

Introduction

Aneurysmal subarachnoid hemorrhages have high morbidity and mortality due to cerebral vasospasm. We sought to demonstrate our institutional rate of sVS, and DCI in preparation for a multi-center randomized controlled trial to investigate the effect of Cilostazol on cerebral vasospasm when used with Nimodipine.

Methods

We reviewed 112 consecutive patients who underwent endovascular intervention (EVI) in 2015 at two institutions under multiple surgeons. We included patients with angiographically confirmed aSAH who presented within 96 hours of onset and have undergone EVI or clipping. On day 1 of aSAH onset, we treated the patients with 60mg oral Nimodipine Q4H until day 21. Our primary outcome was sVS defined as neurological change attributed to the vasospastic vessels. Our secondary outcomes were DCI diagnosed by computer tomography (CT), angiographic vasospasm defined as > 20% stenosis of a vessel compared to baseline, transcranial doppler (TCD) defined by mean velocities greater than 120 cm/sec or Lindegaard ratio > 3, repeat EVI due to angiographic changes, and mortality. Descriptive statistics were used. Sensitivity analysis was used when necessary.

Results

We reviewed 112 EVI patients of which 35 had aSAH. Patient characteristics on presentation are listed in Table 1. Angiographic characteristics are presented in Table 2. The most common aneurysm and treatment were ACOM (28.2%) and coiling (71.8%) respectively. Seventy-one percent of 35 patients had > 1 vasospastic outcome (Table 3). We did not assess sVS in 5 patients due to inability to evaluate. The sVS incidence was 40%. Assuming best and worst scenarios, our sVS incidence was 34.3%-48.6%. The corresponding sample size required for a randomized control trial (RCT) with two groups would be 126.

Table 1

Table 1: Patient Characteristics on Presentation (N=35)	
Age (Y/Mean ± SD)	56.4 ± 10.4
Sex (% Male)	34%
Hunt Hess Score (Median/Range)	3 (0-4)
Modified Fischer Score (Median/Range)	3 (1-4)

Demographics

Table 2

Table 2: Angiographic Presentation (N=39)	
Aneurysm Size (mm/Mean ± SD)	5.3 ± 2.5
Location (%)	
Anterior Communicating (ACOM)	28.2
Posterior Communicating (PCOM)	20.5
Middle Cerebral (MCA)	15.4
Basilar/Posterior Circulation	23.1
Other	12.8
Treatment (%)	
Clipping	23.1
Coiling	71.8
Pipeline	5.1
Four patients presented with two aneurysms	

Angiographic Data

Table 3

Table 3: Clinical Outcomes (N35)		Excluded*
Any of the Below (% per yr)	71.4	0
Symptomatic Vasospasm (% per yr), n=30	40	5
Angiographic Vasospasm (% per yr), n=30	40	5
TCD Vasospasm (% per yr), n=32	43.8	3
Delayed Cerebral Infarct (% per yr), n=32	59.4	3
Mortality Rate (% per yr)	20	0
*Exclusion due to mortality or discharge before outcome can be assessed		

Outcome

Conclusions

Our results agree with the literature. Our next step will be a multi-center RCT assessing the addition of Cilostazol to Nimodipine for treatment and prevention of cerebral vasospasm post aSAH.

Learning Objectives

By the conclusion of this session, participants will know our institution's rate of symptomatic vasospasm, and delayed cerebral ischemia post aneurysmal subarachnoid hemorrhage (aSAH). This will set the foundation for our future RCT study to assess the improvements of these rates with the addition of Cilostazol to our current treatment regimen for aSAH.

References

- Dabus, G. & Nogueira, R. G. Current options for the management of aneurysmal subarachnoid hemorrhage-induced cerebral vasospasm: a comprehensive review of the literature. Interv. Neurol. 2, 30–51 (2013).
- Allen, G. S. et al. Cerebral arterial spasm--a controlled trial of nimodipine in patients with subarachnoid hemorrhage. N. Engl. J. Med. 308, 619–624 (1983).
- Hirashima, Y., Kurimoto, M., Hori, E., Origasa, H. & Endo, S. Lower incidence of symptomatic vasospasm after subarachnoid hemorrhage owing to ruptured vertebrobasilar aneurysms. Neurosurgery 57, 1110–1116; discussion 1110–1116 (2005).
- Seiler, R. W., Grolimund, P., Aaslid, R., Huber, P. & Nornes, H. Cerebral vasospasm evaluated by transcranial ultrasound correlated with clinical grade and CT-visualized subarachnoid hemorrhage. J. Neurosurg. 64, 594–600 (1986).
- Lindegaard, K. F., Nornes, H., Bakke, S. J., Sorteberg, W. & Nakstad, P. Cerebral vasospasm diagnosis by means of angiography and blood velocity measurements. Acta Neurochir. (Wien) 100, 12–24 (1989).
- Sekhar, L. N., Wechsler, L. R., Yonas, H., Luyckx, K. & Obrist, W. Value of transcranial Doppler examination in the diagnosis of cerebral vasospasm after subarachnoid hemorrhage. Neurosurgery 22, 813–821 (1988).
- Senbokuya, N. et al. Effects of cilostazol on cerebral vasospasm after aneurysmal subarachnoid hemorrhage: a multicenter prospective, randomized, open-label blinded end point trial. J. Neurosurg. 118, 121–130 (2013).