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Pre-anaesthetics

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Anesthesia

- Total loss of sensation in a body part or in whole body, generally induced by a drug or combination of drugs that depress the activity of nervous tissue either locally(peripherally) or generally (centrally).

- Five phases of anaesthesia

I. Preanaesthetic or preinduction period
II. Induction of anaesthesia
III. Maintainance
IV. Recovery
V. Post anaesthetic period

Preanaestetic agents

Usually given to prepare the patient for administration of anaesthetic drug.

PURPOSES

1.Aid in animal restraint by modifying behavior

a)Easier to work with

b)Not interested in its surroundings

c)Reluctant to move

2.Reduces stress

3.Prevent or reduce pain during and after surgery.

4.Produce muscle relaxation.

5.Reduce the amount of general anaesthetic needed and increase the margin of safety.

6.Facilitate safe and uncomplicated induction, maintenance and recovery from anaesthesia.

7.Minimise adverse and toxic effects of concurrently administered drugs.

8.Minimise autonomic reflex activity whether of sympathetic or parasympathetic origin.

Drug categories

- Anticholinergics –

  competitively antagonize Ach at sites innervated by post ganglionic , parasympathetic nerve fibres and on smooth muscles that are influenced by Ach but lack innervations.

Eg.Atropine sulphate

Glycopyrrolate (robinul-v)

Hyoscine(scopolamine)

Purposes:

- To reduce salivation and bronchial secretion, motor and secretory activity of GI tracts.
- To block effects of impulses in vagus nerve.
- To block certain of the effects produce by drugs that stimulates parasympathetic system.

Dose:

AGENT	ANIMAL	DOSE(mcg/kg)	DURATION
Atropine sulphate	SA Horses Pigs	20-40 20-40 20-40	60-90 min
Glycopyrrolate	SA Horses Pigs	5-10 3.3-6.6 3.3	2-4 hrs

Cautions:

- Atropine given IV cause a initial bradycardia .
- first and second degree atrioventricular block before sinus tachycardia.
- Ventricular arrhythmias.
- Depression in dogs, cats ; restlessness in ruminants.
- Colic in horses & bloat in ruminants.

Atropine sulphate

Source: Atropa belladona.

- Used as antisialagogue and to antagonise unwanted muscarinic action of anticholinesterases.

Effects:

- Increases heart rate by blocking vagus and blocks bradycardia produced by direct stimulation of vagus.
- Relaxation of bronchial musculature, reduction in its secretions.
- Its use should be avoided in cases where tachycardia already exits.

Dose :

Dogs and cats:-0.02 mg/kg I.M.

Small farm animals: 3-5mg/kg I.M.

Horse:40-60mg I.M.

- Untoward reaction:

a)Slows the heart rate after IV administration.

b)Sinus tachycardia.

c)Cardiac arrhythmia.

d)Depression in dogs and cats ; restlessness ,delirium, disorientation in ruminants and elephants; colic in horses caused by ileus.

2.Hyoscine(Scopolamine)

- Source :Hyoscyamus niger
- It is more potent anti sialagogue but less effective as vagolytic.

Dose:

Dogs &cat : 0.01-0.02 mg/kg

3.Glycopyrrolate (Robinul-V)

- Synthetic quaternary ammonium anticholinergic agent
- Powerful and prolonged antisialagogue activity
- As antisialagogue it is 5 times as potent as atropines

- More rapid onset of action than atropine.
- Dose not cross blood brain barrier and placental barrier.
- Used to prevent acid regurgitation and aspiration which results in Mendelson's syndrome and death due to anaesthesia.
- Should not be administered to pregnant bitches.

Dose :

- Dog -0.01-0.02 mg/kg
- LD 50 in dogs -25 mg/ kg IV

Tranquilizers

Tranquilization: State of tranquility and calmness in which patient is relaxed ,reluctant to move, awake and unconcerned with its surroundings and potentially indifferent to minor pain; sufficient stimulation will arouse the patient.

Agent causing tranquilization are called tranquilizers.

Sedation : CNS depression in which patient is awake but calm.

Agents causing sedation are called sedatives.

Subgroups

A. Phenothiazines
B. Butyrophenones
C. Benzodiazepines
D. Alpha -2 agonists

Purposes :

- s As preanaesthetic sedatives .
- c To relieve anxiety in hospitalized animals.
- t To restrain refractory animals.
- a As anti-emetic for carsickness or prior to administration of antihelmitics .

Mode of action

Phenothiazines & Butyrophenones :

2. Calming and neurologic effects due to depression of reticular activating system and antiopaminergic action in CNS.
3. Suppression of sympathetic nervous system (depresses mobilization of catecholamine's centrally and peripherally)
4. Phenothiazines lowers seizure threshold.
5. Anti-emetic effects by inhibiting dopamine interaction in the chemoreceptor trigger zone in medulla.

Properties:

2. Muscle relaxation.
3. Potentiates analgesics.
4. Anti-arrhythmic effects.
5. Anti-histaminic effects.

Side effects:

a)Tachycardia

b)Hypotension

c)Hypothermia

d) Akathisia

e)Acute dystonic reactions: hysteria ,seizures, ataxia

f)Inhibit platelet aggregation.

Drugs :

1.Phenothiazines –

a) Chlorpromazine hydrochloride (Largactil)

Properties:

v. Central depressant action.
vi. Anti-emetic action.
vii. Alpha adrenergic blocking effect.
viii. Enhancing effect on activity of analgesics,anaesthetics, sedatives,antihistaminics,anti 5-HT.
ix. Anticonvulsive action.
x. No ill effects on fetuses in utero.

Adverse effects:

2. Produces shock due to hypotensive effects.
3. Produces effects similar to stressing agents.
4. Antagonizes and some times reverses alpha action of epinephrine and other sympathomimetic amines (alpha 1-adrenoceptor antagonist).

Dose :

- Dog & cat- 0.5-1 mg/kg IM or IV
- Horse – 0.4 mg/kg IM
- Cattle – 0.5 – 1 mg/kg IM
- Pig – 1 mg/kg IM
- Sheep & goat – 1 -1.5 mg/kg IM

Triflupromazine hydrochloride (siquil)

- 10 times more antiemetic effect and 3-5 times more tranquilizing potency than chlorpromazine.

Dose :

- Dog - 1- 2 mg/kg IM or IV
- Cat -3-5 mg/kg IM
- Horse – 0.2-0.3 mg/kg IM or IV
- Cattle – 0.1-0.2 mg/kg IM or IV

Promazine hydrochloride (Sparine).

- Less hypnosis and fewer side effects as compared to chlorpromazine.
- Safe and efficient preanaesthetic agent for dogs and primates.
- Used extensively as tranquilizer for horses and other large animals.
- Should not be used in animals intended for human consumption.
- Antihistaminic effect is about 1/5 th of that of chlorpromazine.

Dose :

Dog & horse - 1 mg/kg IM or IV

Acepromazine:

2. Potent neuroleptic agent with low toxicity.
3. Most widely used tranquilizer.
4. Drug of choice in horse.

Actions :

vi. Produces CNS depression with sedation and muscular relaxation and reduction in spontaneous activity.

vii. Anti-emetic.

viii. Anti- convulsant.

ix. Anti-spasmodic.

i. Hypotensive
ii. Hypothermic
iii. Effective in preventing cardiac arrhythmia and ventricular fibrilation

Dose :

- Dog & cat- 0.1 -0.2 mg/kg IM
- Horse & Cattle – 0.2 mg/kg IM ; 0.025 –0.05 mg/kg IV

B.Butyrophenones

b) Droperidol :

iii. Short acting neuroleptic

iv. Wide margin of safety.

v. Inhibits learned responses and antagonizes CNS stimulatory effects of amphetamine and vomiting produced by apomorphine.

vi. It has adrenergic blocking properties preventing arrhythmia produce by epinephrine .

vii. Potentiate action of barbiturates

viii. Antagonizes respiratory depressant effects of morphine like compounds.

ix. Innovar vet- Droperidol +fentanyl (neuroleptanalgesia)

Dose :

Dog -0.1-0.4 mg/kg IV

b) Azaperone (Stresnil)

ii. Neuroleptic.

iii. Most specific and potent sedative available for swine.

iv. In swine given IM produces psychomotor sedation without narcosis.

v. Used as premedication for caesarian section with LA(2-4 mg/kg) and for general anaesthesia (2 mg/kg).

vi. Anti shock and adrenolytic activity.

C)Benzodiazepines

a) Diazepam
b) Midazolam
c) Zolazepam
d) Climazolam

Mode of action:

- Exert action by enhancing activity of CNS inhibitory neurotransmitters.
- Depress limbic system, thalamus hypothalamus (reducing sympathetic output) there by inducing mild calming effect

3.Reduce post synaptic reflex activity resulting in muscle relaxation .

4.Cause minimal CNS depression and produce anticonvulsant activity.

6.Stimulate appetite and pica.

Effects

1.Cardiopulmonary effects

f. Minimal hypotensive effects after IV administration.

g. Bradycardia.

h. Some anti arrhythmic effects reduce as a result of depression in sympathetic nervous system.

2.Increase seizure threshold.

3.Respiratory rate and tidal volume minimally affected.

4.Excellent muscle relaxation .

Side effects:

e. Ataxia particularly in large animals.

f. Paradoxic increase in anxiety leading to aggression in cats.

g. Possible CNS depression in neonates.

h. Bradycardia and hypotension can occurs in rapid IV administration.

Antagonist :

Flumazenil - 0.01- 0.1 mg/kg IV

a)Diazepam

ii. Calming, muscle relaxant ,anticonvulsant.

iii. No antiemetic.

iv. Slight cardiovascular depression.

v. Used as feed additive in domestic animals for its tranquilizing ,antidistress and growth stimulating effect.

vi. Excellent preanaesthetic agent for animals with a history of CNS disorder.

vii. Drug readily passes placental barrier and is found in the fetal circulation.

viii. Increase cough reflex and laryngospasm.

i. Increase risk of malformation when used in early pregnancy, not recommended in obstetric use.
ii. Contraindicated in glaucoma.

Dose :

- Cattle & sheep-0.5-1 mg/kg deep IM
- Small animals- 4-5 mg/kg deep IM

2-3mg/kg IV

5mg/kg PO

b)Midazolam

ii. Used extensively in small animals especially with ketamine in cats.

iii. Combination of Midazolam 0.25 mg/kg and metachlopromide HCl 3.3 mg/kg produces good sedation in pigs.

iv. Midazolam 0.3 mg/kg +droperidol 0.5 mg/kg produces excellent sedation.

c) Zolazepam

ii. Zolazepam and dissociative agent tiletamine produces respiratory depression and periods of excitement occurs during recovery.

d) Climazolam

v. Potent benzodiazepines on IV administration has rapid onset.

vi. Climazolam(1-1.5 mg/kg)+fentanyl (5-15 ug/kg) used for anaesthesia in dogs.

Alpha -2 agonists

A. Xylazine
B. Detomidine
C. Medetomidine
D. Romifidine

Mode of action:

vi. Produce CNS depression by stimulating both pre synaptic and post synaptic alpha 2 adrenoceptars in CNS and peripherally.
vii. Decrease in CNS sympathetic outflow and circulating catecholamines.
viii. Produce analgesia by stimulating CNS alpha 2 receptors
ix. Post synaptic reflexes inhibited depress internuncial neuron transmission effects.

Effects

1) CNS:

Sedation,analgesia,hypotention.

2) CVS:

Peripheral vasoconstriction leading to initial hypertension, central bradycardia and vasomotor depression leading to hypotension.

3)GUT:

Relaxation and decreased motility, decreased salivation, reduced gastric secretion.

4)UTERUS:

Stimulation.

5)HORMONES:

Reduced release of insulin ,renin ,ADH.

6)PLATELETES:

Aggregation.

7)EYES:

Decrease intraocular pressure.

Side effects:

ii. Bradycardia .

iii. Hypotension(long term effect).

iv. Decrease tissue perfusion.

v. Respiratory depression.

vi. Ataxia in large animals.

vii. Sweating in horses.

viii. Diuresis.

ix. Xylazine produce severe inflammatory response if administered S/C in horses and cattle.

Alpha 2 antagonist:

a) Yohimbine – 0.1-0.3 mg/kg IV
0.3-0.5 mg/kg IM

b) Tolazoline – 0.5-5 mg/kg slow IV

c)Atipamezole -0.05 mg/kg IV

A) Xylazine:

viii. Most potent non narcotic sedative, analgesic as well as muscle relaxan.

ix. Wide margin of safety an increase in dosage does not increase degree of sedation but rather duration of effect.

x. Produces excellent analgesia in equine colic.

Dose : Horse -1 mg/kg IV
2 mg/kg IM

Dog & cat-1-2 mg/kg IM

Cattle – 0.05-0.2 mg/kg IM

Detomidine

ii. Used primarily for sedation in horses.
iii. Animal may remain standing in low dosage.
iv. Dose dependent sedation is produced.

Dose : Horse -10-100 mcg /kg IV or IM
Cattle -30 mcg /kg IV or IM

Medetomidine

1 potent and efficacious ,selective agonist of alpha 2 adrenoreceptor in central and peripheral nervous system.

Dose :

Dog - 40-80 mcg/kg IM or IV
Cat – 80 -120 mcg/kg IM
Sheep – 10-20 mcg/kg IM