

Intra-arterial Infusion of Calcium Channel Blocker

In medically refractory [vasospasm](#), invasive [intervention](#) may be required. A commonly used approach is [intra-arterial](#) (IA) [drug infusion](#). Although [calcium channel blockers](#) (CCBs) have been widely applied in this setting, studies comparing their efficacies and durations of action have been few. This study was performed to compare attributes of three CCBs ([nicardipine](#), [nimodipine](#), and [verapamil](#)), focusing on duration of the [vasodilatory](#) action based on [angiography](#).

Vasospasm was produced in [New Zealand rabbits](#) (N = 22) through experimentally induced subarachnoid hemorrhage and confirmed in each via conventional angiography, grouping them by IA-infused drug. After chemoangioplasty, angiography was performed hourly for 5 h to compare dilated and vasospastic arterial diameters. Drug efficacy, duration of action, and changes in mean arterial pressure (relative to baseline) were analyzed by group.

Effective vasodilation was evident in all three groups immediately after IA drug infusion. The vasodilative effects of nimodipine and nicardipine peaked at 1 h and were sustained at 2 h, returning to initial vasospastic states at 3 h. In verapamil recipients, effects were more transient by comparison, entirely dissipating at 1 h. Only the nicardipine group showed a significant 3-h period of lowered blood pressure.

Although nimodipine and nicardipine proved longer acting than verapamil in terms of [vasodilation](#), their effects were not sustained beyond 2 h after IA infusion. Further study is required to confirm the vasodilatory duration of IA CCB based on perfusion status, and an effort should be made to find new alternative to extend the duration ¹⁾.

A 26-year-old man presented with subarachnoid hemorrhage and an initial Glasgow Coma Scale score of 4 after a motor vehicle accident. The patient underwent a bifrontal craniotomy and right frontal decompressive craniectomy for bilateral frontal epidural and subdural hematomas secondary to subarachnoid hemorrhage.

Intervention: While the patient was in the intensive care unit, severe vasospasm developed, as documented by transcranial Doppler ultrasonography, cerebral blood flow monitoring, and angiography. The patient was treated on 3 separate days with either nicardipine or verapamil infusions during angiography. After each infusion, the middle cerebral artery diameter improved (diameter increased 23.1-60.5%). The arterial vasospasm eventually resolved after 22 days, and the patient was discharged to acute rehabilitation. Four months after discharge, the patient had a Barthel index of 90 and has relatively slow speech but was able to ambulate without assistance and follow complex commands.

This is the first reported case of multiple intra-arterial calcium channel blocker infusions for severe posttraumatic vasospasm, as assessed by transcranial Doppler ultrasonography, cerebral blood flow monitoring, and angiography. This case reinforces that arterial vasospasm does occur in response to traumatic brain injury and further demonstrates that treatment with calcium channel blocker infusions is associated with angiographic changes and a subsequent reversal of ischemic blood flow ²⁾.

¹⁾

Lim J, Cho YD, Kwon HJ, Byoun SH, Koh HS, Park B, Choi SW. Duration of Vasodilatory Action After Intra-arterial Infusions of Calcium Channel Blockers in Animal Model of Cerebral Vasospasm. Neurocrit Care. 2020 Sep 25. doi: 10.1007/s12028-020-01112-0. Epub ahead of print. PMID: 32978731.

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Lee DJ, Moftakhar P, Glenn TC, Vespa PM, Martin NA. Intra-arterial calcium channel blocker infusion for treatment of severe vasospasm in traumatic brain injury: case report. Neurosurgery. 2008 Nov;63(5):E1004-6; discussion E1006. doi: 10.1227/01.NEU.0000327685.90800.F7. PMID: 19005366.

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