Supplemental materials

Protocol of determining secondary ICH.

The causes of suspected secondary ICH include trauma, aneurysm or vascular malformation, systemic disease related coagulopathy, hemorrhagic venous infarct or hemorrhagic transformation of ischemic stroke. In this cohort, patients had finished all the examinations before they were included in this study. To be more specific, trauma was evaluated according to medical history and imaging examinations (including plain or enhanced CT, MRI of head, chest, abdomen, etc.). Aneurysm and vascular malformation were mainly according to CTA, MRI and DSA. Thrombus in cerebral venous sinus was diagnosed according to CE-MRV and clinical presentations. These diagnoses were determined by experienced neurologists and radiologists in a multiple disciplinary team.

Supplemental Table 1 Comparison of characteristics in patients included and excluded

	Patients included (n=673)	Patients excluded (n=371)	P Value
Demographics			
Age, mean (SD), year	61 (13)	62 (16)	0.108
Female sex, n (%)	237 (35.2%)	109 (33.1%)	0.515
Vascular risk factors and medical history, n(%)			
Hypertension	509 (75.6%)	175 (74.2%)	0.651
Diabetes mellitus	112 (16.6%)	34 (14.5%)	0.435
Atrial fibrillation	21 (3.1%)	19 (8.1%)	0.001
Coronary heart disease	27 (4.0%)	16 (6.9%)	0.080
Ischemic stroke or TIA	27 (4.0%)	22 (9.4%)	0.931
Recurrent ICH	45 (6.7%)	17 (7.3%)	0.751
Alcohol intake	209 (31.1%)	88 (37.3%)	0.079
Smoking	228 (33.9%)	89 (37.8%)	0.288
Medication at baseline, n(%)			
Antiplatelet	58 (8.6%)	29 (12.3%)	0.099
Anticoagulant therapy	7 (1.0%)	16 (6.8%)	<0.001
Statin	36 (5.3%)	21 (8.9%)	0.051
GCS at baseline[a]	15 (14-15)	14 (11-15)	<0.001
Imaging characteristics			
OCT, hour[a]	5 (2-8)	7 (3-24)	<0.001
Hematoma volume, ml[a]	9.0 (3.0-17.6)	10.5 (4.2-26.4)	0.007
Lobar ICH, n (%)	143 (21.2%)	56 (25.6%)	0.033
Intraventricular extension, n (%)	192 (28.5%)	86 (39.8%)	0.002
OMT, day[a]	5 (4-7)	5 (3-7)	0.102

Values are mean (SD), median (IQR) or number (%) as appropriate.

TIA, transient ischemic attack; ICH, intracerebral hemorrhage; GCS, Glasgow Coma Scale; OCT, time from onset to CT (hour); OMT, time from onset to MRI (day).

Supplemental Table 2 Univariable regression analyses of factors associated with hematoma volume.

Variables	β	95% CI	P Value
Age	0.071	-0.009-0.152	0.081
Female	0.498	-2.661-1.664	0.652
Hypertension	-3.221	-5.615- -0.827	0.008
Diabetes mellitus	-3.829	-6.587- -1.071	0.007
Atrial fibrillation	-1.257	-7.197-4.684	0.678
Coronary heart disease	-3.661	-8.918-1.596	0.173
Ischemic stroke or TIA	0.311	-3.261-3.883	0.864
Recurrent ICH	-1.274	-5.408-2.861	0.546
Alcohol intake	0.242	-1.991-2.474	0.832
Smoking	0.710	-1.472-2.892	0.524
Antiplatelet drugs	-1.103	-4.783-2.577	0.557
Anticoagulant drugs	-1.695	-11.877-8.486	0.744
Statin	-0.289	-6.678-2.499	0.372
Lobar ICH	14.716	12.450-16.983	<0.001
Intraventricular extension	3.772	1.502-6.042	0.001
cSS	8.316	5.784-10.848	<0.001
CMBs	0.016	-0.059-0.092	0.670
Lobar CMBs	0.140	0.023-0.256	0.019
Non-lobar CMBs	-0.157	-0.302- -0.011	0.035

mRS, modified Rankin Scale; TIA, transient ischemic attack; ICH, intracerebral hemorrhage; cSS, cortical superficial siderosis; CMB, cerebral microbleed.

Supplemental Table 3 Multivariable regression analyses of factors associated with hematoma volume.

All patients	**β**	**95% CI**	**P Value**
Age	-0.042	-0.116-0.031	0.256
Hypertension	0.251	-1.948-2.451	0.822
Diabetes mellitus	-3.371	-5.834- -0.909	0.007
Lobar ICH	13.842	11.448-16.325	<0.001
Intraventricular extension	3.757	1.682-5.831	<0.001
cSS	4.523	1.959-7.087	<0.001
CMB	/	/	/
Lobar CMBs	0.002	-0.122-0.126	0.972
Non-lobar CMBs	-0.194	-0.342- -0.045	0.011
Sensitivity analysis*	**β**	**95% CI**	**P Value**
Age	-0.100	-0.180- -0.019	0.016
Hypertension	0.300	-2.054-2.654	0.803
Diabetes mellitus	-2.647	-5.303- -0.009	0.051
Lobar ICH	13.460	10.836-16.084	<0.001
Intraventricular extension	3.886	1.553-6.220	0.001
cSS	4.239	1.390-7.088	0.004
CMB	/	/	/
Lobar CMBs	-0.005	-0.135-0.125	0.939
Non-lobarCMBs	-0.177	-0.331- -0.023	0.024

Variables were selected from the univariable analyses with $p < 0.1$ as a screening criterion.

*Patients who had MRI within 1 week after ICH ictus.

ICH = intracerebral hemorrhage; cSS = cortical superficial siderosis; CMB = cerebral microbleed.

Supplemental Table 4 Univariable regression analyses of factors associated with 90-day mRS.

Variables	β	95% CI	P Value
Age	0.030	0.021-0.040	<0.001
Female	0.298	0.035-0.561	0.027
Hypertension	-0.131	-0.424-0.162	0.381
Diabetes mellitus	-0.186	-0.522-0.149	0.277
Atrial fibrillation	-0.301	-1.020-0.417	0.411
Coronary heart disease	-0.199	-0.836-0.437	0.540
Ischemic stroke or TIA	0.397	-0.035-0.828	0.072
Recurrent ICH	0.518	0.019-1.017	0.042
Alcohol intake	-0.058	-0.330-0.214	0.676
Smoking	-0.218	-0.483-0.048	0.108
Antiplatelet drugs	0.340	-0.105-0.785	0.135
Anticoagulant drugs	0.186	-1.045-1.418	0.767
Statin	0.111	-0.444-0.667	0.695
Hematoma volume	0.041	0.032-0.050	<0.001
Lobar ICH	0.161	-0.147-0.470	0.305
Intraventricular extension	0.585	0.310-0.859	<0.001
cSS	0.762	0.450-1.075	<0.001
CMB			
Lobar CMBs	0.027	0.013-0.041	<0.001
Non-lobar CMBs	0.009	-0.009-0.028	0.314
GCS at baseline	-0.251	-0.318- -0.184	<0.001

663 patients with 90-day follow-up consented for analysis. mRS, modified Rankin Scale; TIA, transient ischemic attack; ICH, intracerebral hemorrhage; cSS, cortical superficial siderosis; CMB, cerebral microbleed; GCS, Glasgow Coma Scale.

Supplemental Table 5 Multivariable regression analyses of factors associated with 90-day mRS.

Variables	β	95% CI	P Value
Age	0.022	0.013-0.031	<0.001
Female	0.218	-0.029-0.465	0.084
Ischemic stroke or TIA	0.110	-0.298-0.517	0.598
Previous ICH	0.297	-0.178-0.772	0.221
Intraventricular extension	0.303	0.035-0.571	0.027
Lobar CMBs	0.012	-0.002-0.026	0.084
cSS	0.333	0.008-0.659	0.045
GCS at baseline	-0.220	-0.285- -0.155	<0.001

Variables were selected from the univariable analyses with $p < 0.1$ as a screening criterion. 663 patients with 90-day follow-up consented for analysis. mRS, modified Rankin Scale; TIA, transient ischemic attack; ICH, intracerebral hemorrhage; CMB, cerebral microbleed; cSS, cortical superficial siderosis; GCS, Glasgow Coma Score.

Supplemental Table 6 Outcomes compared among four groups when single CMB was regarded as CMB-.

	cSS-CMB- (n = 255)	**cSS–CMB+** (n = 287)		**cSS+CMB-** (n = 38)		**cSS+CMB+** (n = 93)	
Crude model							
Primary outcome		**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**
90-day mRS ≥ 3*	Reference	1.6 (1.1, 2.3)	0.021	1.8 (0.8, 3.8)	0.127	3.4 (2.0, 5.6)	<0.001
Secondary outcomes		**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**
All-cause death	Reference	2.3 (1.1, 5.0)	0.034	4.9 (1.6, 14.7)	0.004	7.3 (3.3, 15.8)	<0.001
Recurrent	Reference	4.4 (1.7, 11.7)	0.002	5.0 (1.2, 21.1)	0.027	9.7 (3.5, 26.6)	<0.001

ICH							
Recurrent stroke	Reference	2.0 (1.1, 3.4)	0.018	1.9 (0.6, 5.7)	0.230	4.6 (2.5, 8.5)	<0.001
Adjusted model†							
Primary outcome		**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**
90-day mRS ≥ 3*	Reference	1.5 (1.0, 2.2)	0.049	1.3 (0.6, 2.9)	0.456	2.7 (1.6,4.6)	<0.001
Secondary outcomes		**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**
All-cause death	Reference	2.1 (1.0, 4.5)	0.060	2.5 (0.8, 7.8)	0.100	4.6 (2.1, 10.2)	<0.001
Recurrent ICH	Reference	4.5 (1.7, 11.8)	0.002	5.4 (1.2, 23.2)	0.024	10.2 (3.6, 28.7)	<0.001
Recurrent stroke	Reference	1.9 (1.1, 3.3)	0.027	1.6 (0.5, 4.8)	0.410	4.0 (2.1, 7.5)	<0.001

*663 patients with 90-day mRS evaluation were included in analyses for 90-day mRS.
†Adjusted by age, sex.

cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale; ICH, intracerebral hemorrhage.

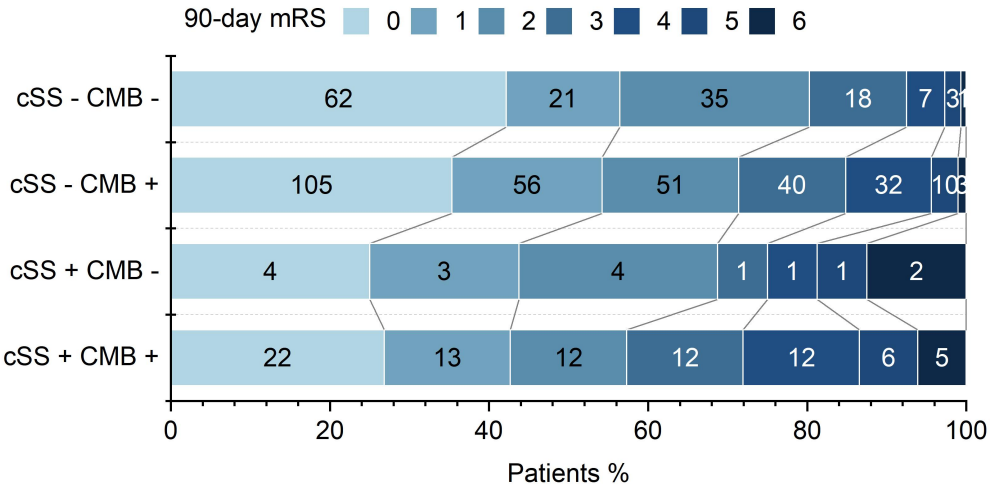
Supplemental Table 7. Outcomes compared in CMB+ and cSS+ groups when single CMB was regarded as CMB-.

	cSS-CMB+ (n = 287)	**cSS+CMB+ (n = 93)**		**cSS+CMB- (n = 38)**	**cSS+CMB+ (n = 93)**	
Crude model						
Primary outcome		**OR (95%CI)**	**P value**		**OR (95%CI)**	**P value**
90-day mRS ≥ 3	Reference	2.1 (1.3, 3.4)	0.002	Reference	1.9 (0.8, 4.2)	0.125
Secondary outcomes		**HR (95%CI)**	**P value**		**HR (95%CI)**	**P value**
All-cause death	Reference	3.2 (1.8, 5.7)	<0.001	Reference	1.5 (0.6, 3.9)	0.430
Recurrent ICH	Reference	2.2 (1.1, 4.2)	0.018	Reference	1.9 (0.6, 6.7)	0.292
Recurrent stroke	Reference	2.3 (1.4, 3.9)	0.001	Reference	2.4 (0.8, 6.9)	0.106
Adjusted model*						
Primary outcome		**OR (95%CI)**	**P value**		**OR (95%CI)**	**P value**
90-day mRS ≥ 3	Reference	1.8 (1.1, 2.9)	0.023	Reference	2.2 (0.9, 5.0)	0.075
Secondary outcomes		**HR (95%CI)**	**P value**		**HR (95%CI)**	**P value**
All-cause death	Reference	2.3 (1.2, 4.1)	0.008	Reference	1.7 (0.6, 4.5)	0.295
Recurrent ICH	Reference	2.4 (1.2, 4.6)	0.012	Reference	1.9 (0.5, 6.6)	0.313

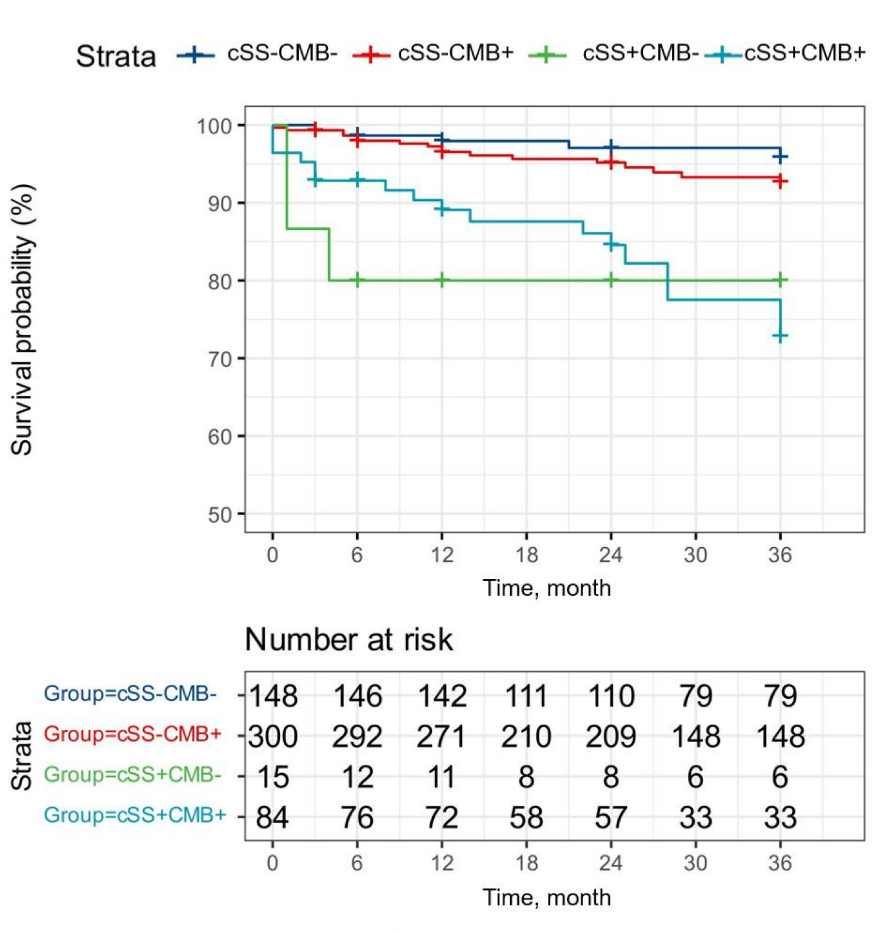
Recurrent stroke	Reference	2.2 (1.3, 3.8)	0.003	Reference	2.5 (0.8, 7.2)	0.095

*Adjusted by age, sex.

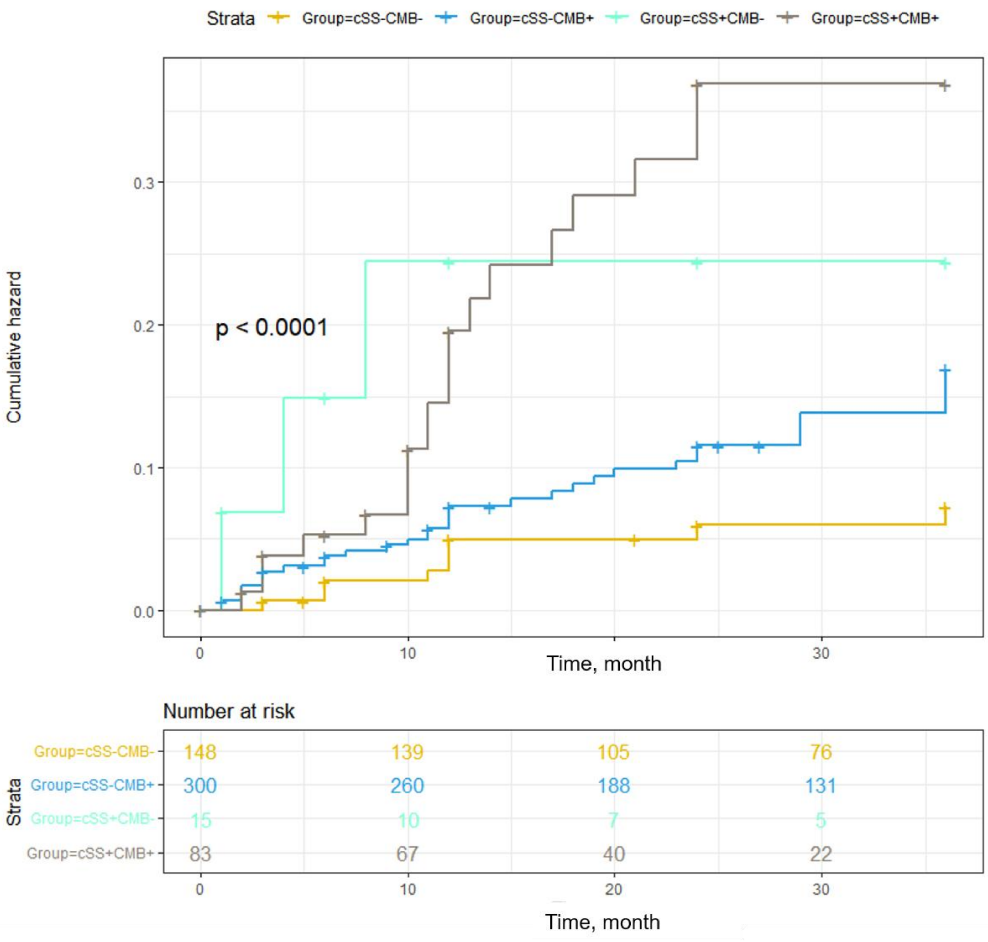
cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale; ICH, intracerebral hemorrhage.



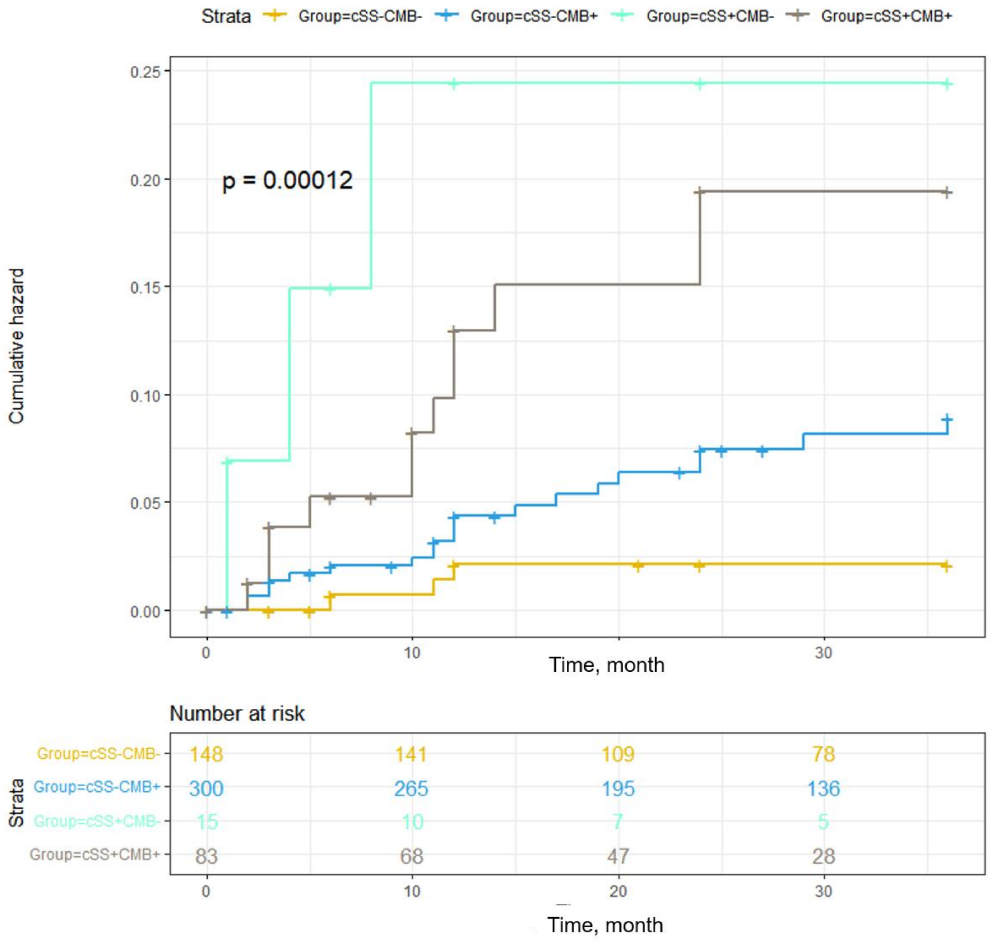
Supplemental Figure 1 Sensitivity analysis of 90-day mRS distribution in four groups among patients who had MRI within 1 week after ICH ictus. 542 patients had 90-day mRS evaluation. cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale.



Supplemental Figure 2 Sensitivity analysis of Kaplan-Meier survival curves among patients who had MRI within 1 week after ICH ictus during follow-up. cSS, cortical superficial siderosis; CMB, cerebral microbleed.



Supplemental Figure 3 Sensitivity analysis of cumulative hazard of recurrent stroke of patients who had MRI within 1 week after ICH ictus during follow-up. cSS, cortical superficial siderosis; CMB, cerebral microbleed.



Supplemental Figure 4 Sensitivity analysis of ccumulative hazard of recurrent ICH of patients who had MRI within 1 week after ICH ictus during follow-up. cSS, cortical superficial siderosis; CMB, cerebral microbleed; ICH, intracerebral hemorrhage.

Supplemental Table 8 Outcomes compared among four groups including NIHSS as covariable.

	cSS-CMB- **(n = 180)**	**cSS–CMB+** **(n = 362)**		**cSS+CMB-** **(n = 25)**		**cSS+CMB+** **(n = 106)**	
Adjusted model†							
Primary outcome		**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**
90-day mRS ≥ 3*	Reference	1.8 (1.1, 3.2)	0.030	1.4 (0.4, 4.8)	0.562	3.6 (1.8,7.1)	<0.001
Secondary outcomes		**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**
All-cause death	Reference	1.9 (0.8, 4.4)	0.151	2.3 (0.6, 9.0)	0.244	3.7 (1.5, 9.0)	0.003
Recurrent ICH	Reference	5.4 (1.6, 18.2)	0.007	7.4 (1.4, 40.9)	0.021	8.8 (2.4, 31.9)	0.001
Recurrent stroke	Reference	2.2 (1.1, 4.3)	0.024	2.1 (0.6, 7.9)	0.256	3.6 (1.7, 7.6)	<0.001

*663 patients with 90-day mRS evaluation were included in analyses for 90-day mRS.
† Adjusted by age, sex, history of hypertension, atrial fibrillation, coronary heart disease, previous ICH, ischemic stroke or TIA, smoking, alcohol intake, NIHSS.

cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale; ICH, intracerebral hemorrhage; NIHSS, National Institutes of Health Stroke Scale.

Supplemental Table 9 Outcomes compared in CMB+ and cSS+ groups including NIHSS as covariable.

	cSS-CMB+ (n = 362)	**cSS+CMB+ (n = 106)**		**cSS+CMB- (n = 25)**	**cSS+CMB+ (n = 106)**	
Adjusted model*						
Primary outcome		**OR (95%CI)**	**P value**		**OR (95%CI)**	**P value**
90-day mRS ≥ 3	Reference			Reference		
Secondary outcomes		**HR (95%CI)**	**P value**		**HR (95%CI)**	**P value**
All-cause death	Reference	1.8 (1.0, 3.4)	0.047	Reference	2.4 (0.4, 12.3)	0.307
Recurrent ICH	Reference	1.7 (0.8, 3.3)	0.142	Reference	1.8 (0.3, 9.7)	0.486
Recurrent stroke	Reference	1.8 (1.0, 3.0)	0.031	Reference	2.2 (0.6, 8.3)	0.244

*Adjusted by age, sex, history of hypertension, atrial fibrillation, coronary heart disease, previous ICH, ischemic stroke or TIA, smoking, alcohol intake, NIHSS.

cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale; ICH, intracerebral hemorrhage; NIHSS, National Institutes of Health Stroke Scale.

Supplemental Table 10. Outcomes compared among four groups adjusting age and sex

	cSS-CMB- **(n = 180)**	**cSS–CMB+** **(n = 362)**		**cSS+CMB-** **(n = 25)**		**cSS+CMB+** **(n = 106)**	
Adjusted model							
Primary outcome		**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**	**OR (95%CI)**	**P value**
90-day mRS ≥ 3*	Reference	1.5 (1.0, 2.4)	0.058	1.2 (0.4, 3.0)	0.773	2.9 (1.6,4.9)	<0.001
Secondary outcomes		**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**	**HR (95%CI)**	**P value**
All-cause death	Reference	1.6 (0.7, 3.7)	0.261	2.2 (0.6, 8.7)	0.256	3.9 (1.6, 9.2)	0.002
Recurrent ICH	Reference	4.7 (1.4, 15.6)	0.011	10.4 (2.0, 53.4)	0.005	10.9 (3.1, 38.7)	<0.001
Recurrent stroke	Reference	2.1 (1.1, 4.0)	0.029	2.3 (0.6, 8.3)	0.217	4.2 (2.0, 8.8)	<0.001

cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale; ICH, intracerebral hemorrhage.

Supplemental Table 11. Outcomes compared in CMB+ and cSS+ groups adjusting age and sex.

	cSS-CMB+ (n = 362)	**cSS+CMB+ (n = 106)**		**cSS+CMB- (n = 25)**	**cSS+CMB+ (n = 106)**	
Adjusted model						
Primary outcome		**OR (95%CI)**	**P value**		**OR (95%CI)**	**P value**
90-day mRS ≥ 3	Reference	1.8 (1.2, 2.9)	0.010	Reference	2.6 (0.9, 7.0)	0.063
Secondary outcomes		**HR (95%CI)**	**P value**		**HR (95%CI)**	**P value**
All-cause death	Reference	2.4 (1.4, 4.3)	0.003	Reference	1.7 (0.5, 5.6)	0.400
Recurrent ICH	Reference	2.4 (1.2, 4.6)	0.010	Reference	1.0 (0.3, 3.4)	0.948
Recurrent stroke	Reference	2.1 (1.3,3.5)	0.004	Reference	1.7 (0.5, 5.8)	0.370

cSS, cortical superficial siderosis; CMB, cerebral microbleed; mRS, modified Rankin Scale; ICH, intracerebral hemorrhage.