

AIM: - To study the effect of drugs on blood pressure and heart rate of dog.

PRINCIPLE:

The arterial blood pressure is defined as the pressure exerted by the blood on the walls of the blood vessels. Therefore, blood pressure = cardiac output \times peripheral resistance.

The heart and the blood vessels are under the control of autonomic nervous system. Both sympathetic and parasympathetic nerves supply the heart. Parasympathetic innervation is through the vagus supply the heart. Parasympathetic innervation is through the vagus whereas the sympathetic nerve supply to the heart comes from fibres arising from stellate or inferior cervical ganglion. The nervous supply to the blood vessels is principally from the sympathetic system. In general, sympathetic stimulation (administration of adrenaline and noradrenaline) increases cardiac output and resistance to flow leading to an increased blood pressure. On the other hand, parasympathetic stimulation (administration of acetylcholine) decreases cardiac output which lowers the blood pressure.

REQUIREMENT:

Apparatus:

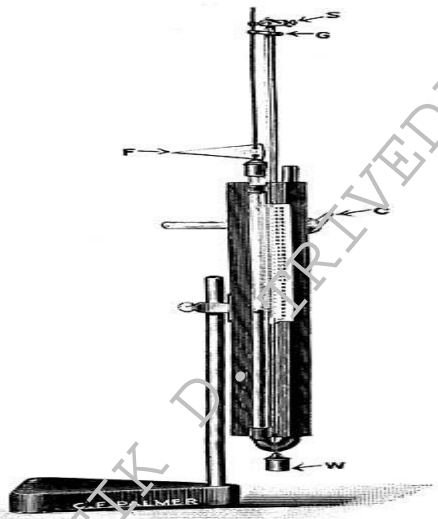
- ✓ Kymograph, Operation Table
- ✓ Arterial Cannula, Venous Cannula, Tracheal Cannula, Condons Mercury Manometer,
- ✓ Connecting Rubber Tubing, Dissecting Instruments, Syringes, Cotton & Threads.

Drugs and solutions:

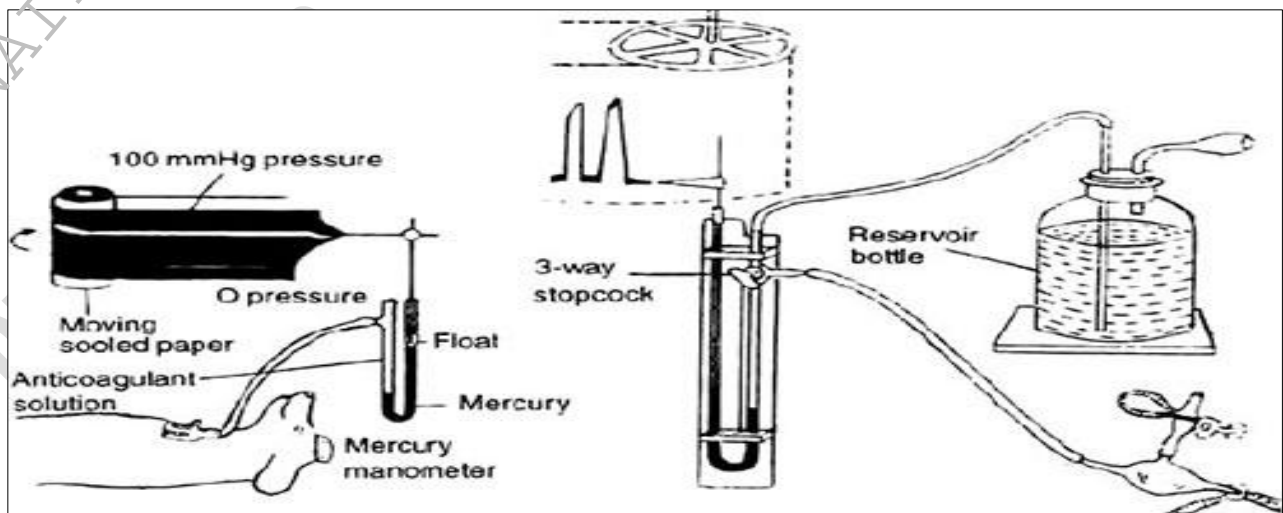
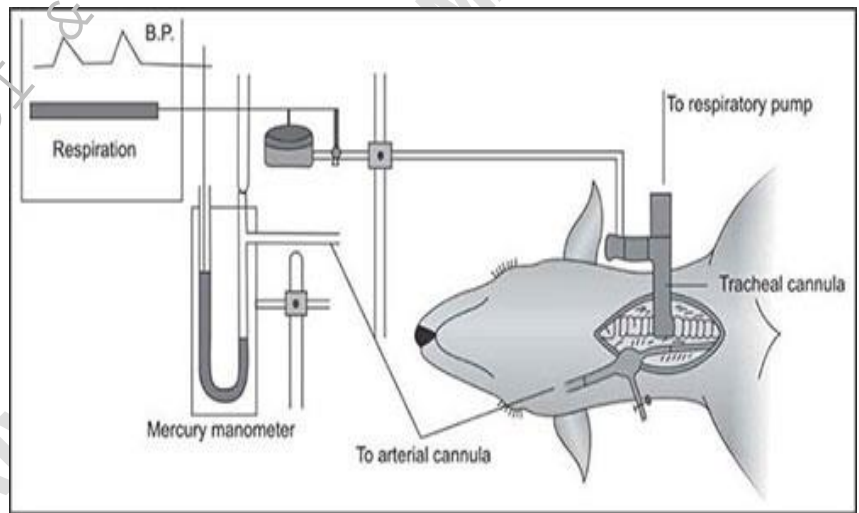
- ✓ Sodium Citrate 8.5% and Heparin : (500 I.U.) [Both are Anticoagulant]
- ✓ Normal Saline :(0.9% NaCl), Morphine (1 μ g/ 1kg), Urethane (1.5 gm/kg)
- ✓ Adrenaline, Acetylcholine, Histamine, Noradrenaline, Isoprenaline (all are 100 μ g/kg),
- ✓ Atropine (1mg/kg),
- ✓ Propranolol (1 μ g/kg)

Condon's manometer

- ✓ It is twice as sensitive as the normal U shaped mercury manometer used for recording of blood pressure in small animals. It can be accurately sense the pressure from 0-200 mmHg.
- ✓ It has 28 cm glass tube with 2.5 mm bore. The glass tube is connected by tubing to a 2.5 cm diameter mercury reservoir. Very small changes in the mercury level in the reservoir can be causes large changes in the glass tube. The scale is calibrates to compensate for the multiplying effects, so that the very accurate pressure reading can be taken. A small cylindrical float vertical in the tube by a rod. An ink writing point is attached to to the stainless still tube and is held against the kymograph cylinder by a suspension wire and a guide weight.

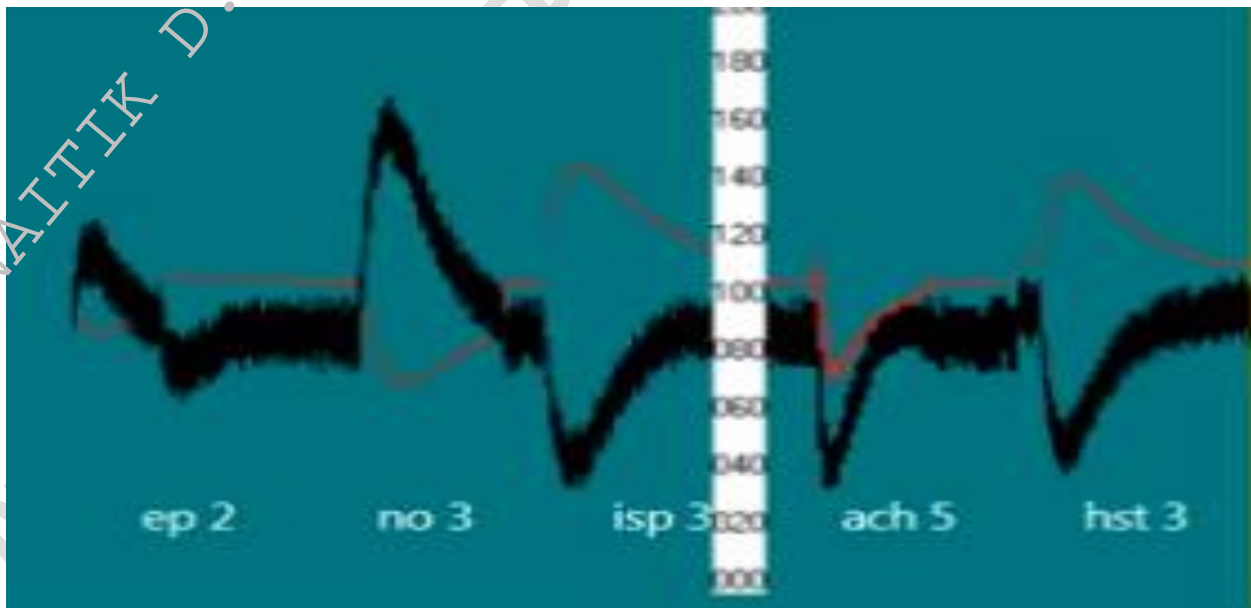


Manometer



PROCEDURE

1. An adult healthy dog is weighed and anaesthetized with morphine (1mg/Kg) and Urethane (1.5 mg/Kg)
2. The dog is laid down operating table and its limbs are tied.
3. The femoral vein is exposed at thigh region and venous cannula is inserted in the vein. it is cannulated by a thin polythene tube, connected to the three way cannula. This is to administer various drugs and solutions.
4. An incision is made in the neck to expose the trachea and two carotid arteries. The tracheal cannula is inserted into the trachea. This is to record effect of drugs on respiration and to provide artificial respiration if necessary.
5. The arterial cannula is cannulated in one carotid artery and it is connected to the 'U' mercury manometer. Space between manometer and the arterial cannula is filled with sodium citrate and care is taken to avoid entry of any air bubble.
6. Inject 100 µg/kg adrenaline through femoral venous canuula. Note sequence of the responses like blood pressure, heart rate. Wait for 10 mins.
7. Similarly administered other drugs through femoral venous cannula and the effect is recorded.

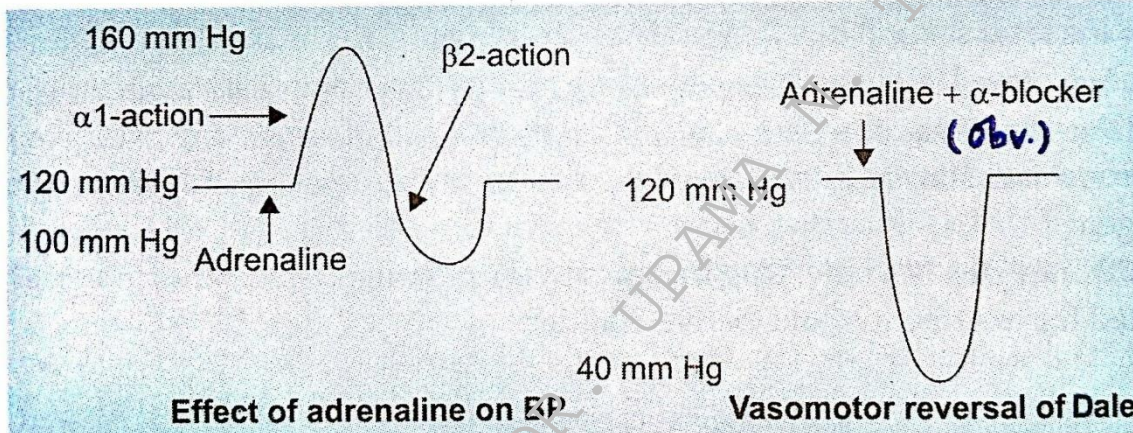


Effect of various drugs on Blood pressure of Dog

RESULT AND DISCUSSION

SR. NO	DRUG	EFFECT ON BP & HR OF DOG
1.	Adrenaline	It is a sympathomimetic catecholamine which produces effect through alpha, beta 1 and beta 2 receptors. As a result of beta 1 receptor stimulation there is sudden increase in heart rate and force of contraction. Immediately due to reflex inhibition there is slight decrease but drug reaches the periphery where alpha 1 receptor stimulation produces vasoconstriction and hence, further rise in blood pressure is observed. A notch is seen due to sudden changes in the response. Increase in Heart Rate.
2.	Noradrenaline	It is a sympathomimetic catecholamine having predominately alpha receptor action. The effect of noradrenaline differs from that of adrenaline that the heart rate is not increased. On the contrary it may be decreased slightly. Only rise in blood pressure is seen and this is due to the vasoconstriction of blood vessels specially those which supply blood to skin and mucosa. Since beta action of noradrenaline is not seen, the effect of rise in B.P. is more than adrenaline only.
3.	Acetylcholine	It is a parasympathomimetic agent which can stimulate both muscarinic as well as nicotinic receptors. However, in low doses it produces only muscarinic receptor action and hence, there is fall in blood pressure due to dilation of blood vessels. The action of acetylcholine is rapidly terminated by cholinesterase enzyme and hence, the response of acetylcholine gets quickly recovered. Heart rate does not change in response to acetylcholine.
4.	Histamine	It is a naturally occurring autocoid which causes generalized vasodilation through H ₁ and H ₂ receptors. When histamine is administered in the dog there is marked fall in the blood pressure. The recovery from histamine is rapid as compared to isoprenaline but slower as compared to acetylcholine.
5.	Isoprenaline	It is a sympathomimetic amine which produces specific beta 1 and beta 2 receptor agonist action. Beta 1 receptors present in the heart are excited by isoprenaline as a result of which there is increase in blood pressure and heart rate. When drug reaches periphery there occurs vasodilation of blood vessels specially which are supplied to skeletal muscle. As a result of this there is fall in blood pressure. Isoprenaline is not the substrate for uptake. Hence the termination of action takes time and there is delayed recovery.
6.	Atropine	This is muscarinic cholinergic antagonist. It is competitively antagonised Ach. Atropine in conventional doses does may not completely block muscarinic receptor
7.	Propranolol	It is beta blocker which reduce blood pressure and HR.

Dales voasomotor reversal principle



α_1 → Vasoconstrictor, α_1 predominant on skin, mucosal & splanchnic blood vessels.
 β_2 → Vasodilation, predominant on coronary & skeletal muscle blood vessels.
[Renal vessel contains both]

QUESTIONS:

1. What is blood pressure?
2. Discuss action of adrenaline on alpha and beta adrenergic receptor.
3. Describe Dales voasomotor reversal principle
4. What is role of femoral venous cannula?

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