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CLINICAL OUTCOME AND COMPLICATIONS AFTER ENDOVASCULAR SPASMOLYSIS IN PATIENTS WITH ANEURYSMAL SUBARACHNOID HEMORRHAGE

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INTRODUCTION

Despite targeted standard therapy, aneurysmal subarachnoid hemorrhage (aSAH) frequently leads to cerebral vasospasms (CVS), delayed cerebral ischemia (DCI), and subsequent development of cerebral infarction, and poor neurological outcome.

Endovascular treatment (eSL) of CVS through targeted application of calcium antagonists or by mechanical dilatation of focal stenoses has become an additional therapeutic option in selected cases. However, its efficacy and safety are controversial.

STUDY DESIGN

- **Monocentric, retrospective cohort study** of 310 patients with CVS after aSAH treated 2006–2020
- **Definition CVS:** Increase of mean blood flow velocity (V_{mean}) in the MCA, ACA, or ICA >200 cm/s in transcranial Doppler ultrasound (TCD) and/or new neurologic deficit and/or decrease of at least 2 points on Glasgow Coma Scale (GCS) after exclusion of other potential reasons

ENDOVASCULAR TREATMENT

- Intraarterial, medical spasmolysis with up to 2.5 mg of Nimodipine per target vessel over 30 minutes, depending on the systemic effect on the mean arterial blood pressure. 3000–5000 IU of heparin were given simultaneously to prevent thromboembolic complications
- In proximal focal stenoses: Percutaneous transluminal Angioplasty via balloon (preferably non-compliant) or other devices

RESULTS

Parameter	No eSL (n = 218)	eSL (n = 92)	p
Age	53 ± 13	55 ± 12	0.516
Female sex	161 (70%)	62 (77 %)	0.182
Hunt & Hess			
1	20 (9 %)	10 (11 %)	0.695
2	77 (35 %)	26 (28 %)	
3	43 (20 %)	23 (25 %)	
4	46 (21 %)	21 (23 %)	
5	32 (15 %)	12 (13 %)	
mFisher			
1	5 (2 %)	3 (4 %)	0.916
2	14 (7 %)	6 (7 %)	
3	190 (89 %)	78 (87 %)	
4	5 (2 %)	3 (4 %)	
Clipping	101 (43%)	31 (33 %)	0.040
Mean V_{mean}	257 ± 50	267 ± 59	0.117
Minimal V_{mean}	100	110	
Maximal V_{mean}	400	400	
Onset after SAH	8 ± 8 days	9 ± 5 days	
New infarcts	50 (23%)	42 (46%)	< 0.001

Table 1 – Baseline characteristics

Patients undergoing eSL did not differ from patients in age, sex, Hunt & Hess score, mFisher score, aneurysm site, aneurysm occlusion method, and V_{mean} in TCD

		n = 92	%
Intervention	Local Nimodipine	63	68
	Local Nimodipine + PTA	19	21
	PTA	10	11
Affected Vessel	Unilateral anterior circulation	25	27
	Bilateral anterior circulation	25	27
	Posterior circulation	4	4
	Generalized	38	41
Angiographic Result	Improvement	79	86
	No improvement	13	14
Complications	Intracranial dissection	2	0.8
	Extracranial dissection	1	0.4
	Groin complication	1	0.4

Table 2 – Angiographic Results

Among endovascularly treated patients, 86% improved in terms of angiographic results. Periprocedural complications were observed in 4%.

		n = 62	%
Hunt & Hess Grading	I	9	15
	II	24	39
	III	15	24
	IV	10	16
	V	4	6
Overall clinical status	Improvement	44	71
	Stable	11	18
	Worse	7	11
Secondary infarct after eSL		21	33
Death before discharge		4	6
Unconscious patients		n = 30	%
Hunt & Hess Grading	I	1	3
	II	1	3
	III	8	27
	IV	12	40
	V	8	27
Secondary infarct after eSL		25	83
Death before discharge		8	27

Table 3 – Clinical Results

71% (n = 44) of 62 patients who underwent eSL due to symptomatic deterioration improved clinically.

CONCLUSIONS

- Endovascular interventions are **safe** and **effective** for the therapy of large-artery vasospasm after aSAH.
- Implementation of a **standardized process** for **detection** and **medical management**, coupled with **well-defined criteria** for endovascular interventions, proves to be an **efficient preventative approach** to improve neurological outcome.

Contact Information

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