Outcomes of Endovascular Treatment in Acute Ischemic Stroke with Current Malignancy

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Introduction

The role of endovascular recanalization in the treatment of cancer patients with acute stroke remains elusive. Our study aimed to investigate the clinical and imaging outcomes of endovascular recanalization treatment in patients with acute large vessel occlusion stroke who had active cancer.

Methods

We reviewed prospectively collected data for ischemic stroke from our stroke registry from January 2011 to September 2016. Acute stroke patients with large artery occlusion in the anterior circulation who had active cancer were identified. Baseline clinical characteristics and postprocedural and long-term clinikoradiological outcomes were evaluated. A good outcome was defined as a 90-day modified Rankin Scale score of 0 to 2. Outcomes were also compared with those of non-malignancy patients who had received endovascular therapy during the same period.

Results

A total 378 ischemic stroke patients received endovascular treatment, of whom 27 had current malignancy. In patients with current malignancy, a low baseline NIHSS score and male sex were associated with functional independency at 90 days. When comparing with non-malignancy patients, no significant differences in the proportions of patients with symptomatic intracranial hemorrhage and good functional outcome were found in the malignancy patients.

Table 1. General characteristics of the participants

	Non-malignancy	Current malignancy	p-value
Number	351	27	
Age, year [SD]	70.12 (11.46)	69.04 (9.95)	0.63
Sex, male %	185 (52.7)	20 (74.1)	0.044
Hypertension, %	208 (59.3)	14 (51.9)	0.54
Diabetes, %	73 (20.8)	7 (25.9)	0.62
Dyslipidemia, %	30 (8.5)	2 (7.4)	1.00
Atrial fibrillation, %	117 (33.3)	6 (22.2)	0.29
Current Smoking, %	50 (14.2)	3 (11.1)	1.00
History of stroke, %	60 (17.1)	3 (11.1)	0.59
TOAST classification			0.013
LAA	86 (24.5)	6 (22.2)	
CE	172 (49.0)	7 (25.9)	
UD	93 (26.5)	14 (51.9)	
Occlusion site			0.46
ICA	124 (35.3)	9 (33.3)	
MCA M1	172 (49.0)	16 (59.3)	
MCA M2	55 (15.7)	2 (7.4)	
Initial NIHSS, median [IQR]	12 [9-15]	11 (7-14)	0.36
Admission SBP, mmHg [SD]	137.35 (22.84)	130.37 (21.75)	0.13
Admission DBP, mmHg [SD]	85.56 (14.88)	81.11 (12.51)	0.13
Admission LDL, mg/dL [SD]	110.55 (38.72)	112.96 (47.29)	0.76
D-dimer, µg/mL [SD]	2.56 (6.27)	3.07 (4.15)	0.72
PT, INR [SD]	1.71 (10.80)	1.03 (0.24)	0.76
ASPECTS	8 [6-9]	8 [6-8.25]	0.86
Onset to reperfusion, min (SD)	341.05 (170.35)	351.81 (170.59)	0.75
Intravenous rt-PA, %	203 (57.8)	17 (63.0)	0.69
Successful revascularization, %	290 (82.6)	23 (85.2)	0.80
Hemorrhagic transformation, %	115 (32.8)	12 (44.4)	0.29
Functional independency	139 (39.6)	10 (37.0)	0.84
Mortality at 90 days	29 (8.2)	9 (33.3)	0.000
siCH (SITS-MOST)	57 (16.2)	3 (11.1)	0.60
In-hospital mortality, %	8 (2.3)	1 (3.7)	0.49

Abbreviations: SD, standard deviation; TOAST, Trial of Org 10172 in Acute Stroke Treatment; LAA, large artery atherosclerosis; CE, cardioembolism; UD, undetermined; ICA, internal carotid artery; MCA, middle cerebral artery; NIHSS, National Institute of Health Stroke Scale; SBP, systolic blood pressure; DBP, diastolic blood pressure; LDL, low-density lipoprotein; PT, prothrombin time; INR, international normalized ratio; ASPECTS, Alberta Stroke Program Early CT Score; rt-PA, recombinant tissue-plasminogen activator; siCH, symptomatic intracerebral hemorrhage; SITS-MOST, Safe Implementation of Thrombolysis in Stroke-Monitoring Study

The success rate of recanalization and incidence rate of hemorrhagic transformation were comparable between the two groups (82.6% vs 85.2%, $p = 0.80$; 32.8% vs 44.4%, $p = 0.29$, respectively). Symptomatic ICH and in-hospital mortality were not significantly different between the two groups (16.2% vs 11.1%, $p = 0.60$; 2.3% vs 3.7%, $p = 0.49$, respectively). However, the CM group showed a higher 90-day mortality than the non-CM group (8.2% vs. 33.3%, $p < 0.001$). The distribution of 90-day mRS scores was not significantly different between the two groups ($p = 0.07$; Figure).

Table 2. Clinical characteristics of the subjects with current malignancy

Number	Sex	Age	Cancer type	Initial D-dimer	Mechanism	Initial NIHSS	HT	siCH	mTICI	Discharge NIHSS	mRS at 3 months
1	M	74	Hepatobiliary	0.19	CE	17	1	0	2b	6	4
2	M	76	Gastric	0.63	CE	11	1	0	2b	11	6
3	M	77	Colorectal	1.34	CE	13	1	0	3	3	2
4	M	67	Hepatobiliary	0.19	CE	14	1	0	3	2	1
5	M	80	Gastric	5.32	CE	14	0	0	2b	3	6
6	M	70	Genitourinary	0.36	CE	13	0	0	2b	1	1
7	F	78	Gastric	3.78	CE	11	1	1	3	8	5
8	M	69	Colorectal	0.27	LAA	2	0	0	3	8	2
9	M	53	Colorectal	0.45	LAA	6	1	0	2a	2	2
10	M	64	Lung	NA	LAA	18	1	0	0	21	6
11	M	72	Lung	4.84	LAA	6	0	0	2b	1	0
12	M	62	Hepatobiliary	1.83	LAA	14	0	0	3	1	0
13	M	66	Genitourinary	0.3	LAA	11	1	0	2b	9	5
14	F	55	Hematologic	NA	Cryptogenic	9	0	0	3	9	6
15	F	63	Hepatobiliary	0.16	Cryptogenic	14	1	1	2b	13	3
16	F	68	Hematologic	0.73	Cryptogenic	20	1	0	3	11	6
17	M	66	Genitourinary	13.72	Cryptogenic	17	1	0	2b	10	4
18	F	77	Lung	4.59	Cryptogenic	17	0	0	2b	17	6
19	F	51	Breast	9.86	Cryptogenic	7	0	0	3	3	6
20	M	73	Hematologic	1.59	Cryptogenic	13	1	0	1	17	5
21	M	87	Lung	1.87	Cryptogenic	4	1	0	1	8	6
22	M	80	Lung	0.91	Cryptogenic	6	0	0	2b	2	1
23	M	69	Lung	16.98	Cryptogenic	10	1	1	2b	18	6
24	M	56	Colorectal	0.72	Cryptogenic	0	1	0	3	5	2
25	M	52	Hepatobiliary	4.69	Cryptogenic	7	0	0	2b	1	3
26	F	87	Hepatobiliary	3.47	Cryptogenic	9	0	0	3	2	4
27	M	72	Hepatobiliary	0.94	Cryptogenic	7	0	0	2b	4	1

Abbreviations: M, male; F, female; CE, cardioembolism; LAA, large artery atherosclerosis; NIHSS, National Institutes of Health Stroke Scale Score; HT, hemorrhagic transformation; siCH, symptomatic intracranial haemorrhage; mTICI, modified thrombolysis in cerebral infarction; mRS, modified Rankin Scale.

Discussion

378 AIS patients with large artery occlusion in the anterior circulation received EVT. In the CM group, low baseline NIHSS score was associated with functional independency at 90 days. Functional outcome and radiological findings were not significantly different between the CM and non-CM groups.

The proportions of patients with favorable long-term outcome and hemorrhagic complication in CM group were comparable with those in the past landmark randomized controlled mechanical thrombectomy trials. In the past landmark large clinical trials, the patients with CM were excluded because the prognosis of cancer patients might be poor and hemorrhagic complications were predicted. Our study showed no significant increase in the incidence of hemorrhagic complications in the CM group after EVT. In the analysis of the CM group, the patients with functional independency at 90 days showed low baseline NIHSS score, more successful reperfusion status, shorter onset to reperfusion time, and low incidence rates of hemorrhagic transformation and siCH. Only low baseline NIHSS score was significantly associated with favorable outcome.

In conclusion, this study suggests that EVT might be feasible for AIS patients with CM. In addition, a low baseline NIHSS score was associated with favorable outcome in this setting. Prospectively designed large clinical studies are necessary.