI	19.9 [8.3-46.0]	13.7 [9.1-33.0]	21.1 [3.2-39.3]	0.934	0.225
From onset to HR-MRI	96.3 [73.3-118.3]	88.4 [74.8-115.5]	99.2 [75.9-111.5]	0.183	0.082
Clinical findings					
NIHSS score on admission	3.5 [1.0-11.0]	2.0 [0.0-4.0]	2.0 [0.0-7.0]	0.012*	0.935
NIHSS score on 7th day	5.5 [0.0-12.0]	2.0 [0.0-6.0]	1.0 [0.0-9.0]	0.008*	0.193
Neurological deterioration	6 (42.9)	2 (20.0)	1 (6.3)	0.031*	0.538
Unfavorable outcome at 3 months	10 (71.4)	3 (30.0)	2 (12.5)	0.001*	0.340
Ischemic lesion volume					
DWI, mm^3	416.2 [64.1-1303.0]	308.2 [68.9-797.8]	288.1 [122.0-895.4]	0.157	0.958
HR-MRI, mm^3	1236.0 [376.0-2412.0]	364.0 [176.0-1188.0]	540.0 [138.0-1386.0]	0.002*	0.693