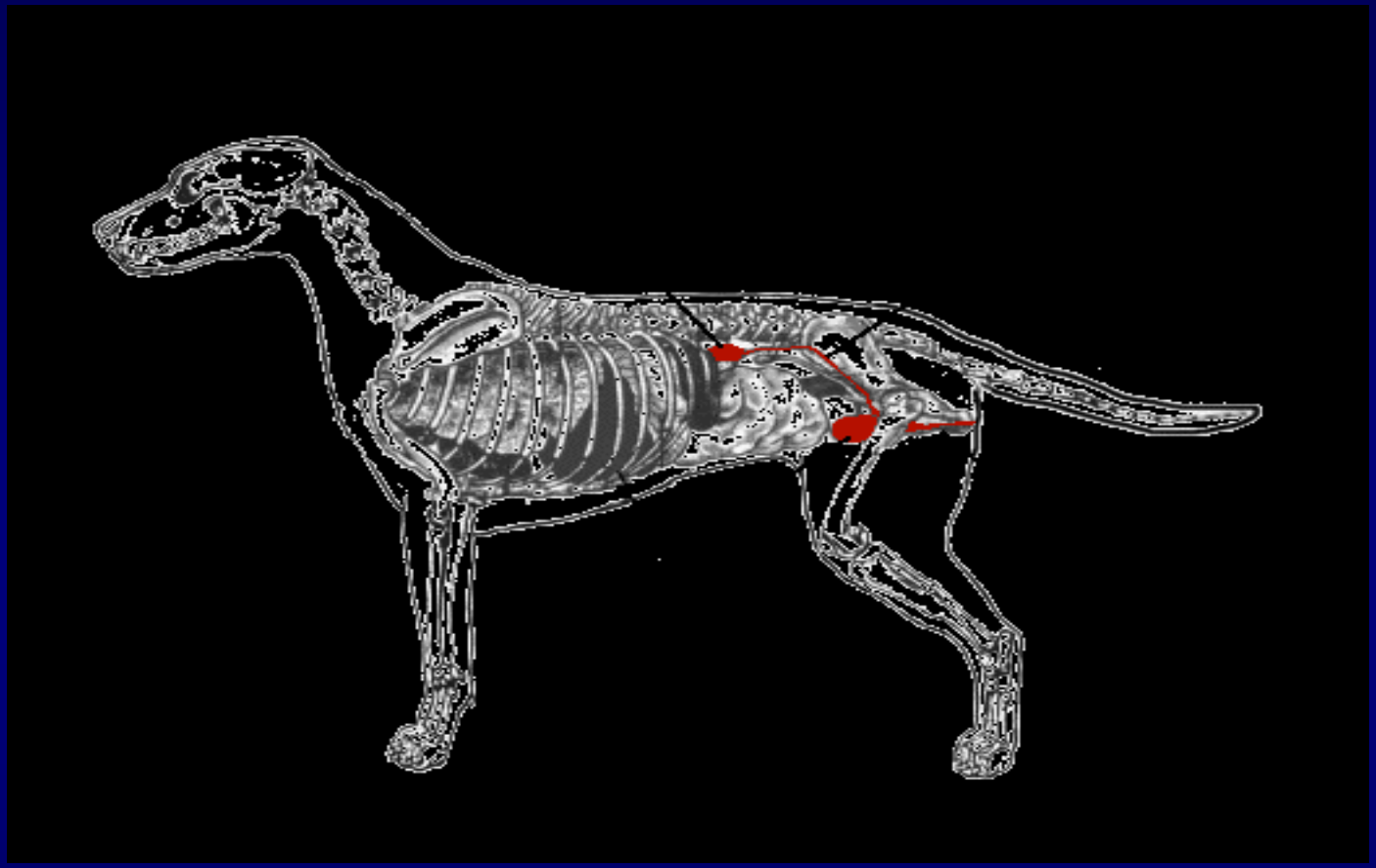
DISEASES OF urinary SYSTEM

Kidneys in dogs



The right kidney which is, somewhat fixed, is located under the sublumber muscles at the level of first, second, and third lumber vertebrae.

The left kidney, which is loosely attached to the peritoneum, lies on the symmetrical position of the right kidney when the stomach is empty. But it may go backward up to the level of the third, fourth; or fifth lumber vertebrae when it is full.

The function of the kidney depends on:

- Blood pressure or adequate perfusion of the blood in the renal artery which is a branch of the aorta.
- The efficiency of the healthy renal tissue, which reflect the adequacy of the nephron unit for filtration.
- The adequacy of the renal system to permit adequate free flow of the urine posterior to the kidneys.
- **The process of urine formation passes through 2 main stages, the formation of diluted urine and the formation of concentrated urine.**

Renal failure

- Renal failure is a term applied to describe a case of disease affection that results in loss of 75% of its kidneys functioning tissue.

Types of renal failure

- Renal failure could be classified according to the situation of the cause into:
  - Pre-renal failure:
  - Primary renal failure:
  - Post –renal failure:

Pre-renal failure:

- This condition is usually due to some affection that results in an inadequate blood pressure in the renal artery as in cases of shock, dehydration; and some cardiac diseases.

Primary renal failure:

- This condition is due to affection of the kidney tissue either by inflammatory process, infection, neoplasm or calculi.

Post –renal failure:

- This condition is due to inadequate flow of the concentrated urine in the urinary tract as in cases of obstruction or rupture of the bladder and/or urethra.

Acute and chronic renal failure

- Renal failure may be acute of chronic.
- Both acute and chronic renal failure was terminated in uremia.
- Acute renal failure, although very dangerous, is curable while chronic renal failure is very dangerous and incurable.

Acute renal failure (ARF)

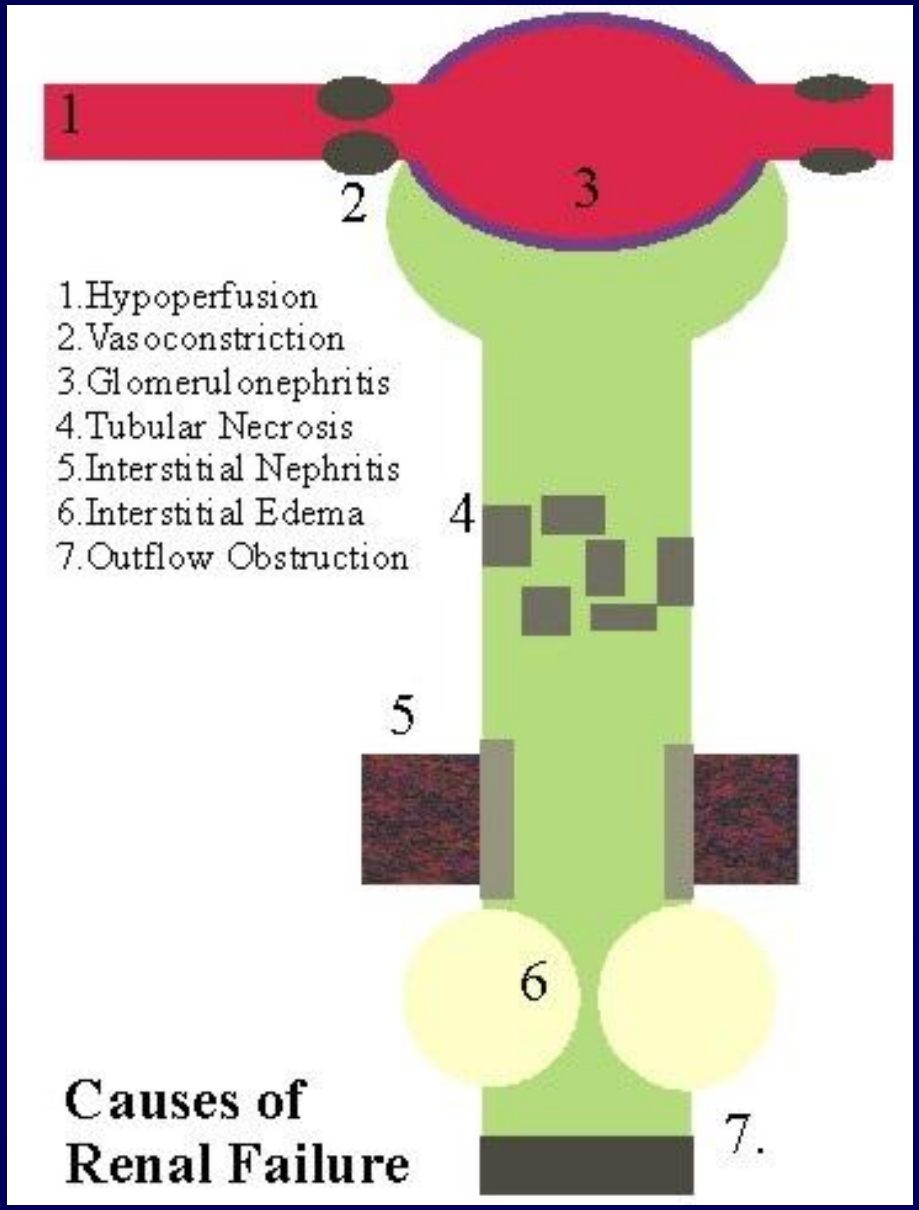
- Definition: It is an acute suppression of renal function Caused by sudden disruption of the functions of all nephrons with no time for compensatory mechanisms,
- ARF differ from chronic renal failure (CRF) in which there is a gradual death of nephrons with the remaining nephrons functioning in a normal or supra normal capacity.
- ARF is potentially reversible whereas CRF is a progressive and irreversible condition.

Possible causes of ARF include:

- **Ischemic injury (hypovpolemia)**
- **Chemical insults (toxins-drugs)**
- **hyperkalemia (uncommon)**
- **Infection (pyelonephritis -** leptospirosis or bacterial kidney infections **)**
- **Glomerular diseases**

Pathogenesis

- **Four major mechanisms are involved in the initiation and maintenance of reduced GFR and reduced urine output.**
  - **Reduced renal blood flow/renal artery vasoconstriction (or thrombi in renal artery)**
  - **Intratubular obstruction (**Drugs such as sulfonamides can precipitate in the lumen of the tubules causing obstruction)
  - **Back leak (reabsorption of urine to blood due to damaged** tubular epithelium
  - **Decreased glumerular permeability.**


1
2
3
1.Hypoperfusion
2.Vasoconstriction
3.Glomerulonephritis
4.Tubular Necrosis
5.Interstitial Nephritis
6.Interstitial Edema
7.Outflow Obstruction
4
5
6
7.
Causes of
Renal Failure

Clinical picture:

- **The clinical course of ARF proceeds through a sequence of overlapping phases:**

1. **Initiation phase (**decreased urine output and increased BUN and creatinine)
2. **Oliguric phase (**majority (80 to 90%) of ARF dogs and cats become oliguric) – increase urea and creatinine with hyperkalemai------ dengrous and fetal
3. **Polyuric phase (**The polyuric phase may indicate the beginning of renal repair and return of function or may be indicative of a less severe insult to the kidneys)- loss of Na and water
4. **Phase of functional recovery (**repairing the renal injury, BUN, creatinine, and urine volume gradually return to normal) – some ARF progress to CRF

Lab diagnosis

- increased total protein and PCV due to hemoconcentration
- Thrombocytopathia is due to the retention of a waste product which makes the platelets less agreeable (less sticky)
- Uremia interferes with the function of WBC which may predispose ARF patients to infection
- Hyperkalemia with ECG abnormalities

There are several causes for polyuria

- Impaired tubular sodium re-absorption causing loss of sodium in the urine.
- Excretion of solutes retained in the oliguric phase (small molecules like urea are osmotically active).
- Impaired response of tubular cells to ADH (nephrogenic diabetes insipidus).

Radiography

- Kidneys are normal to large in patients with ARF as compared to small kidneys in CRF

Treatment of renal failure

I- Immediate care includes:

- Identify if possible, and eliminate the inciting cause
- Correct fluid deficits (dehydration) to reestablish adequate renal perfusion.
- ***Diuretics*** may be administered after fluid replacement when urine production is inadequate
  - Furosemide [lasix] [2 mg/kg IV, if no response in 1-2 hours increase dose to 4 mg/kg IV]
  - Hypertonic dextrose [10-20%] [0.5 g/kg IV over 20 minutes]

- **II- Maintenance treatment:**
- Diets should be comprised of high caloric density fats, carbohydrates and small amounts of high biologic value protein
- Na and K injections in polyuric phase

Treatment of hyperkalemia

- Sodium bicarbonate [0.5-1.0 mEq/kg]
- Sodium bicarbonate combines with hydrogen ions in ECF. This creates a gradient for additional hydrogen ions to move out of cells, into ECF. As hydrogen ions move out of cells, potassium ions move into the cells

Questions