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RISK ASSESSMENT FOR LARGE-ARTERY VASOSPASM SUBSEQUENT TO ANEURYSMATIC SUBARACHNOID HEMORRHAGE

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INTRODUCTION	AIM	METHOD
Large-artery vasospasm (CVS) after aneurysmatic subarachnoid hemorrhage (aSAH) reduces cerebral perfusion and causes delayed cerebral ischemia. Common diagnostic signs are increasing blood flow velocity in intracranial arteries detected through transcranial Doppler (TCD), clinical deterioration, and CSF-biomarkers. Parameters can only be measured discontinuously so that CVS is often detected too late to intervene. Accurate risk stratification is urgently needed.	To identify parameters in a large cohort of aSAH patients at admission to the intensive care unit associated with an occurrence of significant vasospasm to enable risk stratification.	• Monocentric retrospective cohort study of 853 patients with aSAH treated from 2006 to 2020 • Comparison of demographics, clinical, and radiographic parameters at the time of aneurysm occlusion • Significant cohort differences were included as predictors in a multivariate analysis • Logistic regression models were used to determine odds ratios (OR) for the occurrence of CVS for each predictor.
RESULTS		

Parameter	total (n = 853)	CVS (n = 304)	No CVS (n = 549)	p
Age	57.3 ± 14.3	53.7 ± 12.8	59.3 ± 14.7	< 0.001
Female Sex	568 (67 %)	218 (72 %)	350 (64 %)	0.018
Hunt & Hess	1 116 (14 %) 2 286 (34 %) 3 185 (22 %) 4 152 (18 %) 5 114 (14 %)	31 (10 %) 101 (33 %) 66 (22 %) 64 (22 %) 42 (14 %)	85 (15 %) 185 (34 %) 119 (22 %) 88 (16 %) 72 (13 %)	0.143
mFisher	1 31 (4 %) 2 80 (9 %) 3 662 (77 %) 4 31 (4 %)	8 (3 %) 20 (7 %) 261 (86 %) 9 (3 %)	23 (4 %) 60 (11 %) 401 (73 %) 22 (4 %)	0.028
Aneurysm site	ICA 79 (9 %) ACA 43 (5 %) ACOM 290 (34 %) MCA 201 (24 %) PCOM 103 (12 %) Post. Circ. 137 (16 %)	31 (10 %) 12 (4 %) 86 (28 %) 93 (31 %) 45 (15 %) 37 (12 %)	48 (9 %) 31 (6 %) 204 (37 %) 108 (20 %) 58 (11 %) 100 (18 %)	0.005
ICH	200 (23 %)	87 (29 %)	193 (35 %)	0.022
Clipping	313 (37 %)	131 (43 %)	182 (33 %)	0.004
Craniectomy	122 (14 %)	66 (22 %)	56 (10 %)	< 0.001
EVD	572 (67 %)	230 (75 %)	342 (62 %)	< 0.001

Table 1 – Baseline characteristics and univariate of cohorts

- Of all 853 patients treated with acute aSAH, 304 (32 %) developed CVS.
- In the univariate analysis, CVS was associated with young age, female sex, aneurysm location, modified Fisher, BNI, and surgical interventions.
- In the multivariate regression analysis, we identified BNI Score, decompressive craniectomy, and EVD as independent risk factors.

Adjusted for	OR	Unadjusted [95% CI]	p	Age, Sex, A.-location, H&H
Age	0.97	0.96 - 0.98	< 0.001	*
Female Sex	0.69	0.51 - 0.94	0.019	*
Hunt & Hess	1.17	1.04 - 1.31	0.007	*
GCS	0.97	0.95 - 1.00	0.067	0.98 0.93 - 1.02 0.294
WFNS	1.08	0.99 - 1.17	0.087	1.06 0.92 - 1.22 0.399
Fisher	1.33	1.00 - 1.78	0.050	1.29 0.94 - 1.77 0.120
BNI	1.22	1.04 - 1.43	0.015	1.33 1.11 - 1.59 0.002
IVH	1.02	0.76 - 1.35	0.908	1.15 0.83 - 1.58 0.407
ICH	1.48	1.07 - 2.05	0.019	1.29 0.89 - 1.86 0.369
Clipping	1.52	1.14 - 2.04	0.004	1.22 0.86 - 1.72 0.273
Craniectomy	2.44	1.65 - 3.59	< 0.001	1.93 1.22 - 3.04 0.005
EVD	1.88	1.37 - 2.57	< 0.001	2.22 1.50 - 3.29 < 0.001

Table 2 – Multivariate Prediction model for Vasospasm

Note. — GCS = Glasgow coma scale. WFNS = World Federation of Neurological Surgeons Grading. mFisher = modified Fisher Scale. Barrow Neurological Institute Grading Scale (BNI) BNI = IVH = Intraventricular hemorrhage. ICH = Intracerebral hemorrhage. EVD = External ventricular drainage.

CONCLUSIONS

Young female patients with high BNI scores and undergoing surgical interventions are more likely to develop CVS and should therefore be monitored most intensively after aneurysm occlusion

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