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TREATMENT OF SYSTEMIC REACTIONS

The following is a general guideline for the treatment of systemic reactions (anaphylaxis) – actual conditions and treatment will vary. The use of sound clinical judgment should always be undertaken and for severe reactions, EMS or ER evaluation may be necessary.

General Measures

A venous tourniquet above the reaction site might decrease absorption of an injected allergen or venom. Place subject in recumbent position and elevate lower extremities. Assessment of airway, breathing, circulation, and adequacy of mentation. Establish and maintain airway (endotracheal tube or cricothyrotomy may be necessary). Administer oxygen at 6-8 L/min to obtain O₂ saturation > 90%.

Administer normal saline intravenously for fluid replacement and venous access. If severe hypotension persists, rapid infusion of volume expanders (colloid-containing solutions) may be necessary.

Immediate intervention

Administer aqueous epinephrine 1:1000 dilution, 0.3 – 0.5 mL (0.01 mg/kg in children; maximum dose 0.3 mg), intramuscularly every 5 minutes, as necessary, to control symptoms and blood pressure. The arm permits easy access for the earliest administration of epinephrine, however, intramuscular injection into the anterolateral thigh (vastus medialis) produces higher and more rapid peak plasma levels compared with those of injections administered intramuscularly into the arm. Therefore, subjects with moderate, severe, or progressive anaphylaxis should receive epinephrine injections into the anterolateral thigh. Alternatively, an epinephrine auto injector (for example EpiPen 0.3mg or EpiPen Jr. 0.15mg) may be administered into the anterolateral thigh. Repeat every 5 minutes as necessary (avoid toxicity).

Aqueous epinephrine 1:1000, 0.1-0.3 mL of normal saline (1:100,000 – 1:33,000 dilution), administered intravenously over several minutes may be used and repeated as necessary in anaphylaxis not responding to epinephrine injection and volume resuscitation. Continuous hemodynamic monitoring is essential.

For potentially moribund subjects, a still more aggressive option follows: Draw up in a tubercular syringe, aqueous epinephrine 1:1000, 0.1 mL, and insert into a vein or intravenous tubing to aspirate 0.9mL of blood or intravenous fluid (producing 1:10,000 dilution). This epinephrine dilution may be administered intravenously over several minutes, as needed to restore blood pressure. Continuous hemodynamic monitoring is essential.

Specific Measures that depend on the clinical scenario

Aqueous epinephrine 1:1000, one half dose (0.1-0.2 mg), at the reaction site after sting or injection might delay allergen absorption.

Diphenhydramine, 50mg or more in divided doses orally or parenterally, with a maximum daily dose of 300 mg (5mg/kg) for children & 400 mg for adults. Ranitidine, 50mg in adults and 12.5 – 50 mg (1mg/kg) in children, may be diluted in 5% dextrose to a total volume of 20 mL and injected intravenously over 5 minutes. Cimetidine (4mg/kg) alternatively may be administered to adults, but no pediatric dosage in anaphylaxis has been established.

For bronchospasm resistant to epinephrine, administered nebulized albuterol, 2.5-5 mg in 3mL of saline, or levalbuterol, 0.63-1.25 mg unit dose, and repeat as necessary. Levalbuterol is a consideration for albuterol intolerant subjects. Aminophylline, 5mg/kg over 30 minutes intravenously, might be useful if no response to inhaled B-agonist. Note: adjust dosage on the basis of age, current medications, disease states, and current use of theophylline.

For hypotension refractory to volume replacement and epinephrine injections, dopamine, 400 mg in 500 mL of 5% dextrose in water, may be administered intravenously at 2-20 ug/kg min, with the rate titrated to maintain adequate blood pressure. Continuous hemodynamic monitoring is necessary.

Glucagon, 1-5 mg (20-30 ug/kg {maximum 1mg} in children), administered intravenously over 5 minutes, followed by an infusion of 5-15 ug/min, may be used when B-blocker therapy complicates treatment. Aspiration precautions should be observed because glucagon may cause nausea and emesis.

Systemic corticosteroids, such as methylprednisolone 1-2 mg/kg/24 hrs, are usually not helpful acutely but might prevent prolonged reactions/relapses.

Vasodepressor (vasovagal) reaction only

Definition: Nonallergic reaction characterized by slow pulse, nausea, pallor, sweating, clammy skin, and hypotension. Place patient in supine position with elevation of the lower extremities and monitor vital signs. For vasodepressor reaction only (bradycardia, nausea, pallor, sweating, cool clammy skin, and hypotension), administered atropine, 0.3 – 0.5 mg (0.02 mg/kg), subcutaneously every 10 minutes (maximum, 2 mg for adults and 1 mg for children). If hypotension persists, establish intravenous access and administer normal saline rapidly until blood pressure stabilizes.

Key additional interventions for cardiopulmonary arrest occurring during anaphylaxis

High-dose epinephrine administer intravenously (rapid progression to high dose). A commonly used sequence is 1-3 mg (1:10,000 dilutions) slowly administered intravenously over 3 minutes, 3-5 mg administered over 3 minutes, and 4-10 ug/min infusion. The recommended initial resuscitation dosage in children is 0.01 mg/kg (0.1 mL/kg of a 1:10,000 dilution) repeated every 5 minutes for ongoing arrest. Higher subsequent dosages (0.1-0.2 mg/kg, 0.1 mL/kg of a 1:1000 dilution) may be considered for unresponsive asystole or pulseless electrical activity. These arrhythmias are often observed during cardiopulmonary arrest that occurs in anaphylaxis.

Rapid volume expansion is mandatory. Use atropine and transcutaneous pacing if asystole or pulseless activity is present. Prolonged resuscitation efforts are encourage, if necessary, because efforts are more likely to be successful in anaphylaxis, in which the subject is often a young individual with a healthy cardiovascular system.