

MOTOR ACTIVITY OF THE GASTRO-INTESTINAL TRACT IN DOGS WITH EXPERIMENTAL RENAL HYPERTENSION

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Results (obtained in 6 dogs) indicating the state of the evacuatory activity of the gastro-intestinal tract are described. In experimental renal hypertension in the period of maximal elevation of the blood pressure (the first 2-3 months), a sharp increase in motor activity of the stomach and duodenum is observed during digestion (by an electrographic method). In two dogs slight slowing of the passage of the stimulus along the intestinal tract was also observed.

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Changes in the functions of the digestive tract in patients with hypertension have been observed clinically. It is therefore interesting to study experimentally the relationship between changes in the functional state of the digestive organs and hemodynamic disturbances. Very few experimental studies of this problem have been made. Only very recently changes in secretion and absorption of substances in the small intestine have been established [1, 2, 6, 7, etc.]. In a few investigations [3, 4] there are reports of a disturbance of motor function. In our previous communication [5] we presented data showing the character of changes in periodic gastric and duodenal motor activity under these conditions.

In this paper we give data relating to the evacuatory function and motor activity of the digestive tract during digestion in dogs with renal hypertension.

EXPERIMENTAL METHOD

Chronic experiments were performed on 6 dogs. The blood pressure was measured in the carotid artery exteriorized in a skin flap. Hypertension was produced by successive constriction of the renal arteries. Observation was conducted for 3-5 months in the period of maximal elevation of the arterial pressure. All the experiments were performed 18-20 h after the last meal. Milk (150 ml) and minced meat (100 g), mixed with barium sulfate, were used as food stimuli.

Experiments with graphic recording of the motor activity during digestion were performed on three dogs with electrodes implanted in the wall of the body of the stomach and the duodenum. The motor activity of these parts of the gastro-intestinal tract was recorded simultaneously on a 4-channel apparatus using a unipolar method of detection of the potentials. In this case the food stimulus consisted of finely chopped bread (200 g) which was given to the animals in a period of relative rest (10 min after the end of a period of motor activity).

EXPERIMENTAL RESULTS

In the period of maximal elevation of the blood pressure (the first 2-3 months) a sharp increase in the amplitude of the potentials, especially of the duodenum, was observed during digestion.

It will be clear from Fig. 1 that after elevation of the arterial pressure the electrical activity of the stomach and duodenum increased sharply compared with that observed in the experiment when the arterial pressure of the dogs was still normal. A twofold increase in bioelectrical activity of the stomach wall and a threefold or greater increase in that of the duodenum were also observed on the following days. The frequency of the waves of potentials recorded from the stomach and duodenum was unchanged in the animals with renal hypertension.

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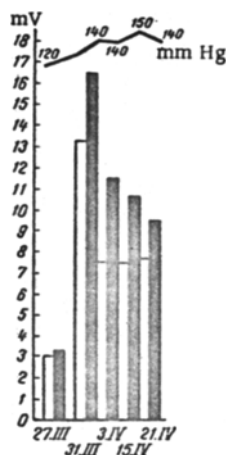


Fig. 1. Amplitudes of potentials of the stomach (unshaded columns) and duodenum (shaded columns) and arterial pressure (continuous line) in the dog Dunai with renal hypertension.

After constriction of the renal arteries in the period of elevation of the arterial pressure (150–160 mm Hg), passage of the contrast material from the stomach into the duodenum of the dog Tom (stimulus, meat) began after 30 min (normally, after 23 min), and evacuation from the stomach was complete after 5 h 40 min (normally after 4 h 20 min). Passage of the stimulus into the large intestine began after 4 h 20 min (normally after 3 h 40 min). Evacuation from the small intestine was complete after 7 h (normally after 6 h). Complete evacuation from the stomach and intestine lasted 7–8 h (normally 6 h 30 min).

Investigations carried out during the period of elevation of the arterial pressure (160–180 mm Hg) on the dogs Polkan and Zhulik using milk mixed with barium sulfate as stimulus showed less marked changes in the evacuatory activity of the gastro-intestinal tract. In the case of Zhulik, delay of the onset of passage of the contrast material from the stomach into the intestine was chiefly observed: this occurred after 30 min instead of after 12 min. Evacuation from the stomach and from the small intestine before constriction of the renal arteries was complete after 6 h 40 min, compared with 7 h 30 min after constriction. In the dog Polkan, no changes in the evacuatory activity of the gastro-intestinal tract were found.

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