Intraventricular Nicardipine for the Medical Management of Clinical Vasospasm in Aneurysmal Subarachnoid Hemorrhage (aSAH) Patients

Adeolu David Olasunkanmi MD; Deadrick Jordan; Rhonda Cadena; Deanna Mary Sasaki-Adams MD
[UNC Hospitals]

Introduction

Subarachnoid hemorrhages (SAH) are only a small percentage of strokes (3-5%) but affect the younger population more than any other stroke and have a very high mortality and morbidity. 10-15% of patients die, never reaching the hospital and the mortality rates of those reaching medical treatment can be greater than 50% within the first 2 weeks of presentation due to complications of the SAH including cerebral vasospasm. Among aSAH patients with successful treatment of the aneurysm, approximately 66% will have residual morbidity and never return to the same quality of life due to Delayed Ischemic Neurologic Deficit (DIND) as a result of cerebral vasospasm. Effective medical therapies remain limited for these patients and more invasive approaches such as a cerebral angiogram for intraarterial verapamil injection or angioplasty are sometimes required. Intraventricular nicardipine is a safe alternative for treatment of cerebral vasospasm. We report our experience with intraventricular nicardipine in aSAH with refractory cerebral vasospasm.

Methods

This is a retrospective case series of patients admitted to the Neurosciences Intensive Care Unit for aSAH in whom intraventricular nicardipine was administered for treatment of refractory and symptomatic cerebral vasospasm. Permission was received from the Institutional Review Board for chart review. All patients were monitored for cerebral vasospasm or delayed ischemic neurologic deficit using neurologic examination, computed tomography, computed tomography angiography, Transcranial Doppler surveillance and invasive digital subtraction angiography when performed. All eight patients failed to respond to standard SAH treatment for vasospasm, were unable to meet blood pressure goals due to hemodynamic instability, or poor neurological exam despite adequate standard therapy or intra-arterial verapamil injection. Vasospasm was diagnosed when mean MCA velocity exceeded 120 cm/s or ACA velocity exceeded 80 cm/s and/or with clinical deterioration indicating vasospasm and signifying failure of prophylactic management, IT nicardipine (4 mg in 2 mL) was administered three times a day for 3 - 5 days. Drains were clamped for 30 minutes following administration.

Results

Eight patients (median Hunt-Hess grade = 3, median Fisher score = 3.25) with refractory vasospasm received intraventricular nicardipine (4 mg every 8 h for 3 to 5 days or 4 mg every 12 h if required after 5 days). Four patients (50%) had a good outcome and returned to their pre-SAH functioning level (mRS 0). One patient (12.5%) had moderate disability and two patients (25%) require assistance with their activities of daily living. One patient (12.5%) required constant care and attention. Average modified Rankin score is 2. Intraventricular nicardipine was well tolerated with minimal side effects. There were no CSF infections as a result of the IT nicardipine administration.

Conclusions

Intraventricular nicardipine is safe and could represent an effective adjunctive medical treatment in the management of patients with severe cerebral vasospasm.

Learning Objectives

By the conclusion of this session, participants would be able to identify that intraventricular administration of nicardipine can be effective in the treatment of cerebral vasospasm and associated delayed ischemic neurologic deficit.

References

Weyer GW, Nolan CP, Macdonald RL: Evidence-based cerebral vasospasm management. Neurosurg Focus. 2006 Sep 15;21(3):E8.
Hop JW, Rinkel GJ, Algra A, et al: Case-fatality rates and functional outcome after subarachnoid hemorrhage: A systematic review. Stroke 28: 660-4, 1997
Drake CG: Management of cerebral aneurysm. Stroke 12: 273-83, 1981
Weir B, Grace M, Hansen J, et al.: Time course of vasospasm in man. J.Neurosurg 48:173-8, 1978
Findlay JM: Current management of cerebral vasospasm. Contemp Neurosurg 19 (24): 1-6, 1997