Why So Blue?

Methylene Blue in the Treatment of Calcium Channel Blocker-Induced Vasoplegia

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Introduction

Calcium channel blockers (CCBs) are commonly used in the outpatient setting for hypertension management and overdose has been documented through various case reports. Despite current therapies, patients with severe CCB toxicity often develop critical vasoplegia. Here we report a case of refractory vasoplegia that was responsive to methylene blue (MB).

Case Report

HPI: 33-year-old male who was brought into the ED after a suicide attempt where he had ingested roughly 100-200 mg of amlodipine.

VS: BP 69/47, HR 58, RR 14, O2 sat 95% on RA.

Hospital Course: In the ED, given atropine 0.25 mg, calcium gluconate 3 g, D5NS drip, insulin drip at 90 units/hr, and low dose norepinephrine drip with little improvement in his vital signs. Admitted to ICU.

Within 8 hours, the patient was maxed on norepinephrine, epinephrine, phenylephrine, vasopressin, and dopamine drips, with mean arterial pressures (MAPs) in the 50s and worsening mentation. He required intubation due to pulmonary edema from the large volume given for his insulin and dextrose infusions and additional volume resuscitation in an attempt to maintain MAPs greater than 65. Patient was not deemed a candidate for VA-ECMO. He was treated with 5g hydroxocobalamin per toxicology recommendations, with minimal response.

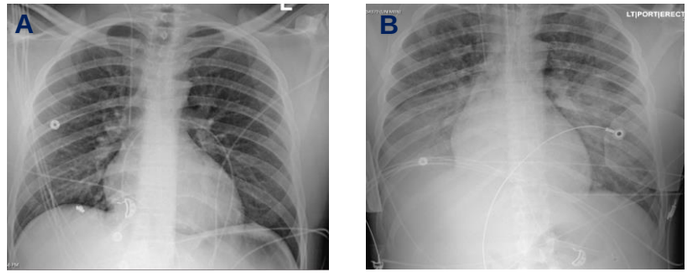

Figure A:. Chest x-ray on presentation at 4:30pm.
Figure B: Chest x-ray after volume resuscitation at 2:30am.

Toxicology recommended MB, and it was started at 5 mg/kg. Blood pressure was 98/45 prior to MB administration and rose to 119/57 one hour after. He was also started on an angiotensin II drip for further blood pressure support.

Soon after the initiation of MB, we were able to titrate off dopamine and phenylephrine drips. His course was complicated by CRRT for acute renal failure and proning for ARDS physiology, both caused by his large volume resuscitation. In 3 days, he was weaned off all pressors, extubated, and transferred to the floors. He is now doing well and follows in our outpatient clinic.

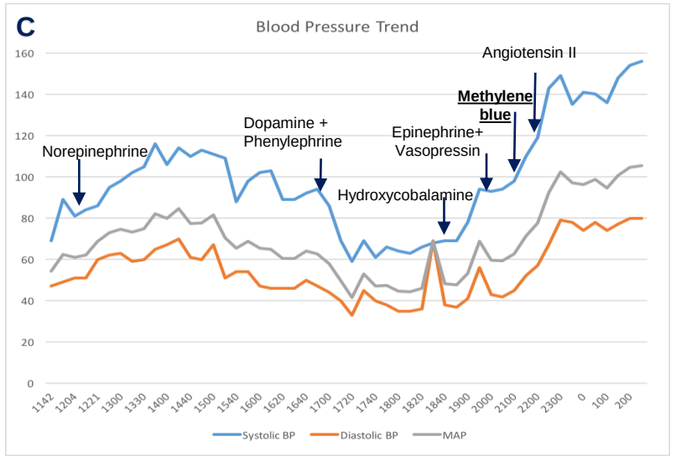

Figure C: Blood pressure trend and medication timeline during the hospital course.

Figure D: Purple urine noted after MB administration.

Discussion

While MB is often seen as a last report therapy, this case illustrates its potential as a earlier agent for severe CCB toxicity.

MB works by restoring vasculature tone through direct inhibition of endothelial nitric oxide synthase and by inhibiting guanylate cyclase, thus decreasing cGMP production. CCB toxicity causes an accumulation of cGMP leading to a decreased contractile response to vasoconstrictors, like norepinephrine. This may explain why our patient was so resistant to standard pressor therapy.

MB has been beneficial for vasoplegic shock associated with cardiac bypass surgery, supporting its relatively novel usage in CCB toxicity. Given its low-risk side effect profile and the critical severity of CCB toxicity, MB should be considered earlier in the treatment course to prevent further decompensation, multiorgan injury, and iatrogenic complications.

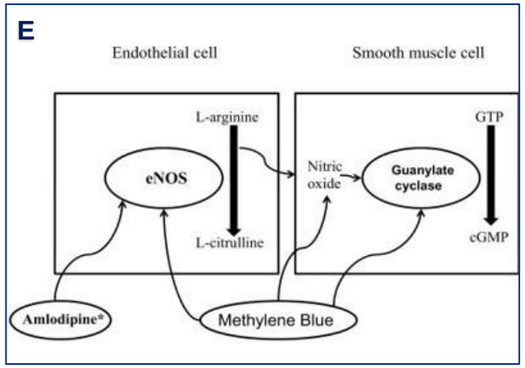

Figure E: Mechanism of action for amlodipine and MB.[3]

References

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