COMPANION AND LABORATORY ANIMAL MEDICINE

(VCM 503)

1st semester 500 level

FLUID THERAPY IN ANIMALS (VCM 503)

Animal in normal healthy state has volume and composition of blood fluid remarkably constant despite wide variations in the daily intake of both water and salt. However in cases of disease states/ extensive surgeries, this balance between intake and output of fluids may be disturbed and the need to restore the balance becomes imperative.

Early recognition of body fluid disorders enables appropriate treatment to be given before serious consequences ensue and this is greatly facilitated by accurate recording of fluid intake and output.

Animal in normal healthy state has volume and composition of blood fluid remarkably constant despite wide variations in the daily intake of both water and salt. However in cases of disease states/ extensive surgeries, this balance between intake and output of fluids may be disturbed and the need to restore the balance becomes imperative.

Early recognition of body fluid disorders appropriate treatment to be given before serious consequences ensue and this is greatly facilitated by accurate recording of fluid intake and output.

The body maintains fluid balance when the amount of intake equals output.

- Water intake by an animal is mainly from fluids drunk and foods eaten, further small quantity is obtained from cellular metabolism of fat and carbohydrates as energy is released.

- Panting after exercise produces an increased water loss, and the animal feels thirsty and drinks freely to replenish its body water.

- Animal loose water by evaporation from the skin and the respiratory tract, in the faeces and in the urine.

- The drier the atmospheric air, the greater is the loss from the skin and the respiratory tract; because this loss cannot be controlled by the animal it is termed “inevitable ” or “insensible ” water loss and this amount to about 20ml/kg/24 hours

- The body maintains, the faecal water loss is negligible but it is greatly increased by diarrhoea.

- Alteration in the volume of urine produced regulates water content of the body and this mechanism together with thirst, serves to maintain the total body water content from day to day; an allowance of 20ml/kg/24hr provides healthy kideys with enough water to excrete normal waste products without difficulty.

As result of this a typical healthy dog requires 50-60ml/kg/ day.

Insensible loss	20ml/kg/day
Faecal loss	10-20ml/kg/day
Urinary loss	20ml/kg/day

MAIN FLUID DISORDERS AND THEIR CAUSES

Primary Water Depletion (Dehydration)

- Prolong in appetence (may be due to fractured jaw/ oral lesions)

- Fever or panting

- Diabetes insipidus

Water and Electrolyte Depletion

- Vomiting

- Diarrhoea

- “Third spaces” losses eg intestinal obstruction

- Peritonitis

Potassium Accumulation

- Ruptured urinary bladder
- Urethral obstruction
- Acute renal disease
- Addision's disease

Potassium Depletion

- Prolong in appetence e.g starvation

MAIN FLUID DISORDERS AND THEIR CAUSES cont'd

- Vomiting
- Prolonged diarrhoea
- Prolonged diuretic therapy

MAIN ACID BASE DISORDERS AND THEIR CAUSES

Metabolic Acidosis

- Accumulation of H+ as it may occur in shock, ruptured urinary bladder/ blocked urethra, diabetic keto-acidosis
- Loss of base,as it may occur in chronic renal failure, chronic diarrhoea.

Metabolic Alkalosis

- Loss of H+, as it may occur in pre pyloric vomiting
- Accumulation of base, as it may occur with over adminstration of HCO_3^-

Metabolic Acidosis

- Impaired ventilation, as a result of general anaestheia, CNS injury, severe lung disease, certain nerve/muscle disease

MAIN ACID BASE DISORDERS AND THEIR CAUSES cont'd

- Inspiration of CO_2 via anaesthetic equipment
- Increase CO_2 production as in malignant hyperthermia

4. Respiratory Alkalosis

- Over ventilation, as a result of overzealous artifical respiration, apprehension, fear and pains

CLINICAL ASSESSMENT OF FLUID LOSS IN SMALL ANIMALS % Dehydration Clinical signs

5%	Slight decrease skin elasticity, dry MM, tachycardia.
7-8%	Loss skin turgor, increase capillary refill time, slightly sunken eye, dry MM.
10%	Tented skin stand in place, increase capillary refill time, sunken eyes, oligo uria dry MM
15%	All above mentioned signs, shock and animal moribund near death.

REPLACEMENT AND MAINTENANCE VOLUME IN FLUID THERAPY

Both replacement and maintenance volume are immediately considered in fluid therapy **.** In practical terms the former is considered 1st and it is rapidly infused especially if shock is imminent. In practice for small animals, rate of up to 100ml /kg/hr can be administered for dogs. The maintenance volume however can be administered 2-3 times over 24 hour period at 10-16ml/kg/hr.

Replacement fluids are Dextrose, lactated ringers, darrow's solution, acidosis solution, alkalosis solution, Normal saline and dextrose saline.

Replacement Volume (ml) = % dehydration X **body wt (kg)** X **1000.**

Maintenance Volume

Insensible loss	20ml/kg/day
Faecal loss	10-20ml/kg/day
Urinary loss	20ml/kg/day

However based on age we can have variations wherein adult dogs can be given 40ml/kg/day and young dogs 60ml/kg/day.

Apyretic dogs 40ml/kg/day and pyretic dog 60ml/kg/day

COMMON REPLACEMENT FLUID IN COMPANION ANIMALS

There are different types of Replacement fluids. The types to be used depend on assessment of the animal patients. Commonly used RF in veterinary practice include: Normal saline, Dextrose, lactated ringers solution, darrows solution, Acidosis solution, Alkalosis solution, water and dextrose saline

POISONING AND TOXICITIES

Poisoning in small animals is usually associated with control of ectoparasites

Common chemical used for dip against ectoparasites

1) Organsphosphate (poison in dogs – salivation, tremor, muscle fasciculations, vomiting and diarrhoea, constriction of pupils, ataxia and convulsion)
    a) Asuntol
    b) Malathion
    c) Diazinon
    d) Coumaphos
    e) Chlorfenuinfos
2) Chlorinated hydrocarbons (poisoning manifested- Nervous excitement, tremor,

convulsion and death)

a) Lindane

b) Methoxychlor

3) Pyrethrins and pyrethroids (cause systemic and cutaneous allergic reactions)

a) Permethrin

b) Fenvalerate

c) Cypermethrin

The poisoning with organophosphates results from exposure to excessive amount during ecto-parasite control. This compound is powerful acetylcholinesterase inhibitors thus prevention of hydrolysis of acetylcholine to choline and acetic acid which eventually leads to parasympathetic manifestations. The sign manifestations include constriction of the pupil of the eye, glandular secretion of enzymes (pancreas) Increase in peristalsis, decrease HR

OTHER SIGNS OF ORGANOPHOSPHATE POISONING AND TOXICITIES

Frequent micturition, diarrhoea,vomitting,dyspnea all resulting from cholinergic stimulation other signs included muscular fasciculation and weakness, CNS signs such as nervousness, ataxia and convulsion.

RX

Physically wash dogs with soap and water if poison is suspected to through the skin or intra dermal.

Cholinesterase re-activators e.g Pralidoxine chloride.

Administration of atropine SO_4 which is muscuronic blocking agent. This drug should be administered every 4-6 hr over a period of 24hrs.

Absorbent like activated charcoal or mineral oil can be administered per os. Similarly emollient and carthartic can be administered.

OTHER POISONINGS ARE

Carbon monoxide, Snake bite and stings.

Carbon monoxide poisons

This occurs when animals inhales CO from exhaust fumes during transit or housing usually the cause of death due to combination of CO with haemoglobin readily causes damage to CNS and asphyxiation

RX

Remove source of CO and improvement of ventilation.

Snake bite

There are two types of snakes.

1. Elapids (Cobras and Mambas).
2. Vipers

In the elapids snake poison usually pains and swelling associated with snake bites are absent, fang marks may or may not be seen. However neurological signs which result in paralysis may be the only sign seen.

In the vipers snake poison there is swelling at the bite sites, sloughing of the skin and discolouration of tissues especially dark discolouration and there is fang marks on the animal.

Snake bite RX

Management of snake bites depends on the followings

1. Type of snake

- Time interval between bite and presentation to the clinic
- Location of bite
- Specie of victim

- Estimated venom dose

RX

Apply tourniquet and ice pack in affected area of bite to slow down absorption of toxins.

Incision of fang mark area and apply suction to aid bleeding.

Give polyvalent vaccine or infiltration of specific antivenin round the bite site and systemic RX

If it is Elapid bite give anticonvulsants symptomatically and for viper bites give antishock However, in addition antibiotic, anti inflammatory drugs can be given. Tetanus antitoxin for tetanus prone animals and other supportive therapy viz fluid therapy, blood transfusion

Some cobras do not have fangs instead they spit poison to defend themselves. They aim their, venom at the eyes, thereby causing blindness.

PUERPERAL HYPOCALCEMIA IN DOGS

This is an acute fatai condition in dogs resulting from very low calcium in blood occuring between 2-4 weeks post whelping.

Aetiology

The low calcium usually result following nursing of many puppies coupled with inadequate dietry calcium intake.

CX

The bitch will show sign that included restlessness, panting, tremors, twitching, tetany, nervousness, seizures and gait disturbance.

DX

Based on Cx signs, history of recent whelping, positive response to Ca therapy.

The serum Ca level showed valuse less than 7ug/dl

RX

Administration of 10% calcium gluconate i/v.

The number of puppies should suckling be decreased and probably weaned and improvement of dietry intake of the bitch.

DIABETES MELLITUS IN CAT AND DOGS

This is a chronic disorder of CHO metabolism resulting from insulin deficiency. It occurs in middle age cat and dogs but occurs more in the female dogs than the male however it occurs more in the male cat than the female cat.

AETIOLOGY

Causes of responsible for decrease in insulin production and secretion. Examples are causes of destruction of the islet cells which sole responsible for insulin production in animals. This include pancreatitis which usually secondary to immune destruction. It could also be as a result of systemic infection.

CX SIGNS

The clinical course of DM is chronic and the common signs in dogs are polydipsia, polyuria, polyphagia, with loss of body weight, bilateral catarracts and general weakness.

DX

This usually based on persistent fasting hyperglycemia and glucosuria. The normal fasting value for blood glucose is between 75- 120mg/dl in dogs and cat.

Rx should be based on combination Wt reduction, diet, insulin and oral hypoglycemic.

EXERTIONAL RHABDOMYOLYIS (AZOTURIA)

This disorder occurs in normally rationed horses rested over the weekend without any exercise. However following sudden exercise after long rest. Horses showed evidence of degenerative changes in muscle and myoglobinuria following strenous exercise after a period of rest.

AETIOLOGY

Basicly due to strenous exercise after a period of rest.

CX SIGNS

Sweating, muscle weakness, stiff gait, incoordination, trembling and tremors of the muscles. In very severe cases there is profuse sweating, exaggerated stiff gait, severe pains resulting in ability to stand (recumbent), hardness of the thigh and gluteal muscles and increase water intake.

DX

Usually based on history and CX signs.

RX

Stop exercise immediately, decrease CHO intake, give laxative and mineral oil, Anti histamine and analgesic are of immense benefit and massaging of affected muscle