General systemic states 2

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Fourth Stage

Acidemia

- Abnormal decrease in blood PH
- Etiology
- I. Metabolic acidosis
- 1- Increased production of metabolic acids such as lactic acid. 2- Disturbances in the ability to excrete acid by kidneys due to renal failure resulting in accumulation of urea and creatinine. 3- Starvation and diabetic acidosis due to accumulation of ketoacids and reflects a severe shift from glycolysis to lipolysis for energy needs. 4- Acid consumption from poisoning such as methanol ingestion. 5- Increasing the levels of iron in blood. 6- The chronic decrease in the production of bicarbonate.
- II. Respiratory acidosis
- 1- Hypoventilation due to pulmonary problems, head injuries, drugs (especially anaesthetics, sedatives), pneumothorax, emphysema, chronic bronchitis, asthma and severe aspiration pneumonia. 2- Severe hypoxemia causing a fall in the rate of oxygen diffusion from arterial blood to tissues 3- Hypoperfusion causing an inadequate blood delivery of oxygen to tissues. 4- Brain tumors. 5- As a result of compensatory response to chronic metabolic alkalosis. 6- Respiratory acidosis can be caused by administration of diuretics and endocrine disorders such as Cushing's syndrome and depression of ionized fraction of serum calcium.

Alkalemia

- Etiology
- 1- Respiratory alkalosis is caused by a) Hyperventilation resulting in a loss of carbon dioxide. b) Deficit of CO2, e.g. excessive breathing in excitement (Hyperventilation) c) Slow shallow respirations because of lack of CO2 stimulation.
- 2- Metabolic alkalosis can be caused by a) Repeated vomiting resulting in loss of hydrochloric acid with the stomach content. b) Severe dehydration. c) Excessive loss of acid. e.g. gastric abomasal dilatation d) Continuous secretion of HCl and K+ ions into abomasum and failure to reabsorb in intestine e) Overdosing with alkali, usually bicarbonate.
- Notes:
- The Henderson-Hasselbalch equation is useful for calculating blood pH, because blood is a buffer solution.
- In the fetus, the normal range differs based on which umbilical vessel is sampled, so the fetal metabolic acidosis is defined as an umbilical vessel pH of less than 7.2
- Metabolic acidosis is most important in adult animals than in calves.
- The clinical finding of alkalemia is not characteristic enough to be recognized reliably.
- The clinical finding of acidemia includes mental depression with varying degrees of muscular weakness, recumbency in severe cases and increase in rate & depth of respiration because of increased Pco2

Principles & Objectives of Fluid and Electrolyte Therapy

- 1- Prevent or minimize dehydration and electrolyte loss whenever possible through: - a- Provision of an adequate water supply. b- Provision of an adequate drinking space c- Continuous supply of salt and the necessary minerals.
- 2- Treatment of the potential losses of fluid and electrolytes as quickly as possible to minimize the degree of dehydration and acid-base imbalance.
- 3- Provide maintenance therapy until the animal has recovered.
- 4- Correct the abnormalities that could exist at the same time & must be corrected. There are at least 4 possible abnormalities are:- a- Fluid volume deficit. b- Plasma osmolar deficits. c- Specific electrolyte imbalances. d- Acid-base imbalance.
- There are two major problems that may occur:- 1- How to determine the nature and degree of the abnormalities present. 2- How to decide which fluid and electrolyte replacement solution should be used.
- Types of intravenous fluids: Fluids can be categorized based on their:- 1- Physical nature (crystalloid or colloid). 2- Osmolarity (hypotonic, isotonic or hypertonic).

Principles & Objectives of Fluid and Electrolyte Therapy

- Examples 1- Hypotonic crystalloid solutions (Dextrose 5%). 2- Isotonic crystalloid solutions (Lactated Ringer's solution, Ringer's solution & 0.9% NaCl solution). 3- Hypertonic crystalloid solutions (NaCl 7.2% , Calcium gluconate 23% or Calcium borogluconate) 4- Colloid solutions contain a substance that is too large to pass through a semipermeable membrane such as whole blood, plasma, Dextrans and gelatins.
- Fluids are usually given for two purposes:-
- 1- Hydration therapy in the first (4-6) hours at a rate depending on the degree of dehydration is given. **Mild dehydration = 5-10 mL/ kgBw. IV; Moderate dehydration 25-30 mL/ kgBw. IV; Sever dehydration100-150 mL/kg BW. IV**
- 2- Maintenance therapy in the next 20-24 hours, depending on the severity and the course of the disease at 40-60 ml/kg B.W. /24 hours intravenously.
- 3- ongoing loss: such as diarrhea or vomiting is estimated in 24 hours
- Rate of administration depends on: 1- The size of the animal. 2- The severity of the illness. 3- The type of fluids being administered. 4- The response of the animal to the fluids.
- Routes of administration 1- Parenteral fluid therapy (SC, IV, IP, OS). 2- Oral fluid therapy

Pain

- Pain is a distressing sensation arising from stimulation of specific end-organs in particular parts of the body and perceived in the thalamus and cerebral cortex.
- Pain is basically a protective mechanism to ensure that the animal moves away from noxious (damaging) influences, but endogenous pain, arising from internal damaging influences, causes its own physiological and pathological problems that require the veterinarian's intervention.
- A major difficulty with pain in animals is the difficulty of pain measurement. Pain is a subjective sensation known by experience and which can be described by illustration, but measurement of pain is an indirect activity related to its effects and is an objective phenomenon

Pain

- Pain is assessed in animals by three methods :
- 1- Observation of behavior.
- 2- Measurement of physiological parameters including heart rate, blood pressure, sweating and polypnea that indicate sympathetic activation.
- 3- Measurement of the plasma concentration of factors that indicate sympathetic activation such as plasma cortisol, epinephrine, norepinephrine and non-esterified fatty acid concentrations.
- The detrimental effects of pain include : 1- Suffering and stress resulting in delayed healing. 2- ↑ Catabolism and ↓ Feed intake. 3- Prolonged recovery and longer recumbency with a greater risk of postoperative complications. 4- Ineffective respiratory ventilation with development of respiratory acidosis and academia. 5- Self mutilation. 6- Acute pain can lead to chronic pain.

Pain

- Types I. Cutaneous (superficial) pain: - Caused by agents or processes that result in damage of the skin such as burning, freezing, cutting and crushing, fire burns, acute mastitis, laminitis, infected surgical wounds, foot rot, crushing by trauma, conjunctivitis.
- II. Visceral pain:- Include:- 1- Inflammation of serosal surfaces as in peritonitis, pleurisy and pericarditis. 2- Distension of viscera, including the stomach, intestines, ureters and bladder. 3- Swelling of organs as in hepatomegaly and splenomegaly. 4- Inflammation as in nephritis and enteritis. 5- Stretching of the mesentery and mediastinum.
- III. Musculoskeletal (somatic) pain:- Which caused by:- 1- Lacerations and hematomas of muscle, myositis and space-occupying lesions of muscle. 2- Osteomyelitis, fractures, arthritis, joint dislocations, sprains of ligaments and tendons 3- Amputation of a claw, laminitis and septic arthritis 4- Ischemia of muscle and generalized muscle tetany. 5- The trauma of surgical wounds.

Pain

- The stimuli that cause pain vary between organs. The important causes include: 1- Skin - Cutting, Crushing, Freezing, Burning. 2- Gastrointestinal tract Distension, Spasm, Inflamed mucosa, Stretching of mesentery. 3- Skeletal muscle Ischemia, Traumatic swelling, Tearing, Rupture, Hematoma. 4- Synovial membranes and cartilage of joints Inflammation.
- Clinical finding
- I. Physiological Responses 1- Tachycardia. 2- Polypnea. 3- Pupillary dilatation. 4- Hyperthermia. 5- Sweating.
- II. Behavioral Responses 1- Related response such as abnormal posture and gait which occur when the pain is musculoskeletal. 2- Non- related response such as rolling, pawing, crouching or grinding of teeth which occur when the pain is visceral.
- Treatment
- 1- Treatment of the causative lesion. 2- Relief and the control of pain by using the local anesthetics and analgesics. 3- Supportive therapy.

Stress

- A systemic state develops as a result of the long-term application of environmental factors that stimulate physiological and behavioral responses above normal.
- The importance of stress is due to: 1- Lead to the development of psychosomatic disease. 2- Increase susceptibility to infection. 3- Represent an unacceptable level of consideration for the welfare of animals. 4- Reduce the efficiency of production.
- Etiology 1- Road transportation. 2- Climate. 3- Excessive physical effort. 4- Pain. 5- Crowding. 6- Presence or absence of bedding. 7- Housing. 8- Nutritional deficiencies. 9- Quietness versus excitement. 10- Herding and flocking instincts
- Management: environmental; medical

Abscesses

- Pyogenic material in certain locations caused by bacterial infections secondary to traumatic injuries.
- Their importance in the differential diagnosis because they causes toxemia and because of their space occupying characteristics causing compression of other structures.
- Most abscess begin as penetrating wounds of the skin caused accidentally or neglectfully because of failure to disinfect the skin adequately before an injection or incision as in castration , tail docking , etc.
- Metastatic implantation from another infectious process especially endocarditis carried by blood or lymph. In this way a chain of lymph nodes can become infected.

Abscesses

- Clinical finding
- 1- Fever, depression, lack of appetite. 2- Pain is resulting in abnormal posture, e.g. arching of the back or gait abnormality including severe lameness. 3- Weight loss which can be rapid in degree. 4- Obstruction of lymphatic and venous drainage which can cause local swelling and edema.
- Diagnosis 1- Careful palpation under anesthesia or heavy sedation may be necessary to overcome the muscle spasm caused by pain. 2- Radiological examination.
- Treatment 1- Drainage of abscesses. 2- Antimicrobial agents.

Disturbances of {Appetite, Food Intake & Nutritional Status}

- Hyperoxia: - A state of increasing appetite due to increase hunger contractions and manifested by polyphagia.
- Polyphagia: - Increasing food intake that may result from starvation, functional diarrhea, chronic gastritis and abnormalities of digestion, particularly pancreatic deficiency, metabolic diseases, including diabetes mellitus and hyperthyroidism
- Inappetence: - Is a state of partial absence of appetite.
- Anorexia: - Is a state of complete absence of appetite.
- Anophagia or Aphagia: - Varying degrees of decreased food intake that occur due to: a- Physical factors such as painful conditions of the mouth and pharynx b- Lack of desire to eat. c- Hyperthermia. d- Toxemia and fever. e- Thiamin deficiency

Pica or Allotriophagia

- - Is a state of the ingestion of materials other than normal food and varies from licking to actual eating or drinking. The abnormal appetite may be temporary state or permanent or habit stage. It is considered as normal behavior in rabbits and foals where it is thought to be a method of dietary supplementation or refection of the intestinal bacterial flora.
- Etiology 1- Dietary deficiency 2- Boredom in the case of animals closely confined often results in the development of pica. 3- Chronic abdominal pain due to peritonitis or gastritis and central nervous system disturbances including rabies.
- Type of pica 1- Osteophagia: - The chewing of bones. 2- Infantophagia: - The eating of young. 3- Coprophagia: - The eating of feces. 4- Cannibalism: - Important problem in housed animals due to biting one another's tails often, that resulting in severe local infections and protein or iron deficiency in the diet.

Disturbances of {Appetite, Food Intake & Nutritional Status}

- Starvation: - A state of complete deprivation of food, that causes rapid depletion of glycogen stores and a changeover in metabolism to fat and protein.
- Inanition or Malnutrition: - More common field state that characterized by incomplete starvation due to insufficient diet in quantity, metabolic changes and some poisons.
- Thirst: - Increased the desire for water manifested by polydipsia. Polydipsia: - Excessive water intake.
- There are two important causes of thirst are:- 1- Dryness of the pharyngeal and oral mucosa that increases the desire for water irrespective of the water status of body tissues. 2- Cellular dehydration due to a rise in blood osmotic pressure that occur in vomiting, diarrhea, polyuria and excessive sweating.

Weight loss {failure to gain weight or ill-Thrift}

- The state of weight loss occurs in the presence of adequate food supply and normal appetite. In the absence of any primary disease, an animal or group of animals that presents with this as the problem is a major diagnostic dilemma.
- Etiology
- 1- Errors by the owner in the estimation of body weight can lead to inadequate feeding.
- 2- Diets that is inadequate in total energy.
- 3- Deficient in the essential trace elements.
- 4- Diseases of the mouth and pharynx.
- 5- Other factors include anxiety, estrus, new surroundings, loss of newborn, bad weather, tick or other insects, worry and abomasal displacement.

Sudden or Unexpected Death

- When an animal is found dead without having been previously observed to be ill, a diagnosis even after necropsy examination is often difficult because of the absence of a detailed history and clinical findings.
- Etiology
- In a single animal 1- Spontaneous internal hemorrhage. 2- Rupture of internal carotid artery. 3- Per-acute of endogenous toxemia. 4- Trauma. 5- Gastrointestinal condition. 6- Iatrogenic deaths.
- In group animals 1- The exposure to potent poisons. 2- Diseases associated with infectious agent. 3- Anaphylaxis. 4- Electrocution.