

J09: Calcium Channel Blockers

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Reviewed:

Introduction

Calcium channel blockers, commonly used to treat hypertension and cardiac dysrhythmias, have a significant risk of toxicity if used inappropriately.

Essentials

- As with most poisonings, prehospital management options are limited. Protect the airway, ensure optimal oxygenation, support ventilation as necessary, and attempt to correct hypotension. Care more generally for the patient than for the specific suspected poison.
- Hypotension and bradycardia are common findings.
- Be aware of the possibility of co-ingestion of other medications or substances.
- Pre-existing heart disease and myocardial ischemia can cause symptoms similar to calcium channel blocker overdose, and must be excluded.

Additional Treatment Information

- As a first line treatment, a fluid bolus of 500 mL should be given to any patient suspected of having overdosed on calcium channel blockers who is hypotensive, and may be repeated as necessary up to 1 L.
- Atropine should be considered in patients who are bradycardic, repeated as necessary, up to a total dose of 3 mg.
- Intravenous calcium (either calcium chloride or calcium gluconate) may overcome the cardiovascular effects of calcium channel blockers. 100 to 200 mg can be given intravenously, ideally over at least 10 minutes.

General Information

- Calcium channel blockers can be divided into two categories: the dihydropyridines, which block L-type calcium channels in the vasculature, and the non-dihydropyridines, which act on calcium channels in the myocardium.
 - The dihydropyridines include nifedipine, amlodipine, and felodipine. They are potent vasodilators, and have limited effect on cardiac contractility or conduction. The non-dihydropyridines, diltiazem and verapamil, and act more centrally.
- In general, dihydropyridine drugs are more likely to cause arterial vasodilation and tachycardia, whereas diltiazem and verapamil tend to produce bradycardia and poor contractility.
- The changes in myocardial contractility may induce symptoms of heart failure. Carefully evaluate patients for signs of myocardial dysfunction, including shortness of breath and pulmonary edema.
- Patients who have overdosed on calcium channel blockers may have a significant hyperglycemia. This is clinically insignificant, but may assist in diagnosis. Obtain and record a capillary blood glucose measurement.
- Epinephrine infusions may be required for patients whose hypotension and bradycardia are refractory to atropine and calcium. Profound calcium channel blocker toxicity may require significantly higher doses and dose rates than might otherwise be expected. Titrate drug doses to effect; be aware of arrhythmogenic potential.

Interventions

First Responder

- Position patient
- Provide supplemental oxygen as required
 - [→ A07: Oxygen and Medication Administration](#)
- Manage airway as required

- [→ B01: Airway Management](#)

Emergency Medical Responder – All FR interventions, plus:

- Provide supplemental oxygen to maintain $\text{SpO}_2 \geq 94\%$
 - [→ A07: Oxygen and Medication Administration](#)
- Obtain capillary blood glucose measurement
- Initiate transport. Consider ACP intercept.

Primary Care Paramedic – All FR and EMR interventions, plus:

- Obtain vascular access and correct hypotension
 - [→ D03: Vascular Access](#)

Advanced Care Paramedic – All FR, EMR, and PCP interventions, plus:

- For bradycardia:
 - [Atropine](#), repeated as necessary
 - [→ C02: Bradycardia](#)
- Consult CliniCall (1-833-829-4099):
 - [Calcium chloride](#) 100-200 mg IV over 10 minutes.
 - Consider push-dose [EPINEPHrine](#) or infusion, for refractory hypotension.

Critical Care Paramedic – All FR, EMR, PCP, and ACP interventions, plus:

- Consider norepinephrine
- Consider high dose insulin and glucose therapy in consultation with CliniCall

Evidence Based Practice

[Poisoning/Overdose](#)

References

1. Barrueto F. Calcium channel blocker poisoning. In UpToDate. 2020. [\[Link\]](#)

