**Supplementary methods**

**Operators standard**

In our study, the operators had to meet the following criteria: (1) all operators were required to have performed at least 50 endovascular procedures annually, including at least 20 mechanical thrombectomy with the stent–retrieval devices; and (2) all intervention teams were certified interventionists for intra–arterial intervention on anterior circulation large artery occlusion stroke and (3) all operators need to engage in intervention work for more than 2 years.

**Medicinal methods**

Patients received intravenous thrombolysis (alteplase) within 4.5 hours after the onset of stroke if they met criteria for intravenous thrombolysis. Without waiting for thrombolysis effect, patient was sent to interventional room as fast as possible to undertake endovascular treatment. However, in cases with a suspicion of a large thrombus burden, or refusal of intravenous thrombolysis from the patients or their informants, the neurointerventionist might decide direct endovascular recanalization.

In the endovascular treatment, reocclusion often occurred after thrombectomy in atherosclerotic disease, thus, rescue therapy including angioplasty, stenting, and glycoprotein IIb/IIIa inhibitor might be utilized to retrieve recanalization. After recanalization of the target artery, most of the patients were transferred to the neuro-intensive care unit for at least 24 hours. Additionally, the patients who underwent extracranial or intracranial stent implantation were prescribed antithrombotic medication to prevent acute stent thrombosis. For the patients without prior IV alteplase, loading doses of clopidogrel (300 mg) and aspirin (300 mg) were given, or a low dose of glycoprotein IIb/IIIa inhibitor was maintained for at least 24 hours, while for those with prior intravenous alteplase, clopidogrel (75 mg) and aspirin (100 mg) were given after 24h of intravenous thrombolysis, then all the patients were given clopidogrel (75 mg/d) and aspirin (100 mg/d) for 1–3 month.

**Supplementary-table 1** Baseline characteristics stratified by the presence of malignant brain edema in patients with successful recanalization

|  |  |  |  |
| --- | --- | --- | --- |
|  | Non-MBE group (n=80) | MBE group (n=24) | P values |
| Age, mean (SD), y | 68.3 (11.5) | 68.2 (10.5) | 0.883 |
| Male, n (%) | 43 (53.8) | 12 (50) | 0.747 |
| Medical history, n (%) |  |  |  |
| Atrial fibrillation | 48 (60) | 16 (66.7) | 0.556 |
| Hypertension | 55 (68.8) | 21 (87.5) | 0.069 |
| Diabetes mellitus | 10 (12.5) | 4 (16.7) | 0.600 |
| Clinical characteristics, median (IQR) |  |  |  |
| Baseline SBP, mmHg | 137 (125-166) | 148 (127-170) | 0.325 |
| Baseline DBP, mmHg | 80 (75-92) | 88 (80-100) | 0.089 |
| Baseline NIHSS score | 16 (13-20) | 18 (15-22) | 0.042 |
| Baseline APESCT score | 9 (8-10) | 8 (8-9) | 0.088 |
| Stroke cause, n (%) |  |  | 0.827 |
| LAA | 18 (22.5) | 4 (16.7) |  |
| Cardioembolic | 53 (66.2) | 17 (70.8) |  |
| Undetermined or others | 9 (11.2) | 3 (12.5) |  |
| Occlusion site, n (%) |  |  | 0.001 |
| ICA | 23 (28.8) | 16 (66.7) |  |
| MCA M1 | 57 (71.2) | 8 (33.3) |  |
| LDL\*, mean (SD), mmol/l | 2.16 (0.72) | 2.06 (0.72) | 0.498 |
| FBG&, mean (SD), mmol/l | 6.89 (3.38) | 8.50 (4.32) | 0.004 |
| BUN#, mean (SD), mmol/l | 5.73 (2.04) | 7.11 (3.29) | 0.067 |
| Cr#, mean (SD), umol/l | 92.25 (42.66) | 94.02 (41.21) | 0.752 |
| UA\*, mean (SD), umol/l | 382.58 (122.14) | 395.31 (143.30) | 0.623 |
| OTP, mean (SD), min | 258.3 (82) | 260.8 (65.7) | 0.520 |
| OTR, mean (SD), min | 316.7 (82.4) | 334.5 (47.6) | 0.197 |
| Intravenous thrombolysis, n (%) | 11 (13.8) | 3 (12.5) | 0.875 |
| Collateral score, n (%) |  |  | 0.001 |
| grade 0 | 11 (13.8) | 10 (41.7) |  |
| grade 1 | 32 (40) | 12 (50) |  |
| grade 2 | 37 (46.2) | 2 (8.3) |  |
| Angioplasty and stenting, n (%) | 23 (28.8) | 11 (45.8) | 0.118 |
| Passes of retriever >3, n (%) | 8 (10) | 4 (16.7) | 0.370 |
| Independence at 90 days, n (%) | 50 (62.5) | 5 (20.8) | <0.001 |
| Mortality at 90 days, n (%) | 8 (10) | 10 (41.7) | <0.001 |

APESCT, Alberta Stroke Program Early CT; BUN, blood urea nitrogen; Cr, creatinine; DBP, diastolic blood pressure; FBG, fasting blood glucose; ICA, internal carotid artery; LAA, large-artery atherosclerosis; LDL, low-density lipoprotein; mTICI, modified Thrombolysis in Cerebral Infarction; MCA, middle cerebral artery; MBE, malignant brain edema; NIHSS, National Institutes of Health Stroke Scale; OTP, symptoms onset to groin puncture time; OTR, symptoms onset to recanalization time; SBP, systolic blood pressure, UA, uric acid.

\* Missing data in 4 patients.

#Missing data in 2 patients.

&Missing data in 3 patients.

**Supplementary-t**able 2 Univariate analysis of 90-day functional outcomes in patients

|  |  |  |  |
| --- | --- | --- | --- |
|  | Good outcome (n=61) | Poor outcome (n=69) | P values |
| Age, mean (SD), y | 64.7 (11.4) | 72.1 (9.1) | <0.001 |
| Male, n (%) | 33 (54.1) | 32 (46.4) | 0.380 |
| Medical history, n (%) |  |  |  |
| Atrial fibrillation | 32 (52.5) | 50 (72.5) | 0.018 |
| Hypertension | 40 (65.6) | 52 (75.4) | 0.221 |
| Diabetes mellitus | 7 (13.1) | 10 (14.5) | 0.611 |
| Clinical characteristics, median (IQR) |  |  |  |
| Baseline SBP, mmHg | 134 (120-162) | 143 (128-166) | 0.106 |
| Baseline DBP, mmHg | 80 (75-94) | 82 (76-95) | 0.817 |
| Baseline NIHSS score | 15 (12-19) | 17 (15-20) | 0.005 |
| Baseline ASPECT score | 9 (8-10) | 8 (8-9) | <0.001 |
| Stroke cause, n (%) |  |  | <0.001 |
| LAA | 13 (21.3) | 14 (20.3) |  |
| Cardioembolic | 35 (57.4) | 55 (79.7) |  |
| Undetermined or others | 13 (21.3) | 0 |  |
| Occlusion site, n (%) |  |  | 0.014 |
| ICA T-terminal | 18 (29.5) | 35 (50.7) |  |
| MCA M1 | 43 (70.5) | 34 (49.3) |  |
| LDL\*, mean (SD), mmol/l | 2.20 (0.70) | 2.27 (1.01) | 0.762 |
| OTP, mean (SD), min | 269.5 (75.9) | 249.1 (73.4) | 0.190 |
| Intravenous thrombolysis, n (%) | 7 (13.1) | 10 (14.5) | 0.611 |
| Collateral score, n (%) |  |  | <0.001 |
| Grade 0 | 4 (6.6) | 26 (37.7) |  |
| Grade 1 | 26 (42.6) | 26 (37.7) |  |
| Grade 2 | 31 (50.8) | 17 (24.6) |  |
| Angioplasty and stenting, n (%) | 19 (31.1) | 25 (36.2) | 0.541 |
| Passes of retriever >3, n (%) | 5 (8.2) | 16 (23.2) | 0.020 |
| mTICI, 2b/3, n (%) | 55 (90.2) | 49 (71.0) | 0.006 |
| Malignant brain edema, n (%) | 7 (11.5) | 28 (40.6) | <0.001 |
| Decompressive craniectomy, n (%) | 2 (3.3) | 3 (4.3) | 1 |

APESCT, Alberta Stroke Program Early CT; DBP, diastolic blood pressure; ICA, internal carotid artery; LAA, large-artery atherosclerosis; LDL, low-density lipoprotein; mTICI, modified Thrombolysis in Cerebral Infarction; MCA, middle cerebral artery; NIHSS, National Institutes of Health Stroke Scale; OTP, symptoms onset to groin puncture time; SBP, systolic blood pressure.

\* Missing data in 4 patients.

**Supplementary-table 3** Multivariateanalysis for functional outcome for malignant brain edema

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Wald | OR | 95% CI | *P* values |
| Malignant brain edema | 7.142 | 7.831 | 1.731-35.427 | 0.008\* |
| Age | 3.632 | 1.059 | 0.998-1.124 | 0.057 |
| Stroke cause | 0.251 |  |  | 0.882 |
| LAA vs Cardioembolic | 0.251 | 1.512 | 0.300-7.629 | 0.616 |
| Undetermined or others vs Cardioembolic | 0 |  |  | 0.998 |
| Baseline ASPECT score | 1.922 | 0.690 | 0.409-1.166 | 0.166 |
| mTICI, 2b/3 | 3.542 | 0.289 | 0.079-1.053 | 0.060 |
| Occluded site (ICA occlusion) | 0.465 | 1.479 | 0.480-4.563 | 0.495 |
| Atrial fibrillation | 0.933 | 0.470 | 0.102-2.174 | 0.334 |
| Passes of retriever >3 | 0.186 | 1.367 | 0.330-5.661 | 0.667 |
| Decompressive craniectomy | 0 |  |  | 0.999 |
| Collateral scores | 6.314 |  |  | 0.043\* |
| Grade 1 vs Grade 0 | 4.118 | 0.164 | 0.029-0.940 | 0.042\* |
| Grade 2 vs Grade 0 | 6.303 | 0.100 | 0.017-0.604 | 0.012\* |
| Baseline NIHSS score | 5.903 | 1.182 | 1.033-1.352 | 0.015\* |

APESCT, Alberta Stroke Program Early CT; ICA, internal carotid artery; LAA, large-artery atherosclerosis; mTICI, modified Thrombolysis in Cerebral Infarction; NIHSS, National Institutes of Health Stroke Scale.

\*P < 0.05

**Supplementary-table 4** Univariate analysis of 90-day mortality in patients

|  |  |  |  |
| --- | --- | --- | --- |
|  | Death  (n=27) | Undeath (n=103) | P values |
| Age, mean (SD), y | 73.5 (7.6) | 67.3 (11.2) | 0.004 |
| Male, n (%) | 15 (55.6) | 50 (48.5) | 0.517 |
| Medical history, n (%) |  |  |  |
| Atrial fibrillation | 22 (81.5) | 60 (58.3) | 0.026 |
| Hypertension | 24 (88.9) | 68 (66) | 0.020 |
| Diabetes mellitus | 3 (11.1) | 14 (13.6) | 0.734 |
| Clinical characteristics, median (IQR) |  |  |  |
| Baseline SBP, mmHg | 144 (128-168) | 138 (121-161) | 0.157 |
| Baseline DBP, mmHg | 88 (75-95) | 80 (76-95) | 0.453 |
| Baseline NIHSS score | 16 (15-20) | 17 (14-20) | 0.189 |
| Baseline ASPECT score | 8 (8-8) | 8 (8-10) | 0.030 |
| Stroke cause, n (%) |  |  | 0.033 |
| LAA | 3 (11.1) | 24 (23.3) |  |
| Cardioembolic | 24 (88.9) | 66 (64.1) |  |
| Undetermined or others | 0 | 13 (12.6) |  |
| Occlusion site, n (%) |  |  | 0.079 |
| ICA T-terminal | 15 (55.6) | 38 (36.9) |  |
| MCA M1 | 12 (44.4) | 65 (63.1) |  |
| LDL\*, mean (SD), mmol/l | 2.52 (1.37) | 2.16 (0.69) | 0.523 |
| OTP, mean (SD), min | 245.6 (63.6) | 262.1 (77.6) | 0.469 |
| Intravenous thrombolysis, n (%) | 3 (11.1) | 14 (13.6) | 0.734 |
| Collateral score, n (%) |  |  | <0.001 |
| Grade 0 | 16 (59.3) | 14 (13.6) |  |
| Grade 1 | 6 (22.2) | 46 (44.7) |  |
| Grade 2 | 5 (18.5) | 43 (41.7) |  |
| Angioplasty and stenting, n (%) | 7 (25.9) | 37 (35.9) | 0.329 |
| Passes of retriever >3, n (%) | 7 (25.9) | 14 (13.6) | 0.121 |
| mTICI, 2b/3, n (%) | 18 (66.7) | 86 (83.5) | 0.052 |
| Malignant brain edema, n (%) | 17 (63.0) | 18 (17.5) | <0.001 |
| Decompressive craniectomy, n (%) | 2 (7.4) | 3 (2.9) | 0.277 |

APESCT, Alberta Stroke Program Early CT; DBP, diastolic blood pressure; ICA, internal carotid artery; LAA, large-artery atherosclerosis; LDL, low-density lipoprotein; mTICI, modified Thrombolysis in Cerebral Infarction; MCA, middle cerebral artery; NIHSS, National Institutes of Health Stroke Scale; OTP, symptoms onset to groin puncture time; SBP, systolic blood pressure.

\* Missing data in 4 patients.

**Supplementary-table 5** Multivariateanalysis for 90-day mortality for malignant brain edema

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Wald | OR | 95% CI | *P* values |
| Malignant brain edema | 10.533 | 7.958 | 2.274-27.848 | 0.001\* |
| Age | 3.028 | 1.067 | 0.992-1.148 | 0.082 |
| Stroke cause | 0.178 |  |  | 0.915 |
| LAA vs Cardioembolic | 0.178 | 0.623 | 0.069-5.619 | 0.673 |
| Undetermined or others vs Cardioembolic | 0 |  |  | 0.998 |
| Baseline ASPECT score | 0.025 | 0.951 | 0.511-1.771 | 0.875 |
| mTICI, 2b/3 | 0.919 | 0.528 | 0.143-1.948 | 0.338 |
| Occluded site (ICA occlusion) | 0.166 | 0.783 | 0.240-2.548 | 0.684 |
| Atrial fibrillation | 0.003 | 1.052 | 0.179-6.187 | 0.956 |
| Previous hypertension | 0.349 | 1.610 | 0.331-7.829 | 0.555 |
| Decompressive craniectomy | 0.031 | 1.306 | 0.067-25.563 | 0.860 |
| Collateral circulation | 5.862 |  |  | 0.053 |
| Grade 1 vs Grade 0 | 5.411 | 0.208 | 0.056-0.781 | 0.020\* |
| Grade 2 vs Grade 0 | 2.886 | 0.280 | 0.064-1.216 | 0.089 |

APESCT, Alberta Stroke Program Early CT; ICA, internal carotid artery; LAA, large-artery atherosclerosis; mTICI, modified Thrombolysis in Cerebral Infarction.

\*P < 0.05

**Supplementary-table 6** Multivariateanalysis for factors associated with malignant brain edema (Collateral score Grade 2 vs Grade 0+1)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Wald | OR | 95% CI | *P* values |
| For all included patients (n=130) |  |  |  |  |
| Occluded site (ICA occlusion) | 4.752 | 2.696 | 1.105-6.577 | 0.029\* |
| Collateral score |  |  |  |  |
| Grade 2 vs Grade 0+1 | 5.503 | 0.267 | 0.088-0.805 | 0.019\* |
| Previous hypertension | 1.241 | 1.861 | 0.624-5.551 | 0.265 |
| mTICI, 2b/3 | 2.805 | 0.414 | 0.148-1.162 | 0.094 |
| FBG | 2.278 | 1.096 | 0.973-1.234 | 0.131 |
| BUN | 1.156 | 1.107 | 0.919-1.334 | 0.282 |
| For patients with recanalization (n=104) |  |  |  |  |
| Occluded site (ICA occlusion) | 5.231 | 3.853 | 1.213-12.240 | 0.022\* |
| Collateral score |  |  |  |  |
| Grade 2 vs Grade 0+1 | 4.850 | 0.160 | 0.030-0.818 | 0.028\* |
| Previous hypertension | 0.929 | 2.107 | 0.463-9.588 | 0.335 |
| Baseline DBP | 1.405 | 1.027 | 0.983-1.072 | 0.236 |
| Baseline NIHSS score | 0.956 | 1.070 | 0.934-1.227 | 0.328 |
| Baseline APESCT score | 0.267 | 0.858 | 0.479-1.535 | 0.605 |
| FBG | 0.188 | 1.033 | 0.892-1.197 | 0.665 |
| BUN | 2.736 | 1.199 | 0.967-1.486 | 0.098 |

APESCT, Alberta Stroke Program Early CT; BUN, blood urea nitrogen; DBP, diastolic blood pressure; FBG, fasting blood glucose; ICA, internal carotid artery; mTICI, modified Thrombolysis in Cerebral Infarction; NIHSS, National Institutes of Health Stroke Scale.

\*P < 0.05