SAFETY AND EFFICACY OF HIGH DOSE INTRAARTERIAL VASODILATORS FOR VASOSPASM AND THE PREVENTION OF DELAYED CEREBRAL ISCHEMIA: COMPARISON OF NICARDIPINE AND VERAPAMIL

Introduction Delayed cerebral ischemia (DCI) continues to be a challenging complication of subarachnoid hemorrhage. This study sought to examine the impact of intra-arterial therapy on patients with medically refractory DCI. More specifically it sought to determine comparative results of nicardipine and verapamil as well as to determine if there was a relationship between IA vasodilator dose and complication rate.

Methods A retrospective chart review of all patients at a single institution undergoing endovascular IA therapy for vasospasm secondary to subarachnoid hemorrhage over a 30 month period was done. In total, 69 patients underwent 126 treatments for cerebral vasospasm in the setting of atraumatic subarachnoid hemorrhage (SAH). In total 91% of patients present with aneurysmal SAH while 9% had angiography negative SAH. 53.6% of patients had their aneurysm treated endovascularly. Median Hunt Hess grade was 3 and 88% of patients presented with Modified Fischer grade 3 or 4. Formal angiography was done in the setting of clinical vasospasm as determine by patients’ neurologic exams, velocity on transcranial doppler, and other clinical factors. The majority of patients underwent a single treatment (55%) while the most treatments for a single patient was 5 (4%).

Results In total, 98% (123/126) of treatments led to an improved or stable neurological exam post treatment, and 3 patients developed a post-operative procedural neurological decline. Delayed cerebral ischemia, defined as a new neurologic deficit, occurred in 55% (38/69) of patients in this cohort; however, the new neurologic deficit was permanent in only 14% of patients (10/69). New infarcts were seen on imaging in 19% of patients (13/69) but were clinically silent in 3/60 patients. Patients with DCI were more likely to undergo multiple treatments of IA therapy (P<0.05). Average total dose of nicardipine was 11 mg (range 3–40 ng). Average dose of verapamil was 88 mg (range 25–240 mg). There was no relationship between dose and complication rate (P>0.05). There was no differential risk of DCI in the nicardipine vs the verapamil group (P>0.05). Patients undergoing verapamil therapy were more likely to experience complications of IA therapy, 20% vs 5% in the nicardipine group (P<0.05), however patients classified to have severe vasospasm by the angiographer were more likely to undergo treatment with verapamil (P<0.05).

Conclusion This report adds to the growing body of literature that endovascular rescue therapy offers a safe and effective option in managing medically refractory vasospasm in order to prevent DCI. Importantly, it also suggests that in select patients high dose therapy can be used for maximal benefit with a reasonable side effect profile. Importantly, this series also demonstrates an initial rate of DCI of 55% in patients with vasospasm undergoing IA therapy with only 14% of patient’s demonstrating permanent neurologic deficit suggesting a significant overall benefit of treatment. The results of this initial study mandate further investigation into the safety and efficacy of intra-arterial verapamil and nicardipine for the treatment and prevention of DCI. More importantly it shows that dose optimization needs to be done prior to pursuing further trials.