Toxicology Lec 3:Dr.siham .A.W.

General management and treatment of toxicosis:-

1-Stabilization of the vital signs.

2-Clinical evaluation .

3-Prevent continued exposure to toxicant .

4-Facilitate removal of the absorbed toxicant .

5-Adminstration of the antidote if available .

6-Supportive therapy and observation.

1-stabilization of the vital signs :-

A-Maintenance of the respiration .

Maintenance of airway ,adequate ventelation ,prevention of aspiration vomitous content.

B- Maintenance of the Cardiovascular function .

Fluid therapy ,produce adequate respiratory ventilation ,Hydration , Acid base and electrolyte balance are necessary for normal cardio pulmonary function and oxygen exchange ,Correction of imbalances of calcium ,sodium, potassium and acid base balance may result in restoration of normal function .

If shock or hypotention occurs balanced of electrolyte solutions lactate (Ringers solution)or normal saline are treatment this state .

Clinical signs of hydrationase :-

Loss of skin turgor ,dry mouth, depression ,oligourea ,hypotention ,and shock.

C-Acid-Base balance:-

Toxicant or its metabolite have acidic or base character lead to imbalances .

Acidosis:- gain of hydrogen ion and decreased in bicarbonate ion ,e.g Aspirine ingestion or methanol or salicylate or ethylene glycol---to correct this state give sodium bicarbonate.

Alkalosis :-retention of excessive bicarbonate or loss of hydrogen due to use of diuretics,hyperkalemia ,blood transfusion ,To correct this case give ammonium chloride .

D-Maintenance or control on central nervous system function:

Convulsion and seizure due to a toxicosis in small animal give Diazepam and phenobarbital.

Hyperactivity : Central nervous system stimulation from excessive exposure to Amphetamine or some Hallucinogens, treatment with phenothiazine .

Control of CNS depression :some agents e.g. Barbiturates –depressant effect ,respiratory stimulant.

2-Clinical evaluation :-

Sample Toxicology History Form:

• Animal's name, species, breed, sex, intact/neutered • Age, weight • Medications presently receiving • Suspected poison involved • Maximum amount of toxin suspected (worst-case scenario) • Potential route of exposure suspected • When did possible exposure occur? • When clinical signs first were noted? Describe them? • Could other poisons be involved? • Could other animals have been exposed? • Describe the animal's environment (where animal kept, how long left alone, hobbies of owner, anything that might lead to poisoning). Through history should be obtained while the animal is being further evaluated if Blood or Urine samples obtained for clinical evaluation . Complete blood count ,Blood urea nitrogen ,Creatinine ,Serum electrolytes ,Glucose ,Liver enzymes,electrocardiogram ,Blood gasses,

Urine analysis ,Body temperature ,and Abdominal radiography should be considered to detected ingested metal objects.

3-Prevent continued exposure to toxicant .

Remove animal from source of exposure to toxicants. feed and water , changing the feed and water source is a general but rational action to prevent further potential ingestion of toxicants.

How to prevent absorption toxicant from GIT:-

Induces emetics:-by specific emetics:

Contraindications : emetics are recommended for rodents , rabbits , horses & ruminants because they cannot vomit safely or effectively . Emetics are contraindicated when

1-The animal is unconscious or very depressed because aspiration of vomitus may occur.

2- The animals is in seizures or is susceptible to spontaneous seizures

3-The animal has ingested corrosive or caustic materials (e.g acids), so the damaged stomach wall could rupture.

4-petroleum distillates or other volatile materials(e.g. gasoline) were ingested and the animal is at risk of aspiration pneumonia.

1-epicac syrup : available from pharmacies for emergency emesis in children , has been used orally in dogs (2 ml/kg BW) and in cats (3 ml /kg BW). if vomiting not occurred in 15 minute ipecac may cause excessive vomiting, ipecac can be inactivated by concurrent administration of activated charcoal

2-hydrogen peroxide : (3%) : given orally at 2-5 ml/kg BW, is most effective if it follows a moistened meal or if the stomach contains ingesta

3-liquid dishwashing detergent : given at 10 ml/kg BW. Should produce vomiting within 20 minutes

Emetics recommended for veterinary use

dogs : Apomorphine : is given by IV or IM (0.04 mg/kg) by Sc injection (0.08 mg/kg)

cats : xylazine (1.1 mg /kg IV) may be a useful emetics , although it is not universally effective . respiratory depression from xylazine may be (reversed with yohimbine 0.1 mg/kg IV).

gastric lavage : is an alternative means of gastrointestinal decontamination . it can be used when emesis is ineffective or contraindicated . lavage must be performed in an unconscious or anesthetized animal.

adsorption therapy with activated charcoal : adsorption is the physical binding of a toxicant to un absorbable carrier, which is eliminated in the feces.

gastrotomy or rumenotomy may be necessary in situations that are refractory to emesis , lavage , or activated charcoal.

Reducing dermal and ocular exposure

exposed animals should be washed with warm water and a soap or mild detergent and the process repeated as needed.

long-haired animals may require clipping to remove toxic residues .

for toxic ocular exposures , immediate enhance the decontamination.

Often the best treatment plan will include more than one of these methods.

4-Facilitating Removal of Absorbed toxicants:-

A-Enhance metabolism to less toxic forms.

B-increase excretion rates of toxin ,or increase elimination off posion.

C- direct removal of a toxicant from the affected animal .

D- used adsorbant (Activated charcoal) and Clay of bentonite kaolin..

E-used forced diuresis and osmotic diuresis like urea, manitol and dextrose .

F-Water loading and other diuretics in large animals such as cattle and horses, when it is difficult to obtain the large volume of solutions necessary for infusion it is sometimes practical to pump fairly larg volumes of water.------used Enemas `

G-Catharatics (osmotic catharatics) like sodium sulfate or magnesium sulfate, saline cathartics

e.g.Magnesium hydroxide and pulk catharatics and oily catharatics like mineral oil and olive oli.

H-Ion trapping Many chemicals particularly drugs are weak acids or weak bases.

an agent becomes trapped in the tubular fluid and is more likely to be excreted .

Acidic compounds such as aspirin remain ionized in alkaline urine and alkaline drugs such as amphetamine remain ionized in acidic urine Generally alkaline urine therefore favors increased excretion of acidic drugs and vice versa.

I-Dialytic techniq: Dialysis is used to describe the movement of an agent across a semipermeable membraine.

Peritoneal Dialysis :-peritonial dialysis include peritonitis ,and hemodialysis.

5-Adminstration of the antidode if available:-

Antidotes are agents with a specific action against the activity or effects of a poison.

Antidote are generally administered after exposure to a toxicant and often in response to clinical toxicosis . Some antidote may be toxic if used excessively or for too long during therapy.

Mechanism of action of antidote

A- chemical antidotes :- specifically interact with or neutralize the toxicant . Relatively few antidotes act in this manner.

Comlex formation : antidote can complex with (bind to) the toxicant , making it unavailable to cross cell membranes or to interact with receptors.

The complex must be both inactive and stable until excreted.

a-dimercaprol and dimercaptosuccinic acid (DMSA) are sulfhydryl compounds that bind metals as arsenic or lead , making them unavailable to susceptible receptors.

b-EDTA , deferoxamine and D-pencillamine act by chelation of the metal , forming a more water-soluble complex that is readily excreted in the urine.

c-antivenins against snake venoms and antibodies against digitoxin are immunologically generated agents that bind specifically to the venom or toxin.

Metabolic conversion. Some antidotes enhance metabolic conversion i.e.detoxification of the toxicant to a less toxic product

a-Nitrite interacts with hemoglobin and cyanide to form cyanmethemoglobin which is less toxic than cyanide and interferes with cyanide access to the cytochrome oxidase system.

b-thiosulfate provides sulfur , which interacts with cyanide to form thiocyanate.

B- pharmacologic antidotes:-

1-prevention of toxic metabolite formation,these antidotes prevent biotransformation to a more toxic metabolite from the original

toxicant as ethanol and 4-methylpyrazole (4-MP) which compete with alcohol dehydrogenase to prevent formation of toxic acidic intermediates from ethylene glycol.

2-enhancement of toxicant excretion . these antidotes facilitate more rapid or complete excretion of the toxicant. As molybdenum and sulfate which form a water soluble complex with copper that is readily excreted in urine.

3- competition for receptor sites

As naloxone blocks the action of opioids by competing for the same opioids receptor sites.

4- restoration of normal function

Acetylcysteine supplies precursors amino acids for glutathione , which serves as a biologic antioxidant against acetaminophen toxicosis.

6-Supportive therapy and observation:-

Maintain the renal function, give antibiotics and give supportive therapy.

for common antidotes:

	Poison or drug overdose	Antidote
1	Acetaminophen	N-ACETYLCYSEINE ,Vit C
2	Aflatoxin	Activated charcoal, Vit C
3	Aspirin	Sodium bicarbonate
4	Diazepam	Flumazenil

5	**Warfarin**	**Vit K**
6	**Xylazine**	**Yohimbine , Atipamazole**
7	**Detomidine**	**Yohimbine , Atipamazole**
8	**Medetomidine**	**Yohimbine , Atipamazole**
9	**Morphine**	**Naloxone**
10	**Folic acid**	**Leucovorin**
11	**Heparin**	**Protamine**
12	**Vitamin D**	**Calcitonin**
13	**Digitalis**	**Digoxin immune FAB**
14	**Caffeine**	**Diazepam**
15	**Carbon monoxide**	**O2**
16	**Amphetamine**	**Acetylpromazine maleate**
17	**Organophosphates**	**Atropine, 2PAM**
18	**B-Bockers**	**Atropine, Glucagon**
19	**Fluoride**	**Calcium lactate**
20	**Iron**	**Deferoxamine**
21	**Zinc**	**Ca EDTA Penicillamine**
22	**Thallium**	**Diphenylthiocarbazone**
23	**Tetanus toxin**	**Tetanus antitoxin,,Diazepam**