Abstract of Thesis

Cardiac abnormalities such as cardiac ischaemia, myocardial infarction etc. are often associated with various visceral and somatic problems like nausea, vomiting, passing of urine, stool and pain in the left chest and the arm. Cardiac receptors located in the heart, both in the ventricles and atria continuously transmit informations regarding the cardiac status through vagal and sympathetic nerves to the central nervous system. It was reported earlier that stimulation of cardiac receptors, specially the ventricular receptors elicit reflex changes in rectal and urinary bladder motility, as well as in renal function. So, with all these informations, in the present study attempts have been made to investigate the role of different nerves and neurotransmitters in the manifestation of such cardiovesicular and cardiorenal reflexes.

Experiments were performed on cats of either sex weighing 2-3 kg anaesthetised with α-chloralose. The trachea, femoral vein, femoral artery, ureters and the urinary bladder were cannulated for artificial respiration, introduction of drugs and anaesthetics, recording of blood pressure, urine flow and intravesicular pressure respectively. The body temperature, body fluid and pH were monitored and maintained throughout the experiment. To stimulate the ventricular receptors, occlusion of the anterior descending coronary artery (LAD) with a fine snare or nicotine (100-200 μg/ml) was applied over the left ventricle with a cotton film soaked with nicotine after exposing the heart with an incision over the pericardium. To study the involvement of the afferents in the manifestation of the reflexes, cardiac sympathetic nerves, and vagi (cervical or thoracic) were sectioned and stellatectomy and rhizotomy (at T₁-T₄) were also performed. To study the efferents involved, isolation of inferior mesenteric ganglia, transection of hypogastric nerves and ventral roots at the S₂-S₄ level were performed. The central cut end (afferent) of LICN or vagus or the peripheral cut end (efferent) of split strands of sacral ventrals roots was stimulated electrically using Grass SD9 stimulator (6 V, 0.6 ms, 60 Hz). Different neurotransmitter blockers were administered at standard dose and standard time was allowed for completion of the blockade to study the neurotransmitters involved in the manifestation of such reflex. To study the role of spinal and supraspinal centres in elucidating such reflexes, studies were made in spinal (C₇-C₄) and decerebrated animals.
The results obtained due to the stimulation of the ventricular receptors with LAD occlusion or epicardial application of nicotine are presented below:

1. a. LAD occlusion or epicardial nicotine application caused biphasic effects on bladder (vesicular) movement having initial large contraction followed by inhibition of bladder movement.

b. LAD occlusion or epicardial nicotine application also caused biphasic change in urine flow with an initial antidiuretic response followed by diuretic response.

2. Changes in urine flow is independent of changes in vesicular motility following excitation of the cardiac receptors.

3. Changes in vesicular motility and also in urine flow are presumably due to excitation of ventricular receptors as because such effects are abolished by application of lignocaine locally on the ventricular surface.

4. Afferent pathways for the initial contraction of the vesicular reflex induced by LAD occlusion or nicotine application are presumably both cardiac vagus and sympathetic while the inhibitory phase of the vesicular contraction is lying in the cardiac sympathetic.

5. Afferent pathways for cardiorenal reflexes induced by LAD occlusion or epicardial application of nicotine are lying both in the cardiac vagus and cardiac sympathetic. However, the initial antidiuretic response is presumably lying in the cardiac vagus.

6. Efferent pathways for the cardiovesicular reflex is presumably lying in the pelvic while the same pathway for the cardiorenal reflex is lying in the renal sympathetic.

7. Neurotransmitters involved in the cardiovesicular reflex induced by excitation of ventricular receptors through both LAD occlusion or epicardial application of nicotine is adrenergic (β-adrenergic) since the initial large contraction was abolished by salbutamol (desensitising
dose) and the inhibitory phase was blocked by atenolol.

8. Neurotransmitters involved in the antidiuretic phase of the cardiorenal reflex is cholinergic (muscarinic) since this phase is blocked by atropine and the diuretic phase is adrenergic as guanethidine sulphate blocked the same response.

9. In decerebrate (midcollicular) animals the initial large contraction is abolished and the inhibition remains unaltered and even prolonged. In such animals the cardiorenal reflex is unaltered.

10. Blood pressure changes induced by both LAD occlusion and nicotine application are presumably independent of cardiovesicular and cardiorenal reflexes.