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Discuss the diseases of the renal system

Renal failure refers to failure of excretory functions of kidney. It is usually, characterized by decrease in glomerular filtration rate (GFR). So GFR is considered as the best index of renal failure. However, decrease in GFR is not affected much during the initial stages of renal failure. If 50% of the nephrons are affected, GFR decreases only by 20% to 30%. It is because of the compensatory mechanism by the unaffected nephrons.

The renal failure may be either acute or chronic.

Renal failure is always accompanied by other complications such as:

1. Deficiency of calcitriol (activated vitamin D) resulting in reduction of calcium absorption from intestine and hypocalcemia. Deficiency of calcitriol and hypocalcemia may cause secondary hyperparathyroidism in some patients
2. Deficiency of erythropoietin resulting in anemia
3. Disturbances in acidbase balance.

ACUTE RENAL FAILURE

Acute renal failure is the abrupt or sudden stoppage of renal functions. It is often reversible within few days to few weeks. Acute renal failure may result in sudden life-threatening reactions in the body with the need for EMERGENCY TREATMENT CAUSES

1. Acute nephritis (inflammation of kidneys), which usually develops by immune reaction.
2. Damage of renal tissues by poisons like lead, mercury and carbon tetrachloride.
3. Renal ischemia, which develops during circulatory shock.
4. Acute tubular necrosis (necrosis of tubular cells in kidney) caused by burns, hemorrhage, snake bite, toxins (like insecticides, heavy metals and carbon tetrachloride) and drugs (like diuretics, aminoglycosides and platinum derivatives).
5. Severe transfusion reactions.
6. Sudden fall in blood pressure during hemorrhage, diarrhoea, severe burns and cholera.

7. Blockage of ureter due to the formation of calculi (renal stone) or tumor.

FEATURES

1. Oliguria (decreased urinary output)
2. Anuria (cessation of urine formation) in severe cases.
3. Proteinuria (appearance of proteins in urine) including albuminuria (excretion of albumin in urine).
4. Hematuria (presence of blood in urine).
5. Edema due to increased volume of extracellular fluid (ECF) caused by retention of sodium and water.
6. Hypertension within few days because of increased ECF volume.
7. Acidosis due to the retention of metabolic end products.
8. Coma due to severe acidosis (if the patient is not treated in time) resulting in death within 10 to 14 days.

CHRONIC RENAL FAILURE

Chronic renal failure is the progressive, long standing and irreversible impairment of renal functions. When some of the nephrons lose the function, the unaffected nephrons can compensate it. However, when more and more nephrons start losing the function over the months or years, the compensatory mechanism fails and chronic renal failure develops.

CAUSES

1. Chronic nephritis.
2. Polycystic kidney disease.
3. Renal calculi (kidney stones).
4. Urethral constriction.
5. Hypertension.
6. Atherosclerosis.
7. Tuberculosis.
8. Slow poisoning by drugs or metals.

FEATURES

1. Uremia

Uremia is the condition characterized by excess accumulation of end products of protein metabolism such as urea, nitrogen and creatinine in blood. There is also accumulation of some toxic substances like organic acids and phenols. Uremia occurs because of the failure of kidney to excrete the metabolic end products and toxic substances.

Common features of uremia

i. Anorexia (loss of appetite)

ii. Lethargy

iii. Drowsiness

iv. Nausea and vomiting

v. Pigmentation of skin

vi. Muscular twitching, tetany and convulsion

vii. Confusion and mental deterioration

viii. Coma.

2. Acidosis: Uremia results in acidosis, which leads to coma and death.

3. Edema: Failure of kidney to excrete sodium and electrolytes causes increase in extracellular fluid volume resulting in development of edema.

4. Blood Loss: Gastrointestinal bleeding accompanied by platelet dysfunction leads to heavy loss of blood.

5. Anemia: Since, erythropoietin is not secreted in the kidney during renal failure, the production of RBC decreases resulting in normocytic normochromic anemia.

6. Hyperparathyroidism: Secondary hyperparathyroidism is developed due to the deficiency of calcitriol (1,25dihydroxycholecalciferol). It increases the removal of calcium from bones resulting