

Module 18

SHOCK

OBJECTIVES

Upon completion of this module, you should be able to:

- Define hypovolemic shock, cardiogenic shock, neurogenic shock, and septic shock.
- Compare and contrast the signs and symptoms of the four classifications of shock.
- Discuss the similarities and differences in treating the four classifications of shock.
- Discuss anaphylaxis.

INTRODUCTION

Shock is a complex, life-threatening condition in which there is inadequate blood flow to tissues, including vital organs. This adequate blood flow results in poor tissue perfusion and poor tissue oxygenation. Consequently, tissue metabolism is impaired, which can lead to cell and organ death if it is untreated or irreversible. Shock may be caused by a decreased volume of blood, heart failure, generalized dilation of the vessels or pooling of blood, or sepsis. Even though the underlying causes of shock may vary, the signs of shock are similar.

Classifications of Shock

Hypovolemic shock can be defined as: inadequate tissue perfusion resulting from insufficient circulating blood volume. It is due to either internal or external losses of blood, plasma or fluid. The most common cause of hypovolemic shock is hemorrhage. Other causes are burns, prolonged vomiting and diarrhea, or rapidly reducing fluid volumes (thoracentesis, paracentesis, catheterization). Diabetes insipidus and diabetes mellitus may also cause hypovolemic shock.

Symptoms

Symptoms of hypovolemic shock are:

- altered level of consciousness-may be anxious and restless to combative to comatose.
- cool, clammy skin
- tachycardia; peripheral pulses weak and thready, difficult to palpate.
- blood pressure is normal initially, due to compensatory constriction of peripheral vessels, then blood pressure eventually decreases. Orthostatic changes occur when moved from supine to standing position.

- tachypnea (increased respiratory rate) in an attempt to provide more oxygen to hypoxic cells
- decreased urine output
- hyperglycemia due to stimulation of the liver by epinephrine to release glucose
- hypoactive bowel sounds

Treatment

Treatment for hypovolemic shock should include the following:

- Assure that the airway is patent. Ventilatory support may be necessary (mouth to mouth, ambu-bag, or ventilator).
- Administer oxygen at 6 to 12L/minute, if not contraindicated as in persons with COPD.
- Control all external bleeding.
- Place patient in supine position; to increase venous return to the heart, elevate legs to 10 to 12 inches.
- Maintain body temperature.
- Apply pneumatic antishock garment and inflate as ordered by a physician. (these are known as MAST trousers – military antishock trousers – which displace 750-1000cc of blood from lower extremities to vital organs.
- Monitor vital signs every 5 minutes.
- Start IV's with large bore catheters and administer lactated ringers or normal saline.
- Be prepared to administer fluid resuscitation; replace blood volume with whole blood as soon as possible.
- Observe closely for signs and symptoms of fluid overload and pulmonary edema.
- Observe for signs and symptoms of cardiogenic shock.
- Insert indwelling catheter.

Cardiogenic shock is due to inadequate pumping action of the heart because of dysfunction of the heart muscle or mechanical obstruction of blood flow. It can result from myocardial infarction, dysrhythmias, valvular insufficiency, pericardial tamponade, pulmonary emboli, advanced hypovolemic shock, or severe contusion.

Systolic Dysfunction: inability of the heart to pump blood forward.

Dystolic Dysfunction: inability of the heart to fill during diastole.

Symptoms

Symptoms of cardiogenic shock are:

- altered level of consciousness (anxiety, restlessness, confusion, lethargy, coma)
- cool, clammy skin
- tachycardia
- peripheral pulses weak

Treatment:

Treatment for cardiogenic shock should include the following:

- Assure that the airway is patent. Ventilatory support may be necessary (mouth to mouth, ambu-bag, or ventilator).
- Administer oxygen at 6 to 12L/minute, if not contraindicated as in persons with COPD.
- Apply pneumatic antishock garment and inflate as ordered by a physician.
- Monitor vital signs every 5 minutes.
- Start an IV of lactated ringers or normal saline to provide venous access. Because major problems include pulmonary and cardiac congestion initially infuse IV at keep-open rate.
- Be prepared to administer fluid resuscitation.
- Administer medications as directed by a physician. Patient may need diuretics.
- Monitor cardiac rhythm and treat arrhythmias as necessary.
- Monitor arterial blood gases.
- Insert indwelling catheter.

Neurogenic shock results from an increase in the size of the vascular bed. There is massive vasodilatation of peripheral vessels. Consequently, there is decreased blood pressure, decreased venous return to the heart, and decreased cardiac output. Neurogenic shock can be caused by: (1) deep general anesthesia, (2) spinal or epidural anesthesia, or (3) brain damage such as concussions or contusions to the basal areas of the brain.

Symptoms

Symptoms of neurogenic shock are:

- altered level of consciousness (anxiety, restlessness, confusion, or coma)
- skin is warm, dry and flushed
- bradycardia
- decrease in blood pressure with orthostatic changes when moved from supine to standing position
- tachypnea

Treatment for neurogenic shock should include the following:

- Assure that the airway is patent. Ventilatory support may be necessary (mouth to mouth, ambu-bag, or ventilator).
- Administer oxygen at 6 to 12L/minute, if not contraindicated as in persons with COPD.
- Place patient in supine position and elevate legs to 10 to 12 inches.
- Apply pneumatic antishock garment and inflate as ordered by a physician.
- Monitor vital signs every 5 minutes.
- Start an IV with large bore catheter.
- Start an IV of lactated ringers or normal saline to provide venous access.
- Be prepared to administer fluid resuscitation.
- Administer medications as directed by a physician.
- Observe closely for signs and symptoms of fluid overload and pulmonary edema.

Septic shock is inadequate tissue perfusion resulting from bacteremia (bacterial infection in bloodstream). It is also called toxic shock, bacterial shock, or endotoxic shock.

It is most commonly caused by gram negative organisms such as Escherichia coli, Pseudomonas, Proteus, and Klebsiella. Predisposing factors for the development of septic shock include:

- Immunosuppression (due to AIDS, chemotherapy, leukemia, organ transplant)
- Chronic disease such as diabetes, cancer, or cirrhosis
- Multiple trauma or burns
- Malnutrition or debilitation
- Indiscriminate use of antibiotics
- Extremes of age

Symptoms

There are two stages of septic shock.

Stage I. Early (“warm”) stage: AKA hyperdynamic, progressive phase.

- alert, anxiety may or may not be present
- warm, flushed skin, temperature > 102°F
- tachycardia (100-200) beats/minute
- peripheral pulses are full and bounding
- decreased diastolic blood pressure
- normal or increased urine output
- tachypnea
- increased cardiac output
- slight hypoxia
- respiratory alkalosis

Stage II. Late (“cool”) stage: AKA hypodynamic, irreversible phase.

- altered level of consciousness (confusion, lethargy, agitation, or coma)
- cool, clammy skin, subnormal temperature
- increasing tachycardia
- peripheral pulses weak and thready
- blood pressure decreased
- oliguria or anuria
- increased respiratory distress
- decreased cardiac output
- metabolic acidosis
- disseminated intravascular coagulation (DIC) – sludging of blood in the vessels

Treatment

Treatment for septic shock should include the following:

- Assure that the airway is patent. Ventilatory support may be necessary (mouth to mouth, ambu-bag, or ventilator).
- Administer oxygen at 6 to 12L/minute, if not contraindicated as in persons with COPD.
- Monitor vital signs every 5 minutes.
- Establish IV access with two large bore catheters.
- Be prepared to administer fluid resuscitation. Obtain immediate blood cultures and other pertinent cultures.
- Administer medications as directed by a physician. IV antibiotics are usually started as soon as cultures are done.
- Observe closely for signs and symptoms of fluid overload and pulmonary edema.
- Place indwelling catheter to monitor urine output.

If hypovolemic shock occurs, all of the above must be accomplished plus additional measures as discussed in the section of hypovolemic shock.

Anaphylaxis

Anaphylaxis or anaphylactic shock is an immediate allergic reaction which can be life-threatening and is similar to shock. Some of the high risk materials and substances causing this shock-like reaction include:

- antibiotics such as penicillin and synthetic analogues, cephalosporins, tetracyclines, streptomycin, erythromycin, nitrofurantoin.
- other drugs such as aspirin, iodides, iron, dextran, tranquilizers, procaine, cocaine, benzocaine.
- diagnostic substances such as iodinated contrast media, radiopaque dyes, sulfobromophthalein, sodium dehydrochoalate.

- biologicals such as antitoxins, vaccines, gamma globulin, insulin, adrenocorticotrophic hormones, enzymes.
- food such as eggs, milk, nuts, seafood.
- insect stings from bees, wasps, hornets.

Symptoms

The initial signs and symptoms include:

- patient may be alert initially, but is very anxious
- acute respiratory distress with dyspnea, wheezing, stridor, choking, and airway obstruction due to broncho- and laryngospasms and laryngeal edema
- facial and/or generalized edema
- extreme itching, Erythema, urticaria
- abdominal cramps, nausea and vomiting, diarrhea
- decreased blood pressure
- weak, rapid pulse
- diaphoresis

Prevention

A complete patient history is essential. The major components of the history relative to preventing anaphylaxis are the drug and food allergy sections. In addition, before giving any medication, it is a good idea to state the exact drugs to be given and ask the patient if he/she is allergic to those preparations.

Always make certain that the emergency cart is current and is centrally located to all patients.

Treatment

- Assure that the airway is patent. Ventilatory support may be necessary (mouth to mouth, ambu-bag, or ventilator).
- Start an IV with a large bore catheter; administer normal saline.
- Monitor vital signs every 5 minutes.
- Continually assess patient's cardiopulmonary status.
- Administer epinephrine.
- Administer antihistamine.
- Be prepared to administer fluid resuscitation.
- Aminophyllin may be administered to control bronchospasm.
- Observe closely for signs and symptoms of fluid overload and pulmonary edema.

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