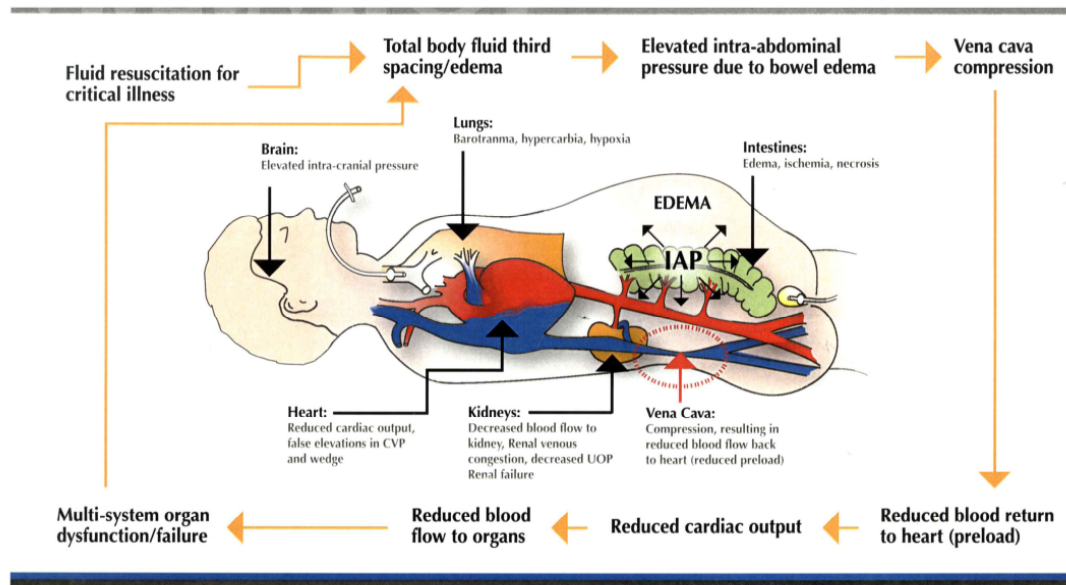


Figure: Organ Pathophysiology of intra-abdominal hypertension

What Happens to the Body's Organs? A Vicious Cycle



- 1. Gastrointestinal:** Cytokine induced capillary leaking causes edema to occur throughout the body including the abdominal cavity. The edema within the abdominal cavity leads to distention of the abdomen and an increase in the intra-abdominal pressure. As this elevated pressure reaches the level of the pressure within the venous system (6-8 mm Hg), the venous structures in the abdomen and retroperitoneal spaces are compressed. If the pressure continues to rise until it reaches the pressure within the capillary bed (15-25 mm Hg) capillary blood flow is obstructed. The result is reduced venous flow, venous congestion and worsened ischemia. This ischemia leads to further capillary leak, further elevations in intra-abdominal pressure and eventually bowel necrosis.
- 2. Cardiovascular:** Elevated pressure in the abdominal cavity compresses the vena cava, reducing blood flow through the vena cava to the heart. This drop in venous return (reduced preload) leads to a reduction in cardiac output. As the cardiac output falls, the body responds by vasoconstriction (increased SVR or afterload) to maintain an adequate central blood pressure. The vasoconstriction in combination with the reduced cardiac output leads to further reduction in blood flow to tissue with worsened ischemia in the intestines and kidneys.
- 3. Pulmonary:** As the intra-abdominal pressure rises, it pushes the diaphragms cephalad (upward into the chest) reducing intrathoracic volume and increasing intrathoracic pressure. In response, to maintain an adequate tidal volume, the peak

pressures rise as the ventilator drives the air into the lung. This leads to barotrauma and eventually hypercarbia and hypoxia. As the pressure remains elevated and ischemic injury progresses, inflammatory mediators are released from the gut. These inflammatory mediators cause pulmonary capillary damage leading to interstitial edema and an ARDS like syndrome. Simultaneously, the elevated intrathoracic pressure causes reduced blood flow into the chest, further reducing preload and impacting cardiac output. In addition, if central vein catheters are being used for hemodynamic monitoring, they transmit this increased intrathoracic pressure out to the transducer and falsely elevated CVP and wedge pressures are detected.

- 4. CNS:** The elevated intrathoracic pressure causes by intra-abdominal hypertension inhibits venous return to the chest, leading to congestion in the veins of the neck and arms. This congestion continues up through the internal jugular vein into the cranial vault, leading to elevations of intracranial pressure.
- 5. Renal:** Compression of the retroperitoneal veins (including the renal vein) and renal parenchyma by intra-abdominal hypertension leads to congestion of the kidneys. Simultaneously the reduced cardiac output leads to decreased renal perfusion. This combination causes glomerular filtration to drop, urine output to drop and renal insufficiency and eventually failure may occur.