MJF College of Veterinary & Animal Sciences, Jaipur.

Shock

Dr. Kuldeep
Assistant Professor
MJFCVAS, CHOMU

SHOCK

- SHOCK can be defined as an imbalance between oxygen delivery and oxygen consumption such that the delivery of oxygen does not meet the needs of the tissues.

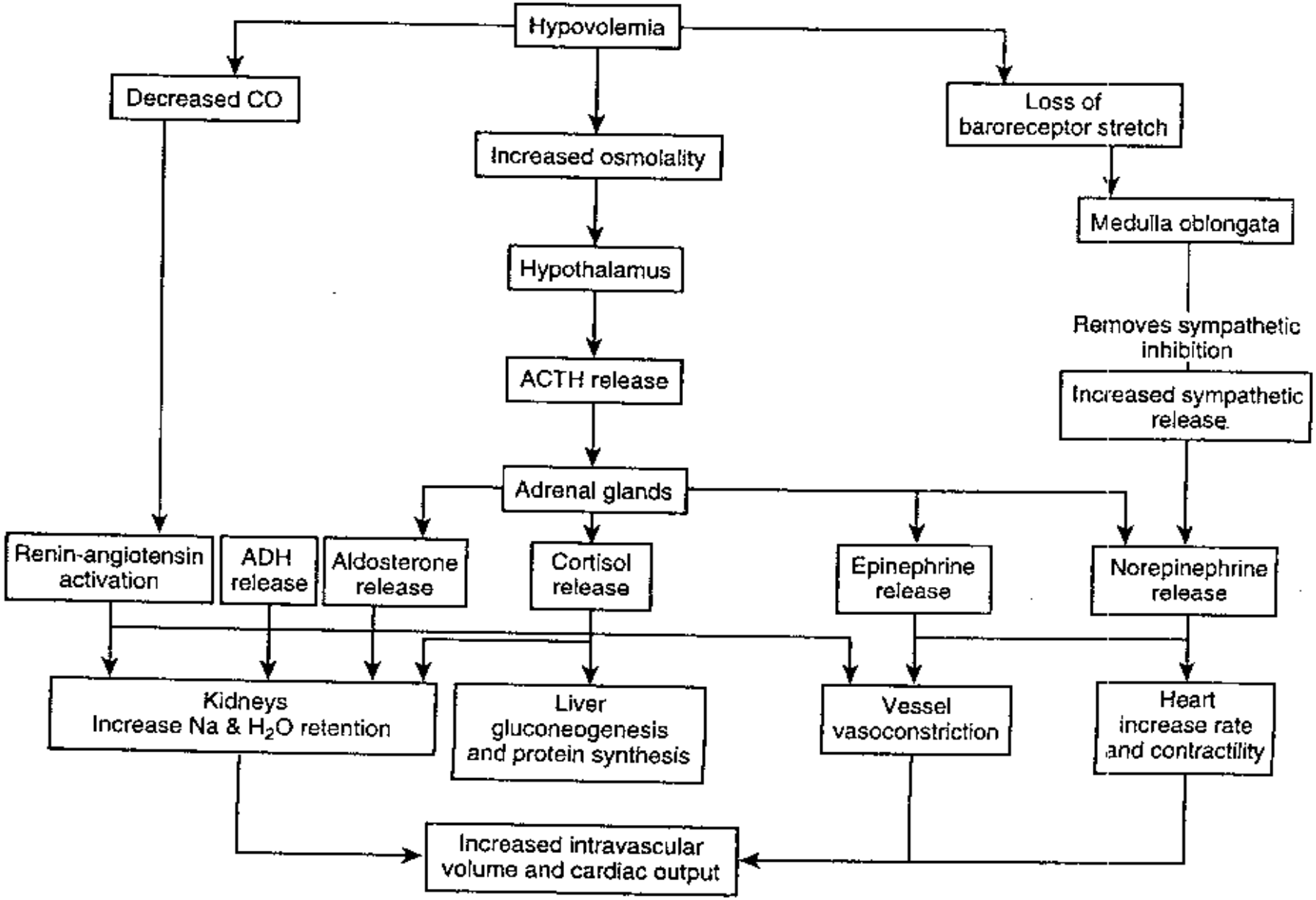
- The underlying problem of all causes of shock is a decrease in effective blood flow and oxygen delivery to tissues that does not meet demand of tissues.

- **Poor tissue perfusion** initiates a complex series of events that eventually result in:

- ✓ Altered cellular metabolism
- ✓ Cellular death
- ✓ Organ failure and ultimately Death.

PATHOPHYSIOLOGY

- The initiating event of shock is ***poor tissue perfusion.***



Neurohormonal responses to a decrease in intravascular volume.

In early shock, blood flow is maintained to the brain and heart at the expense of intestinal tract ,liver ,kidney and other organs.

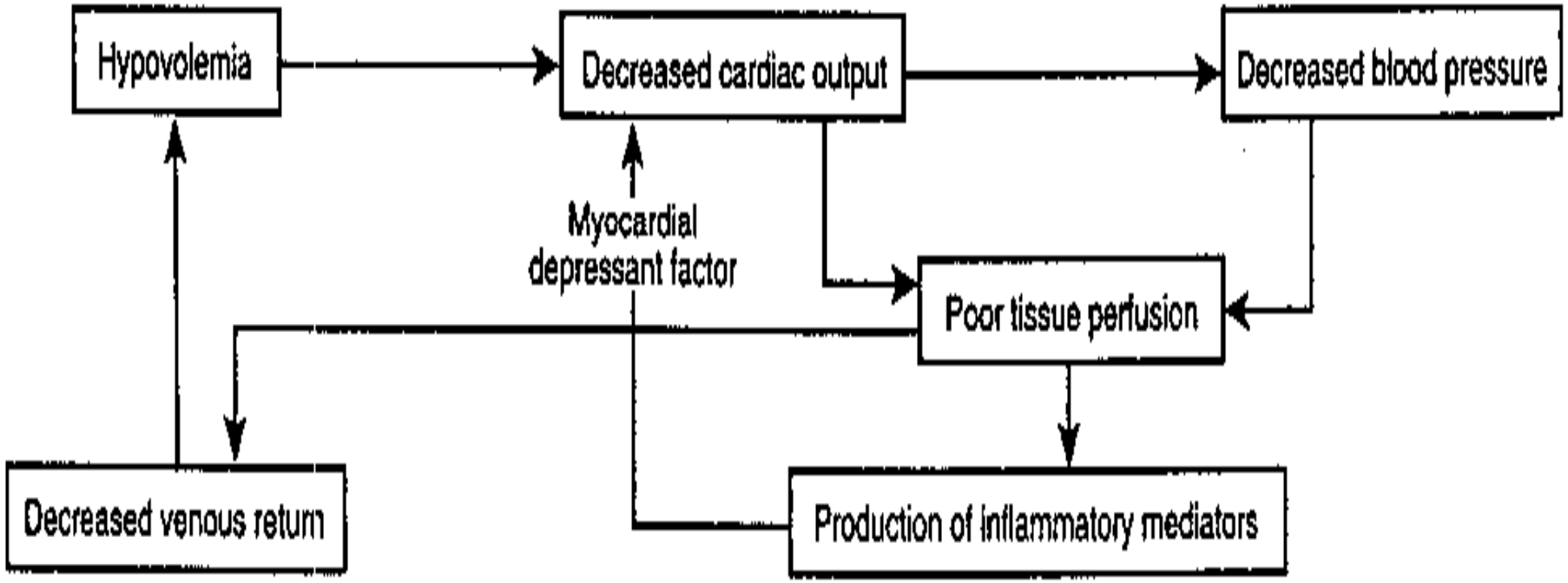
The neurohormonal response cause vasoconstriction of major arteries and veins and of capillaries

Both precapillary and postcapillary vessels constrict

Precapillary consriction results in decreased perfusion to tissue=➔ anaerobic metabolism

Precapillary vessels dilate and postcapillary vessels remain constricted

Increased blood flow to the capillary system and pooling in venules (maldistribution of blood flow)



Circulatory events that lead to the vicious circle (circulus vitiosus) of shock.

Clinical Signs and Stages of Shock

Clinical Stage of Shock	Characteristics	Clinical Signs
Compensatory stage	Increases in CO, HR, and SVR Neurohormonal response Hypermetabolic hyperdynamic state	Mild increases in HR, RR Normal mentation and blood pressure "Brick" red MM CRT <1 sec
Early decompensatory stage	Redistribution of blood flow to heart and brain Consumption of oxygen dependent on oxygen delivery Development of lactic acidosis	Tachycardia, tachypnea Pale MM Poor CRT, weak pulse, poor mentation Usually hypothermia, hypotension
Decompensatory (terminal) stage	Autoregulatory escape Sympathetic center lost Chronotropic and inotropic response lost	Low heart rate despite low CO Absent CRT Severe hypotension

Classification of Shock

1) **Hypovolemic shock**

- Severe hemorrhage
- Severe dehydration
- Loss of I/V volume

- Decrease in oxygen delivery

Clinical presentation of *hemoperitoneum* and coagulopathies etc

2) Cardiogenic shock

- Respiratory distress
- Exercise intolerance
- Crackles
- Cardiac murmurs

Obstructive shock– Pericardial tamponade

Heartworm disease,pulmonary thrombo-embolism,intracardiac neoplasia,CHF

In GDV ,caudal venacava obstruction lead to decreased ventricular filling

- In *Cardiogenic shock* there is decrease in myocardial contractility and decreased oxygen delivery

- ***In Cardiogenic shock aggressive fluid therapy may be fatal***

3)Vasogenic / Distributive shock

- *Septic shock-*--cytokines----vasodilation--~~------affect capillary circulation~~

- *Traumatic shock(neurogenic inju-*

  pain induced vasoconstriction
- *Anaphylactic shock-*--IgE mediated massive dilation

4) Metabolic shock

- ✓ Cellular metabolic machinery disturbed
- ✓ Hypoglycemia
- ✓ Cyanide toxicity

5)Hypoxemic shock

- Decrease in oxygen content in arterial blood

- Anemia , severe pulmonary disease
- CO Toxicity
- methemoglobinemia

DIAGNOSIS AND MONITORING

- Clinical signs
- Continous ECG monitoring
- BP measurement
- Blood lactate levels

  (normal less than 2.5 mmol/lit)
- Respiration rate
- Temperature etc

TREATMENT

The goal of Rx in early shock is to *restore effective tissue perfusion* and *oxygenation*

A---**A**irway-----patent airway

B---**B**reathing**—**oxygen supplimentation @5 litre/minute

C---**C**irculation----circulatory support------fluid therapy in all shock syndromes

(except cardiogenic)

D----**D**rugs----drugs to support CO and BP

1) INOTROPES like

Dobutamine @2-15 microgram/kg/min

Dopamine @ 1-5microgram/kg/min

1)VASOPRESSORS like

Epinephrine@ 0.1-0.3 microgram/kg/min

1)OPIOD analgesics like

Butorphanol@ 0.2-0.6mg/kg IV

2)Antiarrythmic drugs like

Lidocaine @ 2mg/kg IV bolus

1) Broad spectrum antibiotics

if external trauma is there

2) Glucocorticoids

- ✓ Anti inflammatory
- ✓ Improve microcirculation

Prednisolone @ 10-20 mg/kg IV

7)FLUID THERAPY

a) ISOTONIC CRYSTALLOIDS

- **TO INCREASE EFFECTIVE CIRCULATORY VOLUME**

The rate of admistration of isotonic crystalloids

- ✓ dogs----@90ml/kg
- ✓ Cats-------@55ml/kg
- ✓ Cattle----@100ml/kg

- ➢ Entire fluid should be administered within 10-25 minutes.

b) Hypertonic solutions

7% NaCl @ 4ml/kg in 5 mins

- ✓ For acute volume resustication in normally hydrated animals

c)Colloids

- ✓ Whole blood @ 22ml/kg/hr
- ✓ Plasma @10-20 ml/kg---restore OP
- ✓ Packed RBC---hemolytic anemia
- ✓ Hetastarch @10-20ml/kg bolus

NOTE

- Fluid administered subcutaneously or in peritoneal cavity is not considered adequate for shock therapy.

- The IV fluid adminstered distribute into ECF compartment so only about ***25%*** of the delivered volume remains in the IV space by 30 minutes after infusion

- THANKS