Department of Anesthesia Techniques
Title of the lecture:- Common disorders of fluid & electrolytes imbalance

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Hypervolemia

Is an abnormal increase in the volume of fluid in the blood, particularly the blood plasma. Hypervolemia, which is often referred to as fluid overload can occur as the result of :

- Increased sodium in the body which is hypernatremia.
- Excessive fluid supplementation that cannot be managed effectively by the body.
- Disorders and diseases such as hepatic failure, renal failure and heart failure.

The signs and symptoms of hypervolemia include

- Hypertension
- Dyspnea
- Adventitious breath sounds such as crackles
- Abdominal ascites
- Bulging and distended jugular veins with pulsations
- Peripheral edema in hands, feet and/or ankles, tachycardia, and strong pulse

In addition to **treating** the underlying cause whenever possible, other treatments for hypervolemia include fluid and sodium restrictions and diuretics.

Hypovolemia

Is a deficit of bodily fluids. can occur as the result of :-

- Secondary to bleeding and hemorrhage.
- Severe dehydration.
- Vomiting, and diarrhea.

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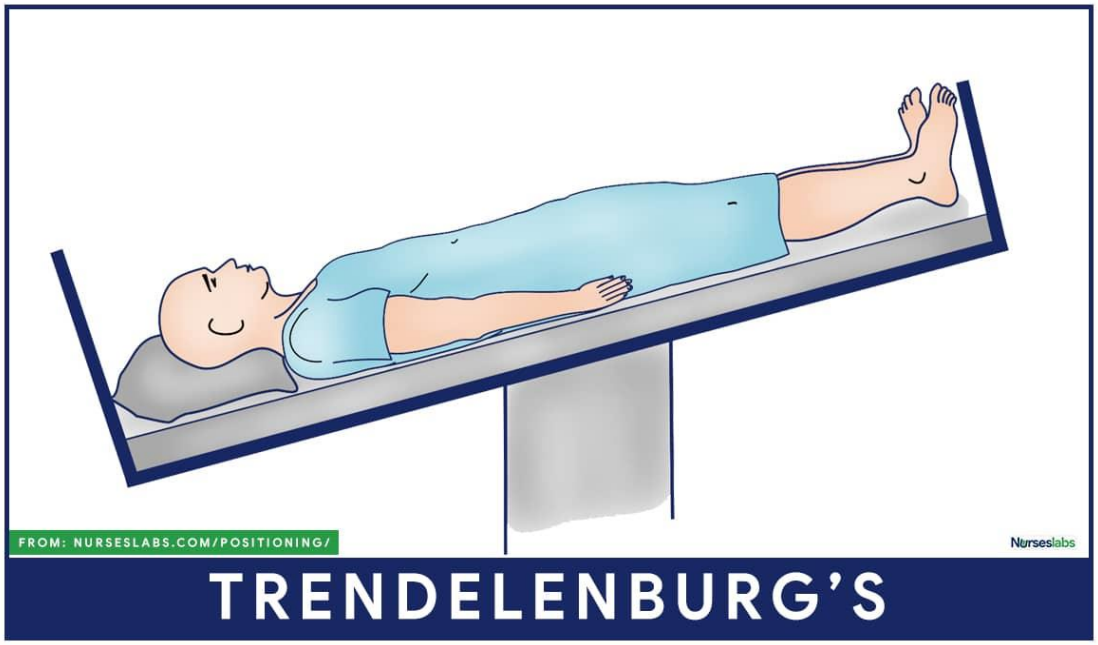
This fluid deficit can lead to complications such as

- Decreased cardiac output;
- Hypovolemic shock;
- Metabolic acidosis;
- Multisystem failure;
- Coma and death.

The treatment of an underlying disorder are:-

- Intravenous rehydration with fluids such as lactated Ringers
- The placement of the patient in the Trendelen burg position
- Administration of plasma expanders, blood and blood products as indicated by the nature of the patient status and the severity of the hypovolemia.



Diabetic ketoacidosis

Diabetic ketoacidosis (DKA) is a life-threatening problem that affects people with diabetes. It occurs when the body starts breaking down fat at a rate that is much too fast. The liver processes the fat into a fuel called ketones which causes the blood to become acidic.

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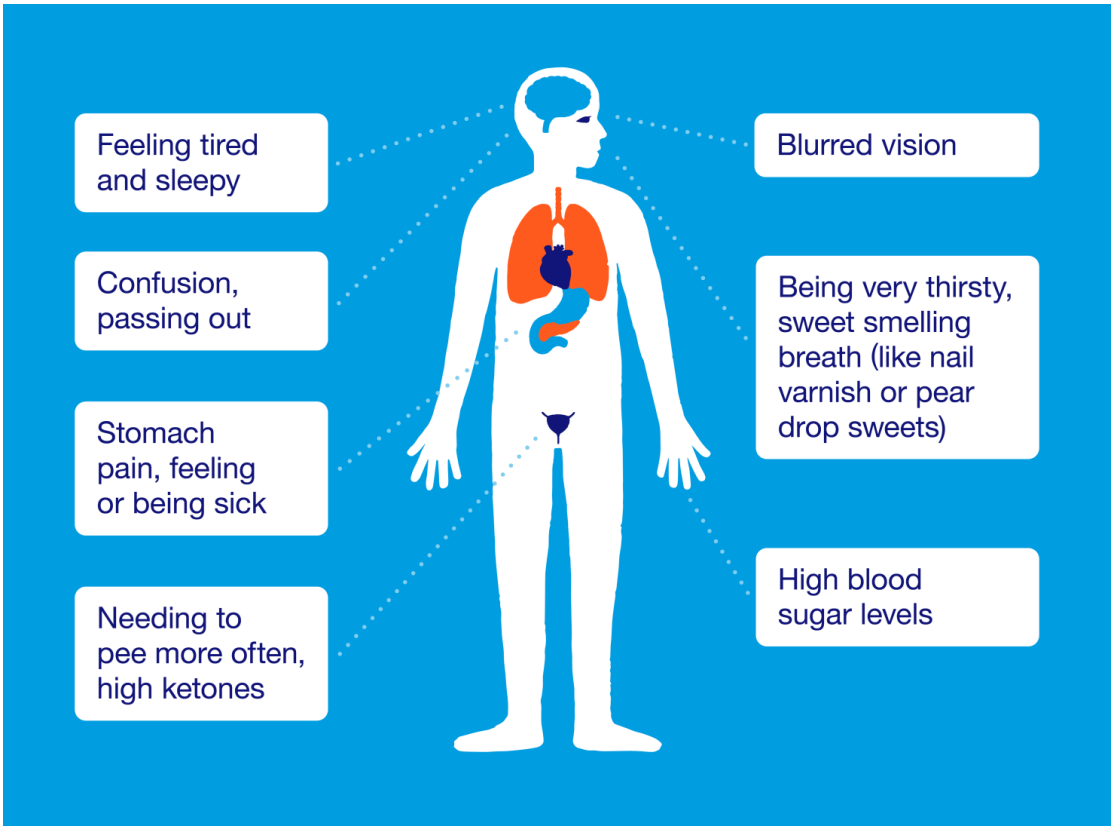
Causes

- ♣ DKA happens when the insulin in the body is so low that;
- ♣ Glucose (blood sugar) can't go into cells to be used as a fuel source;
- ♣ Fat is broken down too rapidly for the body to process.



The fat is broken down by the liver into a fuel called ketones

Ketones are normally produced when the body breaks down fat after a long time between meals. When ketones are produced too quickly and build up in the blood and urine, they can be toxic by making the blood acidic. This condition is known as ketoacidosis

DKA is sometimes the first sign of type 1 diabetes in people who have not yet been diagnosed.

People with type 2 diabetes can also develop DKA, but it is less common and less severe. It is usually triggered by prolonged uncontrolled blood sugar.

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Anesthesia, surgery and fluid balance

Many patients are dehydrated before theatre owing to prolonged fasting, the use of purgatives or diuretic therapy. Therefore, a general tendency towards hypovolemia is usually present leading to thirst and vasopressin secretion.

There are two main components to the stress response to surgery

- **The neuroendocrine response**
- **Cytokine response**

The **neuroendocrine response** is stimulated initially by **painful afferent neural** stimuli reaching the CNS and **central baroreceptors** which cause increased ADH activity. It may be diminished by dense neural blockade from anesthesia.

The **cytokine response** is stimulated by local tissue damage at the site of surgery itself (the more extensive the surgery the higher the response) and is independent of neural blockade

The most important response to anesthesia and surgery in the perioperative period is **sodium and water retention**. In general, the tendency to retain water is directly related to the magnitude of surgery. A number of factors may contribute to this including

- The effects of anesthetic agents on renal blood flow and GFR;
- Effects of intraoperative hypotension or hypovolemia on renal function;
- Increased sympathetic tone a causing renal vasoconstriction;
- Increased plasma cortisol and aldosterone levels in response to the stress of surgery.

One of the most important of these is the **increase in ADH activity**. During surgery the ADH concentration may increase 50–100-fold. This concentration falls at the end of surgery but does not return to normal for 3–5 days (similar to the period of postoperative oliguria).

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This response is partly related to:-

- Drugs;
- Pain ;
- The stress of surgery;
- Loss of intravascular fluid into cells;
- Sequestration and immobilization in damaged tissues.