



perfusion CT

Clinical Usefulness of Perfusion CT in Patients with Acute Ischemic Stroke

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Background: The goal of this study was to evaluate the utility of perfusion-weighted CT in predicting clinical outcome in patients with acute middle cerebral artery territory infarction. **Methods:** Twenty-nine patients with acute middle cerebral artery stroke had brain noncontrast CT and perfusion-weighted CT imaging within 6 hours of stroke onset. They were divided into following four groups according to the difference in hypoperfused lesion between cerebral blood volume (CBV) and cerebral blood flow (CBF), and the use of thrombolytic agent. group 1; the size of the hypoperfused lesion in CBV < that in CBF with the use of thrombolytic agent, group 2; the size of the hypoperfused lesion in CBV < that in CBF without the use of thrombolytic agent, group 3; the size of the hypoperfused lesion in CBV = that in CBF with the use of thrombolytic agent, group 4; the size of the hypoperfused lesion in CBV = that in CBF without the use of thrombolytic agent. Degree of clinical improvement was measured by the difference of NIHSS score between admission and discharge day. **Results:** Of 29 patients, 13 patients were included in group 1, eight in group 2, two in group 3, and six in group 4. Degree of clinical improvement was significantly different between the four groups ($p < 0.05$); Group 1 had a higher degree of clinical improvement. **Conclusion:** Perfusion CT may provide valuable information in predicting clinical outcome after thrombolysis and help us to select good candidates for thrombolytic therapy.
(Korean Journal of Stroke 2004;6(1): 63-67)

Key Words: Cerebral infarction, Perfusion CT, Cerebral blood volume, Cerebral blood flow

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가 . 가 1990
가
가
가 (penumbra)
National Institute of Neurological Disorders and Stroke (NINDS) [1] 3
recombinant tissue Plasminogen Activator

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, Prolysis in Acute Cerebral Thromboembolism (PROACT) [2] prourokinase

가 가 가 가

가 가 PET, SPECT, MRI [3-4]

cerebral blood volume (CBV), cerebral blood flow (CBF), mean transit time (MTT) perfusion computed tomography (perfusion CT)가

perfusion CT CBV CBF

1. 2002 9 2003 3

6 pefusion CT 1 noncontrast enhanced computed tomography (NCCT,)

NIHSS (National Institutes of Health Stroke Scale) 가 5 perfusion CT 29 NIHSS

2. (1) perfusion CT perfusion

CT . perfusion CT multislice helical CT scanner (Light-speed CT unit; GE Medical Systems, Milwaukee, Wisconsin, U.S.A)

. Perfusion CT 5 40 가 5 mm 10 mm

5 mm 4 50 ml Ultravist (Shering, Germany) (Medrad, USA) 4

ml/s CT (GE Medical Systems, Milwaukee, WI) CBV, CBF, MTT

(2) perfusion CT CBV CBF 2 1

.2 CBV 가 CBF CBF 가 CBV

4 1 , 2 , CBV

CBF 가 3 , 4

3. ± 1) CBV 가 CBF t-test

2) , perfusion CT , NIHSS Kruskal-Wallis test, Chi square test, t-test

3) ANOVA test p<0.05 SPSS 10.0 version for Window

1. 29 16 , 13 .

Table 1. Comparison of age, sex, time intervals and NIHSS score on admission between 4 groups.

Group	Age*	Gender [†]	Time interval from symptom onset (min)			NIHSS score on admission*
		(M/F)	Admission*	Perfusion CT*	Thrombolytic agent [#]	
Group 1	59.6 ± 15.2	8/5	153 ± 76	207 ± 91	236 ± 98	15.4 ± 4.1
Group 2	69.8 ± 17.3	3/5	162 ± 39	220 ± 45		13.7 ± 2.6
Group 3	72.0 ± 8.48	2/0	75 ± 21	125 ± 7	1665 ± 7	19.0 ± 7.0
Group 4	72.3 ± 9.6	3/3	212 ± 61	277 ± 65		11.0 ± 4.0
p value	0.425	0.567	0.108	0.091	0.337	0.085

Values are mean ± SD

NIHSS: National Institutes of Health Stroke Scale

* Kruskal-Wallis test

† Chi square test

t-test

Table 2. Comparison of clinical improvement between 4 groups

Group	Difference of NIHSS score between admission and discharge day
Group 1	5.6 ± 3.8
Group 2	0.1 ± 3.7
Group 3	1.0 ± 1.4
Group 4	1.1 ± 3.2
p value*	0.011

Values are mean ± SD

NIHSS: National Institutes of Health Stroke Scale

*One-way ANOVA test

가 CBF
 1.1 ± 2.7
 (p = 0.204, 0.161).
 . CBV
 가 CBF
 가
 CBV 가 CBF
 가
 . CBV 가 CBF
 가
 (Table 2).

66 ± 15 ,
 162 ± 68 , perfusion CT
 219 ± 79 . CBV 가
 CBF 21 , 8 가
 4
 1 13 , 2 8 , 3 2 , 4 6
 .
 15
 tissue plasminogen activator 9 ,
 urokinase 6 . 14 가
 가
 , perfusion CT ,
 (Table 1).
 NIHSS 10 ~ 20 mL/sec
 2. mL/sec 4 ~ 6
 CBV 가 CBF . CT
 NIHSS 3.4 ± 4.6, CBV

whole brain perfused blood volume technique

perfusion CT 가

[8-9]. CBV, CBF, MTT 가

perfusion CT가 [13]. 가 perfusion CT

first-pass CT CBV, CBF, MTT 가 가

CT . perfusion CBF, CBV, MTT

가 CBF 가

CT MRI rCBF 0.34, rCBV 0.43 [14], 24

CBF가 CBV 가 [15]. MTT 가 가

MRI rCBF 0.36, rCBV 0.61 MRI

가 CBV, CBF 가 CBV [4]

Perfusion CT [13,15]. CBF

가 가 [15].

sion CT

perfu- CBV , CBF perfusion CT CBV, CBF, MTT 48

MRI MTT 가 CBF CBV 가 [10], 6

2,3,5-triphenyltetrazolium chloride CBF (< 10 mL/100

CBV, CBF

g/min), MTT 가 (> 6 seconds), CBV (< 0.5 mL/100g) [11].

가 CBF

. CBV

CBV

perfusion CT 가 CBF 가 CBF

CBV 가 CBF 가

perfusion CT 34% CBF가 가

CBV가 2.5 mL/100 g mL/100 g 가 , 2.5

가 3 2 CBV CBF

3 perfusion CT MRI MRI

CBV CBF

perfusion CT 가 [12]. MRI 3 MRI

perfusion CT가

fusion CT MRI per-

REFERENCES

sion CT MRI perfu-

1. National Institute of Neurological Disorders and Stroke

