nitroprusside  (nye-troe-pruss-ide)

Nitropress

Classification
Therapeutic: antihypertensives
Pharmacologic: vasodilators

Pregnancy Category C

Indications
Hypertensive crises. Controlled hypotension during anesthesia. Cardiac pump failure or cardiogenic shock (alone or with dopamine).

Action
Produces peripheral vasodilation by a direct action on venous and arteriolar smooth muscle. Therapeutic Effects: Rapid lowering of BP. Decreased cardiac preload and afterload.

Pharmacokinetics
Absorption: IV administration results in complete bioavailability.
Distribution: Unknown.
Metabolism and Excretion: Rapidly metabolized in RBCs and tissues to cyanide and subsequently by the liver to thiocyanate.
Half-life: 2 min.

TIME/ACTION PROFILE (hypotensive effect)
ROUTE ONSET PEAK DURATION
IV immediate rapid 1–10 min

Contraindications/Precautions
Contraindicated in: Hypersensitivity; cerebral perfusion deficit.
Use Cautiously in: Renal disease (risk of thiocyanate accumulation); Hepatic disease (risk of cyanide accumulation); Hypothyroidism; Hypoproteinemia; Vitamin B deficiency; ALL; Eclampsia: Safety not established; Geri: May have ↑ sensitivity to drug effects.

Adverse Reactions/Side Effects

Interactions
Drug-Drug: ↑ hypotensive effect with ganglionic blocking agents, general anesthetics, and other antihypertensives. Estrogens and sympathomimetics may ↓ response to nitroprusside.

Route/Dosage
IV (Adults and Children): 0.3 mcg/kg/min initially; may be ↑ as needed up to 10 mcg/kg/min (usual dose is 3 mcg/kg/min; not to exceed 10 min of therapy at 10 mcg/kg/min infusion rate).

NURSING IMPLICATIONS
Assessment
● Monitor BP, heart rate, and ECG frequently throughout therapy; continuous monitoring is preferred. Consult physician for parameters. Monitor for rebound hypertension following discontinuation of nitroprusside.
● Pulmonary capillary wedge pressure (PCWP) may be monitored in patients with MI or HF.

● Lab Test Considerations: May cause ↑ bicarbonate concentrations, PCO₂, and pH.
● May cause ↑ lactate concentrations.
● May cause ↑ serum cyanide and thiocyanate concentrations.
● Monitor serum methemoglobin concentrations in patients receiving 10 mg/kg and exhibiting signs of impaired oxygen delivery despite adequate cardiac output and arterial Po₂ (Blood is chocolate brown without change on exposure to air). Treatment of methemoglobinemia is 1–2 mg/kg of methylene blue IV administered over several minutes.

● Toxicity and Overdose: If severe hypotension occurs, drug effects are quickly reversed, within 1–10 min, by decreasing rate or temporarily discontinuing infusion. May place patient in Trendelenburg position to maximize venous return.

● Monitor plasma thiocyanate levels daily in patients receiving prolonged infusions at a rate >3 mcg/kg/min or 1 mcg/kg/min in patients with anuria. Thiocyanate levels should not exceed 1 millimole/L.
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● Signs and symptoms of thiocyanate toxicity include tinnitus, toxic psychoses, hypo-reflexia, confusion, weakness, seizures, and coma.

● Acute treatment of cyanide toxicity includes 4–6 mg/kg of sodium nitrite (as a 3% solution) over 2–4 min. This acts as a buffer for cyanide by converting 10% of hemoglobin to methemoglobin. If administration of sodium nitrite is delayed, inhalation of crushed ampule (vaporole, amyl nitrite) for 15–30 sec of every minute should be started until sodium nitrite is running. Following completion of sodium nitrite infusion, administer sodium thiosulfate 150–200 mcg/kg (available as 25% and 50% solutions). This will convert cyanide to thiocyanate, which may then be eliminated. If required, entire regimen may be repeated in 2 hr at 50% of the initial doses.

Potential Nursing Diagnoses
Ineffective tissue perfusion (Indications)

Implementation
● If infusion of 10 mcg/kg/min for 10 min does not produce adequate reduction in BP, manufacturer recommends nitroprusside be discontinued.

● May be administered in left ventricular HF concurrently with an inotropic agent (doxazosin, dobutamine) when effective doses of nitroprusside restore pump function and cause excessive hypotension.

IV Administration
● pH: 3.0–6.0.

● Continuous Solution: Infusion: Dilute 10 mg of nitroprusside in 250–1000 mL of D5W. Wrap infusion in aluminum foil to protect from light; administration set tubing need not be covered. freshly prepared solution has a slightly brownish tint; discard if solution is dark brown, orange, blue, green, or dark red. Solution must be used within 24 hr of preparation. Concentration: 50–200 mcg/mL. Rate: Based on patient’s weight (see Route/Dosage section). Administer via infusion pump to ensure accurate dosage rate.

● Y-Site Compatibility: aminophylline, argatroban, atropine, aztreonam, bivalirudin, bumetanide, calcium chloride, calcium gluconate, cefazolin, cefotaxime, ceftriaxone, cefuroxime, chloramphenicol, clindamycin, cyclosporine, dopamine, dobutamine, dexamethasone sodium phosphate, digoxin, diphenhydramine, doxycycline, enalaprilat, epinephrine, etoposide, esmolol, famotidine, fentanyl, felodipine, furosemide, ganciclovir, gentamicin, granisetron, heparin, hydrocortisone sodium succinate, hydromorphone, insulin, isoproterenol, ketorolac, labetalol, lidocaine, linuron, lorazepam, magnesium sulfate, methotrexate, midazolam, milrinone, morphine, nafcillin, nafadotride, norepinephrine, ondansetron, palonosetron, pancuronium, pantoprazole, pentamidine, potassium chloride, potassium phosphate, procainamide, pentoxyfylline, penicillin G potassium, phenylephrine, phenytoin, piperacillin/tazobactam, potassium thiocyanate, ranitidine, sodium bicarbonate, tacrolimus, ticarcillin/clavulanate, tirofiban, tobramycin, vancomycin, vasopressin, vecuronium.

● Y-Site Incompatibility: acyclovir, ampicillin, aztreonam, bupivacaine, calcium gluconate, dopamine, diphenhydramine, dexamethasone sodium phosphate, dobutamine, diazepam, dihydrostreptomycin, digoxin, diphenhydramine, doxycycline, fentanyl, felodipine, furosemide, furosemide, ganciclovir, gentamicin, granisetron, heparin, hydrocortisone sodium succinate, hydromorphone, insulin, isoproterenol, ketorolac, labetalol, lidocaine, linuron, lorazepam, magnesium sulfate, methotrexate, midazolam, milrinone, morphine, nafcillin, nafadotride, norepinephrine, ondansetron, palonosetron, pancuronium, pantoprazole, pentamidine, potassium chloride, potassium phosphate, procainamide, pentoxyfylline, penicillin G potassium, phenylephrine, phenytoin, piperacillin/tazobactam, potassium thiocyanate, ranitidine, sodium bicarbonate, tacrolimus, ticarcillin/clavulanate, tirofiban, tobramycin, vancomycin, vasopressin, vecuronium.

Patient/Family Teaching
● Advise patient to report the onset of tinnitus, dyspnea, dizziness, headache, or blurred vision immediately.

Evaluation/Desired Outcomes
● Decrease in BP without the appearance of side effects.

Why was this drug prescribed for your patient?