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The Study on Etiology, Symptoms, Pathophysiology and Management of Shock

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ABSTRACT

Shock is the state of insufficient blood flow to the tissues of the body as a result of problems with the circulatory system. Initial symptoms of shock may include weakness, fast heart rate, fast breathing, sweating, anxiety, and increased thirst. This may be followed by confusion, unconsciousness, or cardiac arrest, as complications worsen

Shock is divided into four main types based on the underlying cause: hypovolemic, cardiogenic, obstructive, and distributive shock. Hypovolemic shock, also known as low volume shock, may be from bleeding, diarrhea, or vomiting. Cardiogenic shock may be due to a heart attack or cardiac contusion. Obstructive shock may be due to cardiac tamponade or a tension pneumothorax. Distributive shock may be due to sepsis, anaphylaxis, injury to the upper spinal cord, or certain overdoses.

Treatment of shock is based on the likely underlying cause. An open airway and sufficient breathing should be established. Any ongoing bleeding should be stopped, which may require surgery or embolization. Intravenous fluid, such as Ringer's lactate or packed red blood cells, is often given. Efforts to maintain a normal body temperature are also important. Vasopressors may be useful in certain cases. Shock is both common and has a high risk of death.

KEYWORDS:- Shock ,tissues, airways, temperature, causes.

SHOCK

Definition

Shock is a life-threatening clinical syndrome of cardio vascular collapse characterised by:

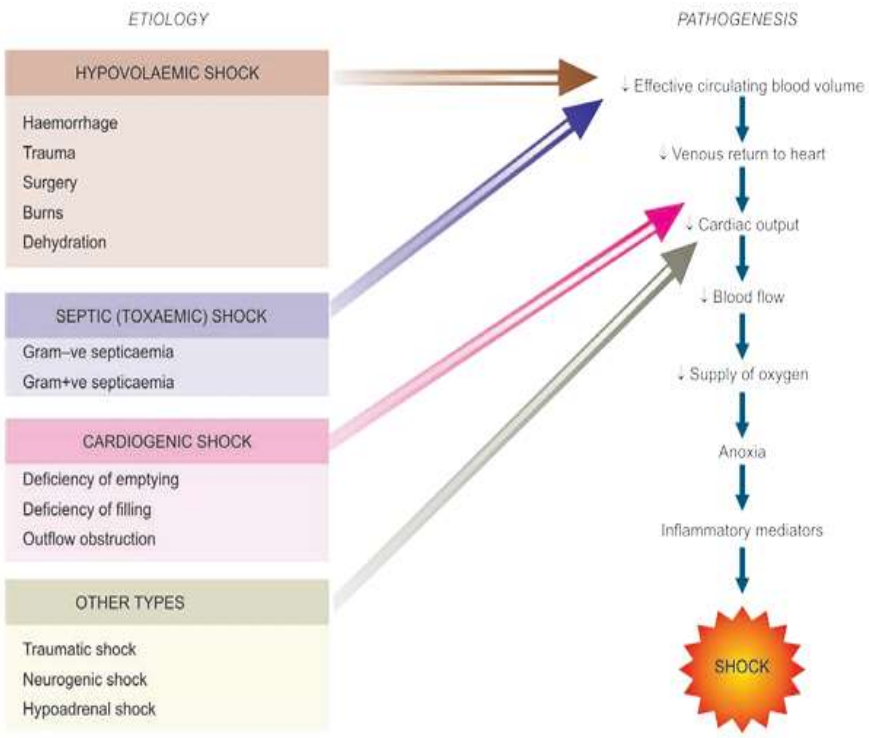
An acute reduction of effective circulating blood volume (hypotension); and an inadequate perfusion of cells and tissues (hypoperfusion).

If uncompensated, these mechanisms may lead to impaired cellular metabolism and death

ETIOLOGY:-

Shock is a common end point of many medical conditions. Shock triggered by a serious allergic reaction is known as anaphylactic shock, shock triggered by severe dehydration or blood loss is known as hypovolemic shock, shock caused by sepsis is known as septic shock, etc. Shock itself is a life-threatening condition as a result of compromised body circulation. It can be divided into four main types based on the underlying cause: hypovolemic, distributive, cardiogenic, and obstructive.

A few additional classifications are occasionally used, such as endocrinologic shock.



Signs and symptoms

The presentation of shock is variable, with some people having only minimal symptoms such as confusion and weakness. While the general signs for all types of shock are low blood pressure, decreased urine output, and confusion, these may not always be present. While a fast heart rate is common, those on β-blockers, those who are athletic, and in 30% of cases of those with shock due to intra abdominal bleeding, heart rate may be normal or slow .Specific subtypes of shock may have additional symptoms.

Dry mucous membrane, reduced skin turgor, prolonged capillary refill time, weak peripheral pulses, and cold extremities can be early signs of shock.

Pathophysiology (Stages of Shock):-

Although deterioration of the circulation in shock is a progressive and continuous phenomenon and compensatory mechanisms become progressively less effective, historically shock has been divided arbitrarily into 3 stages :

1. Compensated (non-progressive, initial, reversible) shock.
2. Progressive decompensated shock.
3. Irreversible decompensated shock.

1.REVERSIBLE) SHOCK:-

In the early stage of shock, an attempt is made to maintain adequate cerebral and coro nary blood supply by redistribution of blood so that the vital organs (brain and heart) are adequately perfused and oxygenated. This is achieved by activation of various neuro hormonal mechanisms causing widespread vasoconstriction and by fluid conservation by the kidney. If the condition that caused the shock is adequately treated, the compensatory mechanism may be able to bring about recovery and re establish the normal circulation; this is called compensated or reversible shock.

2.PROGRESSIVE DECOMPENSATED SHOCK:-

This is a stage when the patient suffers from some other stress or risk factors (e.g. pre-existing cardiovascular and lung disease) besides persistence of the shock so that there is progressive deterioration.

The effects of progressive decompensated shock due to tissue hypoperfusion are as under:

i) Pulmonary hypoperfusion. Decompensated shock worsens pulmonary perfusion and increases vascular permeability resulting in tachypnoea and adult respiratory distress syndrome (ARDS).

ii) ii) Tissue ischaemia. Impaired tissue perfusion causes switch from aerobic to anaerobic glycolysis resulting in metabolic lactic acidosis. Lactic acidosis lowers the tissue pH which in turn makes the vasomotor response ineffective. This results in vasodilatation and peripheral pooling of blood.

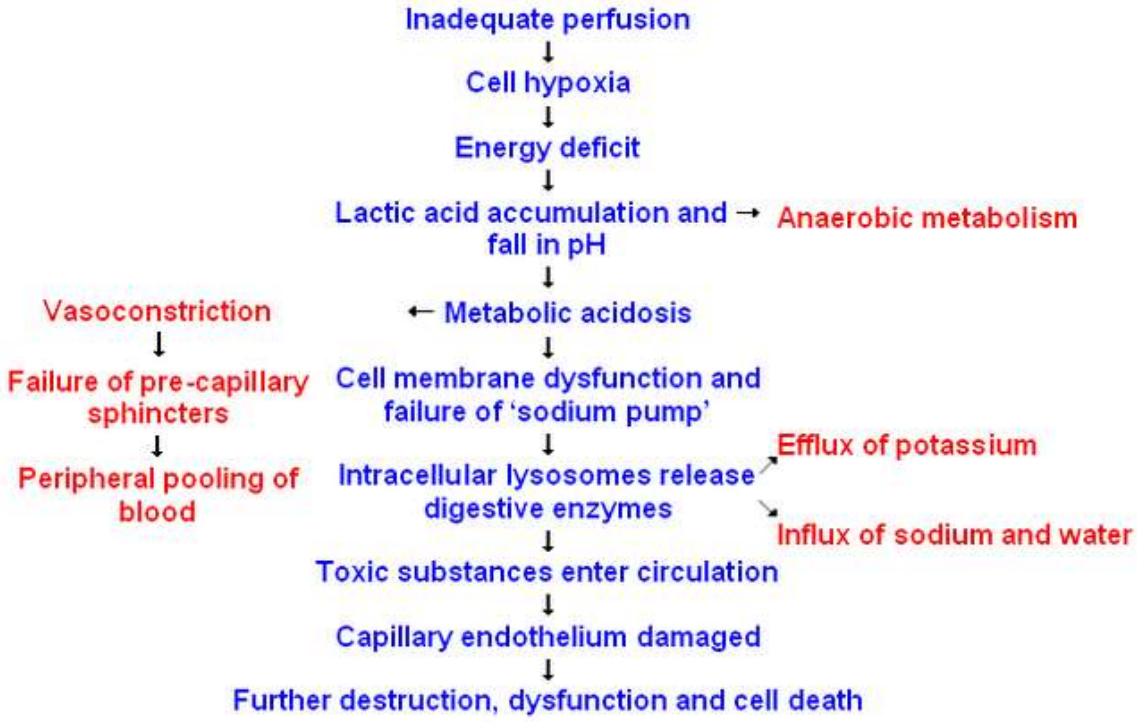
3.IRREVERSIBLE DECOMPENSATED SHOCK:-

When the shock is so severe that in spite of compensatory mechanisms and despite therapy and control of etiologic agent which caused the shock, no recovery takes place, it is called decompensated or irreversible shock.

Its effects due to widespread cell injury include the following:

i) Progressive vasodilatation. During later stages of shock, anoxia damages the capillary and venular wall and arteioles become unresponsive to vasoconstrictors listed above and begin to dilate.

ii) Vasodilatation results in peripheral pooling of blood which further deteriorate the effective circulating blood volume



Management

The best evidence exists for the treatment of septic shock in adults. However, the pathophysiology of shock in children appears to be similar so treatment methodologies have been extrapolated to children. Management may include securing the airway via intubation if necessary to decrease the work of breathing and for guarding against respiratory arrest. Oxygen supplementation, intravenous fluids, passive leg raising (not Trendelenburg position) should be started and blood transfusions added if blood loss is severe.In select cases, compression devices like non-pneumatic anti-shock garments (or the deprecated military anti-shock trousers) can be used to prevent further blood loss and concentrate fluid in the body's head and core. It is important to keep the person warm to avoid hypothermia as well as adequately manage pain and anxiety as these can increase oxygen consumption. Negative impact by shock is reversible if it's recognized and treated early in time.

Fluids

Aggressive intravenous fluids are recommended in most types of shock liter normal saline bolus over 10 minutes or 20 mL/kg in a child) which is usually instituted as the person is being further evaluated.Colloids and crystalloids appear to be equally effective with respect to outcomes.,Balanced crystalloids and normal saline also appear to be equally effective in critically ill patients. If the person remains in shock after initial resuscitation, packed red blood cells should be administered to keep the hemoglobin greater than 100 g/L.

For those with hemorrhagic shock, the current evidence supports limiting the use of fluids for penetrating thorax and abdominal injuries allowing mild hypotension to persist (known as permissive hypotension).Targets include a mean arterial pressure of 60 mmHg, a systolic blood pressure of 70–90 mmHg,or until the patient has adequate mentation and peripheral pulses. Hypertonic fluid may also be an option in this group.

Medications

Epinephrine auto-injector

Vasopressors may be used if blood pressure does not improve with fluids. Common vasopressors used in shock include: norepinephrine, phenylephrine, dopamine, and dobutamine.

There is no evidence of substantial benefit of one vasopressor over another;however, using dopamine leads to an increased risk of arrhythmia when compared with norepinephrine. Vasopressors have not been found to improve outcomes when used for hemorrhagic shock from trauma but may be of use in neurogenic shock. Activated protein C (Xigris), while once aggressively promoted for the management of septic shock, has been found not to improve survival and is associated with a number of complications. Activated protein C was withdrawn from the market in 2011, and clinical trials were discontinued.The use of sodium bicarbonate is controversial as it has not been shown to improve outcomes. If used at all it should only be considered if the blood pH is less than 7.0.

People with anaphylactic shock are commonly treated with epinephrine. Antihistamines, such as Benadryl (diphenhydramine) or ranitidine are also commonly administered. Albuterol, normal saline, and steroids are also commonly given.

Mechanical support

Intra-aortic balloon pump (IABP) – a device inserted into the aorta that mechanically raises the blood pressure. Use of Intra-aortic balloon pumps is not recommended in cardiogenic shock.

Ventricular assist device (VAD) – A mechanical pump that helps pump blood throughout the body. Commonly used in short term cases of refractory primary cardiogenic shock.

Artificial heart (TAH)

Extracorporeal membrane oxygenation (ECMO) – an external device that completely replaces the work of the heart.

Treatment goals

Clinical Features and Complications

The classical features of decompensated shock are characterised by depression of 4 vital processes:

Very low blood pressure Subnormal temperature Feeble and irregular pulse Shallow and sighing respiration

In addition, the patients in shock have pale face, sunken eyes, weakness, cold and clammy skin.

Life-threatening complications in shock are due to hypoxic cell injury resulting in immuno-inflammatory responses and activation of various cascades (clotting, complement, kinin).

These include the following*:

1. Acute respiratory distress syndrome (ARDS)

2. Disseminated intravascular coagulation (DIC)

3. Acute renal failure (ARF)

4. Multiple organ dysfunction syndrome (MODS) With progression of the condition, the patient may develop stupor, coma and death

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