GRAPHIC RECORDING OF POINT PERISTALSIS IN STOMACHS OF DOGS

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(Received October 14, 1956. Presented by Active Member Academy of Medical Sciences, Prof. V. V. Parin)

There are numerous methods available for recording gastric motility [1, 2, 3, 4, 5]. However, the gastrogram recorded by means of these methods is the result of many factors: tonic gastric contractions, its peristalsis, unevenly timed and varying in strength and rhythm movements in different portions of the stomach, alterations in the pressures within the stomach produced by respiration, animal movements, even, for example, turning the head and moving the legs, etc. The character of the gastrogram fluctuates continuously depending on which movements are affecting it at any given moment, and to what degree.

As we studied gastric motility under various conditions affecting the organism, we came to the conclusion that it was essential to differentiate gastric peristaltic movements from other forms of its movements in order to be able to follow the pure dynamics of peristalsis itself. This can be attained by graphic registration of so-called point peristalsis, i. e., peristaltic movements originating in one small gastric area.

EXPERIMENTAL METHODS

The method we propose consists of the following. Through a fistula tube in the stomach of a dog, there is introduced a thin-walled balloon (usual children's toy sphere) with a capsule glued to its outside (2) which absorbs the peristaltic wave (Fig. 1). The balloon (1) communicates by means of a wide rubber tube (3) with a water manometer which assures the extended placement of the balloon and the pressure within it equaling that within the stomach.

The capsule (2) is made from the finger of a surgical glove and a rubber stopper (from a penicillin flask). This latter is of a thickness 1.5-2 mm and is glued to the base of the capsule (2) and serves to assure pressure stability within the capsule during changes in pressure occurring within the balloon. With the aid of a nipple tube (5) which, while within the region of the balloon and the stopper of the fistula, passes within the rubber tube uniting the balloon with the manometer, allowing the capsule (2) communication with the Marey capsule. Preparatory to registration, it is necessary to insert the balloon into the stomach, fill balloon and capsule with air, and then place the balloon in such a manner that the highest waves would become recorded.

The balloon and capsule are filled with air through stopcocks (6) and (7). The balloon is inflated to a volume of 200-300 cc, as is the capsule (2), until the membrane is observed to be obviously stretched. The Marey capsule is of less than average size; its membrane is made of the thinnest and most elastic rubber available.

The balloon is placed by rotating slowly the fistula tube until the recording device records maximal fluctuations. Occasionally, the fistula tube has to be fixed at the place found to be most advantageous for the balloon. This fixation is readily accomplished by the aid of a roller bandage pulling the fistula tube against the rubber tube (3 or 10) as indicated.

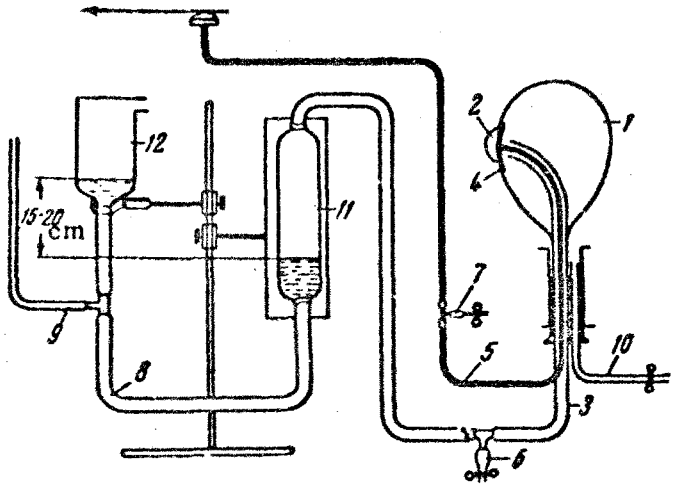

Fig. 1. Scheme of the installation for graphic registration of dog point gastric peristalsis. 1) Balloon absorbing all changes in pressures within the stomach and transmitting them to the manometer; 2) capsule absorbing the perstalsis in a small area of the stomach; 3) rubber tube connecting balloon with manometer; 4) thick base of capsule assuring pressure stability within it as pressures fluctuate within the balloon; 5) nipple tube connecting capsule to recording device; 6) stopcock for filling balloon with air; 7) stopcock for filling capsule with air; 8) rubber manometer tube; 9) side tube on Marey capsule for recording the general gastrogram; 10) rubber tube for introducing food into stomach; 11 and 12) wide flasks serving as manometers.

Fig. 2. Recording of a peristaltic wave.

After the balloon and capsule (2) have been filled with air, we have two closed systems: balloon—manometer and capsule (2)—Marey capsule.

The influence of pressure alterations within the stomach is either fully nullified or markedly weakened by the balloon—manometer system and so is not reflected in the capsule (2)—Marey capsule system. The thick foundation of capsule (2) hampers this. When, however, a peristaltic wave passes over capsule (2), a maximal effect is obtained, as its pressure does not have to overcome the muffling effect of the thick base (4) lying on the balloon (1). The peristaltic wave is then readily recorded as shown on Fig. 2.

EXPERIMENTAL RESULTS

We advance our method of graphic registration of point peristalsis as a very useful maneuver. The method does not demand much time for its setup and, most important, permits the differentiation of peristaltic waves from other stomach movements. When two instead of one absorbing capsules are placed on the balloon at a known distance from each other, it is possible to determine the velocity of the peristaltic wave. The setup can be used for obtaining simultaneously the usual gastrogram. To do this , it is necessary only to connect tube (9) by a side-arm leading to another Marey capsule.

SUMMARY

This method is offered as a procedure for recording the peristaltic movements of the stomach and eliminating the extraneous influences of other movements. It is simple and allows precise localization of the waves and also the recording of the peristaltic velocities.

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* In Russian.