



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.

CAUSES:

1/ Excessive sodium and/or fluid intake:

- IV therapy containing sodium
- As a transfusion reaction to a rapid blood transfusion
- High intake of sodium

2/ Sodium and water retention:

- Heart failure
- Liver cirrhosis
- Nephrotic syndrome
- Corticosteroid
- Hyperaldosteronism
- Low protein

3/ Fluid shift into the intravascular space:

- Fluid remobilization after burn treatment
- Administration of hypertonic fluids, e.g. mannitol or hypertonic saline solution
- Administration of plasma proteins, such as albumin

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.

TREATMENT:

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.

CAUSES:

1/ Kidney:

- + Loss of body sodium and consequent intravascular water (due to impaired reabsorption of salt and water in the tubules of the kidneys).
- Osmotic diuresis: the increase in urine production due to an excess of osmotic (glucose) and urea load in the tubules of the kidneys.
- Overuse of pharmacologic diuretics.
- Impaired response to hormones controlling salt and water balance
- Impaired kidney function due to tubular injury or other diseases

2/ Others:

- + Loss of bodily fluids due to:
 - Gastrointestinal losses; e.g. vomiting and diarrhea
 - Skin losses; e.g. excessive sweating and burns
 - Respiratory losses; e.g. hyperventilation (breathing fast)
- + Build up of fluid in empty spaces (third spaces of the body due to:
 - Acute pancreatitis
 - Intestinal obstruction
 - Increase in vascular permeability



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- Hypoalbuminemia
- ✚ Loss of blood (external or internal bleeding or blood donation).

This fluid deficit can lead to complications such as:

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

TREATMENT:

The treatment of an underlying disorder are:-

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

PATHOPHYSIOLOGY:

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, so that 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.

CLINICAL MANIFESTATION:

Diabetic ketoacidosis symptoms often come on quickly, sometimes within 24 hours. For some, these symptoms may be the first sign of having diabetes.

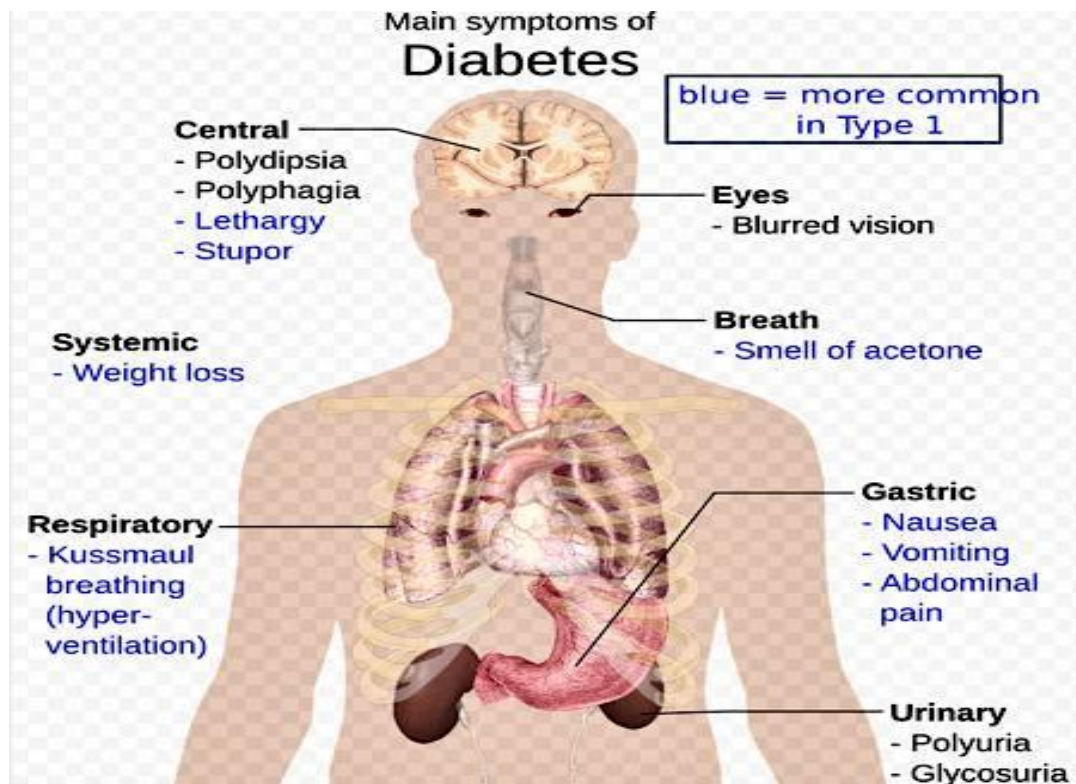


Symptoms might include:

- Being very thirsty.
- Urinating often.
- Feeling a need to vomit and vomiting.
- Having stomach pain.
- Being weak or tired.
- Being short of breath.
- Having fruity-scented breath.
- Being confused.

More-certain signs of diabetic ketoacidosis include:

- High blood sugar level.
- High ketone levels in urine.





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 causing renal vasoconstriction.
- ✚ Increased plasma cortisol and aldosterone levels in response to the stress of surgery.



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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).

This response is partly related to:-

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