SUPPLEMENTAL MATERIAL

Mechanical Thrombectomy in Patients with Cervical Artery Dissection and Stroke in the Anterior or Posterior Circulation

– A Multicenter Analysis from the German Stroke Registry

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for the GSR-ET investigators

Supplemental Table I Baseline characteristics in subgroups of patients with anterior or posterior circulation occlusion.

	Patients with occlusion in a vessel of the anterior circulation			Patients with occlusion in a vessel of the posterior circulation			CAD-Patients
	No CAD n=2,207	CAD n=45	P	No CAD n=283	CAD n=17	P	P[a]
Demographic							
Age – years, median (IQR), n	76 (65-82), n=2207	51 (48-56), n=45	.001	75 (65-81), n=283	46 (36-57), n=17	.001	.305
Female, % (n)	52.4% (1157)	20.0% (9)	.001	40.3% (114)	41.2% (7)	1.000	.111
Pre-stroke mRS, % (n)							
0	68.0% (1443)	93.3% (42)		69.0% (189)	100.0% (17)		
1	12.6% (268)	0% (0)		14.2% (39)	0.0% (0)		
2	8.3% (177)	4.4% (2)	.002	6.9% (19)	0.0% (0)	.[b]	.[b]
3	6.2% (131)	2.2% (1)		4.0% (11)	0.0% (0		
4	3.4% (72)	0% (0)		4.4% (12)	0.0% (0)		
5	1.5% (31)	0% (0)		1.5% (4)	0.0% (0/)		
Current smoking, % (n)	15.4% (298)	23.8% (10)	.335	13.0% (32)	25.0% (3)	.301	.635
Clinical							
NIHSS, median (IQR)	15 (10-18), n=2,207	14 (7-16), n=45	.100	15 (7-26), n=283	13 (5-26), n=17	.410	.967
Medical history, % (n)							
Hypertension	76.3% (1,672)	26.7% (12)	.001	79.4% (223)	23.5% (4)	.001	1.000
Diabetes mellitus	21.4% (470)	4.4% (2)	.003	20.7% (58)	5.9% (1)	.210	1.000
Dyslipidemia	34.2% (747)	22.2% (10)	.112	33.3% (93)	5.9% (1)	.016	.262
Atrial fibrillation	42.8% (935)	2.2% (1)	.001	34.5% (97)	0.0% (0)	.002	1.000
Medication, % (n)							
Antiplatelet	32.4% (697)	15.6% (7)	.015	41.4% (111)	23.5% (4)	.203	.475
Anticoagulation	21.5% (462)	0.0% (0)	.001	16.8% (45)	5.9% (1)	.325	.274
Etiology, % (n)							
Cardioembolism	53.1% (1,171)	-		41.0% (116)	-		
Dissection	-	100.0% (45)		-	100.0% (17)		
Large-artery atherosclerosis	25.1% (553)	-	-	33.2% (94)	-		-
Small-vessel occlusion	0.0% (1)	-		0.0% (0)	-		
Stroke of other determined etiology	4.3% (96)	-		7.4% (21)	-		
Stroke of undetermined etiology	17.5% (386)	-		18.4% (52)	-		
Direct-to-center, % (n)	52% (1,140)	58% (26)	.454	53.7% (152)	47.1% (8)	.625	.570
Symptom onset known, % (n)	61.8% (1,365)	73.3% (33)	.123	58.0% (164)	76.5% (13)	.203	1.000
Time from symptom onset to admission – min, median (IQR), n	128 (59-203), n=1,365	87 (54-171), n=33	.120	127 (60-243), n=164	262 (63-356), n=13	.177	.032
Time from last-seen-well to admission – min, median (IQR), n	346 (201-676), =842	267 (195-331), n=12	.181	475 (301-780), n=119	348 (270-426), n=4	.422	.485
Radiological							
ASPECTS, median (IQR)	9 (7-10), n=1,904	8 (6-10), n=37	.029	-	-	-	-[a]
Occluded vessel, %(n)							
ICA	27.5% (607)	62.2% (28)	.001	-	-	-	-
MCA, M1	63.9% (1,410)	40.0% (18)	.002	-	-	-	-
MCA, M2	20.0% (441)	26.7% (12)	.262	-	-	-	-
ACA	2.8% (61)	0.0% (0)	.633	-	-	-	-
BA	-	-	-	88.3% (250)	70.6% (12)	.049	-
VA	-	-	-	13.4% (38)	64.7% (11)	.001	-
PCA	-	-	-	15.9% (45)	5.9% (1)	.486	-
mTICI before thrombectomy, % (n)	86.6% (1,845)	90.7% (39)		81.5% (221)	76.5% (13)		
0	4.4% (93)	4.7% (2)		7.7% (21)	5.9% (1)		
1	2.1% (44)	2.3% (1)	.416	2.2% (6)	0.0% (0)	.139	
2a	3.2% (68)	0.0% (0)		2.2% (6)	17.6% (3)		
2b	3.8% (81)	2.3% (1)		6.3% (17)	0.0% (0)		
3	86.6% (1845)	90.7% (39)		81.5% (221)	76.5% (13)		
Extracranial ICA stenosis (>70%) ipsilateral to intracranial vessel occlusion, % (n/n)	15.7% (327)	61.4% (27)	.001	0.8% (2)	6.3% (1)	.161	.001

[a] P-value for comparing patients with CAD and an occlusion in a vessel of the anterior circulation to patients with CAD and an occlusion in a vessel of the posterior circulation. [b] P value cannot be estimated due to singularities in the Fisher information matrix.

CAD stands for cervical artery dissection; IQR, interquartile range; mRS, modified Rankin scale; NIHSS, National Institutes of Health Stroke Scale; ASPECTS, Alberta Stroke Program Early CT Score; ICA, internal carotid artery; ACA, anterior cerebral artery; BA, basilar artery; VA, vertebral artery; PCA, posterior cerebral artery; mTICI, modified Treatment in Cerebral Infarction.

Supplemental Table II Procedural characteristics in subgroups of patients with anterior or posterior circulation occlusion.

	Patients with occlusion in a vessel of the anterior circulation			Patients with occlusion in a vessel of the posterior circulation			CAD-Patients
	No CAD n=2,207	CAD n=45	P	No CAD n=283	CAD n=17	P	P[a]
Intervention							
Treatment with intravenous thrombolysis, % (n)	56% (1231)	80% (36)	.001	49.3% (139)	35.3% (6)	.322	.001
Anesthesia, % (n)							
Conscious sedation	32.8% (696)	28.9% (13)	.555	2.9% (8)	0.0% (0)	.256	.017
Beginning with conscious sedation, switch to general anesthesia	3.8% (80)	6.7% (3)		11.0% (30)	0.0% (0)		
Primary general anesthesia	63.4% (1,346)	64.4% (29)		86.1% (235)	100% (17)		
Number of passages, median (IQR), n	2 (1-3), n=2,207	2 (1-3), n=5	.578	1 (1-2), n=283	3 (1-4), n=17	.171	.797
Intra-arterial medication, % (n)	14.9% (322)	34.1% (15)	.002	22.2% (61)	35.3% (6)	.236	1.000
Additional heparin bolus given, % (n)	13.0% (258)	28.6% (12)	.009	16.1% (42)	23.5% (4)	.496	.759
Stenting of >70% ipsilateral extracranial ICA stenosis (if present), % (n)	69.7% (228)	63.0% (17)	.391	0.0% (0)	100.0% (1)	.333	1.000
Time intervals							
Known symptom onset – min, median (IQR), n							
Time from symptom onset to flow restoration	245 (188-320), n=1,365	313 (233-422), n=33	.002	280 (200-350), n=164	395 (233-444), n=13	.203	.566
Unknown symptom onset – min, median (IQR), n							
Time from last-seen-well to flow restoration	512 (350-817), n=842	463 (372-480), n=12	.654	625 (464-949), n=119	568 (568-568), n=4	.881	.500
Known and unknown symptom onset – min, median (IQR), n							
Time from admission to i.v. thrombolysis	21 (-77-34), n= 2207	17 (-67-28), n=45	.757	28 (-75-42), n=283	-34 (-195-58), n=17	.467	.662
Time from admission to groin puncture	70 (46-101), n=2,207	80 (56-114), n=45	.130	78 (53-122), n=283	98 (75-129), n=17	.168	.225
Time from groin puncture to flow restoration	69 (45-97), n=2,207	95 (61-136), n=45	.005	75 (53-113), n=283	101 (82-152), n=17	.051	.382

[a] P-value for comparing patients with CAD and an occlusion in a vessel of the anterior circulation to patients with CAD and an occlusion in a vessel of the posterior circulation. [b] No P-value estimated due to low numbers.
CAD stands for cervical artery dissection; IQR, interquartile range; ICA, internal carotid artery; mTICI, modified Treatment in Cerebral Infarction.

Supplemental Table III Reperfusion outcomes in subgroups of patients with anterior or posterior circulation occlusion.

	All patients			Patients with occlusion in a vessel of the anterior circulation			Patients with occlusion in a vessel of the posterior circulation			CAD-Patients
	No CAD n=2,527	CAD n=62	P	No CAD n=2,207	CAD n=45	P	No CAD n=283	CAD n=17	P	P[a]
mTICI after thrombectomy, % (n)										
0	9.0% (224)	4.9% (3)	.116	8.7% (189)	6.8% (3)	.125	10.2% (28)	0.0% (0)	.207	.449
1	1.9% (48)	0.0% (0)		1.8% (39)	0.0% (0)		2.9% (8)	0.0% (0)		
2a	5.7% (141)	9.8% (6)		5.9% (129)	13.6% (6)		3.3% (9)	0.0% (0)		
2b	35.6% (881)	54.1% (33)		37.3% (809)	47.7% (21)		22.2% (61)	70.6% (12)		
3	47.7% (1182)	31.1% (19)		46.3% (1004)	31.8% (14)		61.5% (169)	29.4% (5)		

[a] P-value for comparing patients with CAD and an occlusion in a vessel of the anterior circulation to patients with CAD and an occlusion in a vessel of the posterior circulation.
CAD stands for cervical artery dissection; mTICI, modified Treatment in Cerebral Infarction.

Supplemental table IV Adverse events in subgroups of patients with anterior or posterior circulation occlusion.

	Patients with occlusion in a vessel of the anterior circulation			Patients with occlusion in a vessel of the posterior circulation			CAD-Patients
	No CAD n=2,207	**CAD n=45**	**P**	**No CAD n=283**	**CAD n=17**	**P**	**P[a]**
Any adverse events, % (n)	13.4% (294)	13.3% (6)	1.000	12.5% (35)	11.8% (2)	1.000	1.000
Device malfunction	0.3% (7)	0.0% (0)	.[b]	0.4% (1)	0.0% (0)	.[b]	.[b]
Dissection/perforation	2.8% (61)	4.4% (2)	.[b]	3.2% (9)	5.9% (1)	.[b]	.[b]
Clot migration/embolism	3.2% (70)	6.7% (3)	.[b]	2.1% (6)	0.0% (0)	.[b]	.[b]
Intracerebral hemorrhage	2.3% (51)	0.0% (0)	.[b]	1.4% (4)	0.0% (0)	.[b]	.[b]
Vasospasm	2.8% (62)	4.4% (2)	.[b]	1.1% (3)	5.9% (1)	.[b]	.[b]
Stroke	0.0% (1)	2.2% (1)	.[b]	0.0% (0)	0.0% (0)	.[b]	.[b]
New persistent neurological deficit	0.1% (2)	0.0% (0)	.[b]	0.0% (0)	0.0% (0)	.[b]	.[b]
New transient neurological deficit	0.0% (1)	0.0% (0)	.[b]	0.0% (0)	0.0% (0)	.[b]	.[b]

[a] P-value for comparing patients with CAD and an occlusion in a vessel of the anterior circulation to patients with CAD and an occlusion in a vessel of the posterior circulation. [b] No P-value estimated due to low numbers.
CAD stands for cervical artery dissection.

Supplemental Table V Functional outcome in subgroups of patients with anterior or posterior circulation occlusion.

	Patients with occlusion in a vessel of the anterior circulation			Patients with occlusion in a vessel of the posterior circulation			Patients with CAD
	No CAD n=2,207	CAD n=45	P P_{adj}	No CAD n=283	CAD n=17	P P_{adj}	P[a] P_{adj}[a]
After 24 hours							
NIHSS after 24 hours, median (IQR)	10 (4-19), n=2,207	9 (4-17), n=45	.418 .494[b]	9 (3-30), n=283	3 (1-5), n=17	.002 .942[b]	.010 .969[b]
mRS score after 24 hours, % (n)							
0	2.6% (49)	5.0% (2)		3.8% (9)	23.5% (4)		
1	5.8% (110)	12.5% (5)		9.6% (23)	11.8% (2)		
2	8.7% (166)	10.0% (4)	.032	9.6% (23)	0.0% (0)	.242	.974
3	13.5% (258)	17.5% (7)	.634[b]	10.5% (25)	5.9% (1)	.294	.996[b]
4	18.6% (355)	17.5% (7)		13.0% (31)	5.9% (1)		
5	50.2% (957)	37.5% (15)		51.9% (124)	52.9% (9)		
6	0.6% (12)	0.0% (0/40)		1.7% (4)	0.0% (0)		
At discharge							
NIHSS at discharge, median (IQR)	6 (2-13), n=2,207	5 (0-11), n=45	.210 .946[b]	5 (1-12), n=283	0 (0-3), n=17	.002 .750	.018 .812[b]
mRS score at discharge, % (n)							
0	7.9% (170)	11.6% (5)		11.2% (31)	41.2% (7)		
1	12.1% (260)	23.3% (10)		11.9% (33)	17.6% (3)		
2	11.9% (255)	9.3% (4)	.008	10.1% (28)	11.8% (2)	.001	.054
3	14.0% (302)	20.9% (9)	.673[b]	10.8% (30)	5.9% (1)	.868	.678[b]
4	17.3% (371)	14.0% (6)		14.4% (40)	0.0% (0)		
5	21.7% (466)	18.6% (8)		21.3% (59)	11.8% (2)		
6	15.2% (326)	2.3% (1)		20.2% (56)	11.8% (2)		
After 90 days							
mRS score after 90 days, % (n/n)							
0	11.7% (228)	17.5% (7)		12.4% (31)	20.0% (3)		
1	14.7% (285)	32.5% (13)		12.4% (31)	33.3% (5)		
2	10.4% (203)	22.5% (9)	.001	10.8% (27)	13.3% (2)	.029	.901
3	12.1% (236)	5.0% (2)	.548[b]	12.4% (31)	6.7% (1)	.601	.122[b]
4	13.4% (260)	10.0% (4)		8.4% (21)	6.7% (1)		
5	9.7% (189)	10.0% (4)		12.8% (32)	6.7% (1)		
6	27.9% (542)	2.5% (1)		30.8% (77)	13.3% (2)		

[a] P-value for comparing patients with CAD and an occlusion in a vessel of the anterior circulation to patients with CAD and an occlusion in a vessel of the posterior circulation. [b] P-value adjusted for age, gender, pre-stroke modified Rankin scale score, medical history, prior medication, Alberta Stroke Program Early CT Score (only anterior circulation occlusions), and location of occluded vessel.

CAD stands for cervical artery dissection; IQR, interquartile range; mRS, modified Rankin scale; NIHSS, National Institutes of Health Stroke Scale.