Shock

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Shock

• Inadequate blood flow throughout the body which might lead to damage the tissues due to less supply of O2 and other nutrients
The causes of shock

- Due to decreased CO (Cardiogenic shock):
  
  A. Cardiac abnormalities
  1. Myocardial infarction
  2. Toxicity
  3. Valves dysfunction
  4. Arrhythmias
The causes of shock

B. Factors that decrease venous return
   1. Decreased blood volume
   2. Decreased vascular tone
   3. Obstruction to blood flow
The causes of shock

• Without diminished CO
  1. Increased body metabolism
  2. Abnormal tissue perfusion

N.B. the arterial pressure is not the principle measure of the adequacy of circulatory function
Stages of shock

- **Nonprogressive stage** (compensated stage), normal compensatory mechanisms will cause recovery
- **Progressive stage**, steadily worse till death
- **An irreversible stage**, no kind of treatment could protect the person’s life
Shock caused by hypovolemia-hemorrhagic shock

• Figure 1 p. 254
Sympathetic Reflex Compensations in Shock

• Hemorrhage $\rightarrow$ ↓ arterial pressure $\rightarrow$
  ↑ baroreceptors $\rightarrow$ ↑ sympathetic activity, resulting in:

1. Constrict the arterioles and ↑ TPR
2. Maintain adequate venous return
3. ↑ Heart activity
Sympathetic Reflex Compensations in Shock

- In the absence of Sympathetic activity, less amount of hemorrhage leads to death.
- Last-ditch stand: the plateau in arterial pressure curve.
- Protection of cerebral and cardiac blood flow by the excellent local autoregulation mechanism, in addition, no significant constriction by the sympathetic innervation on these vessels.
Progressive Shock (positive feedbacks)

- Cardiac depression
- Vasomotor failure
  - First 4-8 min of cerebral circulatory arrest → intensive sympathetic discharges
  - 10-15 min of cerebral circulatory arrest → depressed sympathetic discharge

N.B. vasomotor failure occurs in the late stage of Shock
Progressive Shock (positive feedbacks)-cont

- Blockage of vessels (sludged blood)
  - Due to waste products and acidosis of blood
- Increased capillary permeability (after many hours, late stage of shock)
  - Due to hypoxia and lack of nutrients
- Release of toxins by ischemic tissue
- Cellular deterioration
- Acidosis in Shock
Non-progressive Shock (negative feedback control mechanisms)

- Baroreceptor reflexes
- Central nervous system ischemic response
- Reverse stress-relaxation of the circulatory system
- Angiotensin secretion by the kidneys
- Vasopressin (antidiuretic hormone), constricts the peripheral arteries and veins
- Other compensatory mechanisms to readjust the blood volume
Body response to Shock

- Sympathetic compensation (30 sec)
- Other compensatory mechanisms (10min-1hour)
- Absorption of fluid from different sources to increase blood volume (1-48hour)
Irreversible shock

- The inability of saving person’s life
- Returning the cardiac output or arterial pressure to normal will not help
Neurogenic Shock

- Increased vascular capacity due to sudden loss of vasomotor tone (neurogenic shock)
Causes of Neurogenic Shock

- Deep general anesthesia
- Spinal anesthesia
- Brain damage
Anaphylactic Shock and Histamine Shock

- An allergic condition, due to entrance of certain antigen into the circulation
- Basophils produce histamine which causes
  a) Increased vascular capacity
  b) Dilatation of arterioles
  c) Increased capillary permeability
Septic Shock

• Due to bacterial infection
• Causes of septic shock
  1. Unsterilized operations, peritonitis
  2. Skin infection leads to general body infection generalized gangrenous infection
  3. Renal infection
Special features of septic shock

1. High fever
2. Vasodilatation
3. High cardiac output
4. Development of blood clots
5. Sludging of the blood