

Hyperinsulinemia Euglycemia

Calcium channel blockers (CCB) are commonly used to treat hypertension and angina. They exert negative chronotropic and inotropic effects and lower blood pressure by inhibiting calcium influx into myocardial tissue and vascular smooth muscle. Major effects of CCB overdose are hypotension and dysrhythmias. The treatment of a CCB overdose includes decontamination, calcium, and supportive care such as intravenous vasopressors. When the above measures fail to improve the hemodynamic status in patients, hyperinsulinemia euglycemia therapy (HIE) may be employed.

During CCB-induced shock, hypoinsulinemia and hyperglycemia can occur due to the inhibition of calcium channels in pancreatic beta cells. In addition, the myocardium becomes dependent on carbohydrate instead of free fatty acids to derive energy, and the heart fails to use carbohydrate efficiently in the hypoinsulinemic state. Meanwhile, delivery of glucose and insulin is impaired due to decreased cardiac output. Insulin has been proposed to improve myocardial function in the hyperglycemic state, to increase the ionized calcium level in plasma, and to exert a positive inotropic effect independently.

HIE is recommended when patients do not respond to atropine and calcium chloride. It may be given in addition to glucagon and norepinephrine for persistent hypotension and myocardial depression. The recommended regimen of HIE is regular insulin 1 unit/kg IV push followed by 0.5 unit/kg/hr. Dextrose 50% 1 ampule (25ml) IV push followed by D5W at 10 cc/kg/hr is given to maintain euglycemia. Monitor the blood glucose every hour until 6 hours after discontinuation of insulin infusion and adjust the dextrose administration as needed to avoid hypoglycemia. Serum electrolyte levels (potassium, magnesium and phosphate) and vital signs should also be monitored regularly. Hypokalemia may occur due to insulin causing a shift of extracellular potassium into cells. Supplement potassium when the serum level falls under 2.5mEq/L. Insulin can be discontinued when the patient's heart rate and blood pressure become stable, and dextrose can be discontinued accordingly. Note that HIE improves hemodynamic status and inotropy but it does not treat heart block in calcium channel blocker toxicity.

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DID YOU KNOW THAT... the downturn in the economy has hit poison centers hard?

Funding for poison centers is primarily from state governments with less than 10% of total funds coming from federal grants. A poison center in Michigan has closed as a result of funding cuts, and several centers in other states are at risk, including the entire California Poison Control System. Citizens in California would not have access to a poison center at all if these centers cease to operate. The Maryland Poison Center has also had to endure budget and salary cuts, but you can rest assured that at this time, we are able to provide the same high quality emergency services by expert poison specialists to the public and health professionals in our state.



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