

MODIFICATION OF THE METHOD OF RECORDING GASTRO-INTESTINAL MOTILITY

S. V. Sholokhov

Physiological Laboratory (Head — Candidate of Biological Sciences A. I. Zol'nikova),
Experimental Section (Head — Professor F. D. Vasilenko), Central Scientific Research
Institute of Sanatoria and Physiotherapy (Director — Candidate of Medical Sciences
G. N. Pospelova)

(Presented by Active Member AMN SSSR P. D. Gorizontov)

Translated from *Byulleten' Ėksperimental' noi Biologii i Meditsiny*, Vol. 56, No. 7,
pp. 112-113, July, 1963

Original article submitted July 27, 1962

In the usual method of recording gastric motility a balloon is introduced into the stomach and then filled with air or water; the extent to which it is filled is determined from the level of fluid in the manometer. It is usually thought that the maintenance on different days of the same difference between the levels in the limbs of the manometer indicates a constant degree of filling of the balloon and therefore constancy of the conditions for recording motility. It is therefore assumed that for a given strength of gastric contractions the portion of the air or water contained in the balloon which is expelled from it into the transmitting tube, and the extent to which the pen writer is displaced will be proportional to the force of contraction.

It is however essential to realize that the variation in the tone of the gastric musculature which is related principally to the phase of work or rest of the muscle but also to the factors will alter the pressure exerted by the stomach wall on the balloon, with the result that it will displace more or less air or water. Special difficulties arise in cases when the stomach is contracting continually at the time of introduction of the balloon.

Therefore, when the usually accepted method of recording gastric motor function is used the strength of the contractions and the tonic response of the gastric musculature recorded on different days of the experiment cannot be compared.

We have developed the following modification of the usual method. The limbs of the water manometer should have a length such that when the contents of the balloon (air or water) are completely expelled, fluid from the opposite limb of the manometer shall not be transferred into the connecting tube running to the Marey's capsule (see figure a); the balloon is filled with air (or water) before it is introduced into the stomach. The experimenter then establishes some arbitrary air pressure in the balloon, and a difference in the fluid levels in the manometer limb will be established which is proportional to it (see figure b). This quantity (h_1) is indicated by markers and should be constant for each dog in each experiment. The size of the balloon and the pressure are selected to correspond to the size of the dog and the length of the transmitting system. Because room temperature and the animal's body temperature are quite constant, small fluctuations in it affect the volume contained in the balloon only by a very small amount which is less than the accuracy of the manometer; these fluctuations may, therefore, be neglected. Before to facilitate introduction of the balloon into the stomach all the air (or water) from the it is first expelled; the level (h_2) in the opposite limb of the manometer will then of course rise considerably (see figure c). A clamp is placed on the rubber tube close to the balloon, the empty balloon is introduced into the stomach, and the clamp is removed. Then the level in the manometer approaches the mark made before the balloon was introduced (see figure d), but it always is somewhat higher; the difference between these two levels ($h-h_1$) is a variable quantity, and its fluctuation indicates change in gastric muscle tone.

In long experiments, in case the balloon fails to remain intact and has to be replaced, in order that the recording conditions shall not be disturbed the volume of the filled balloon is measured by immersion in a graduated vessel containing water. If the balloon is damaged it can then be replaced by another of the same volume.

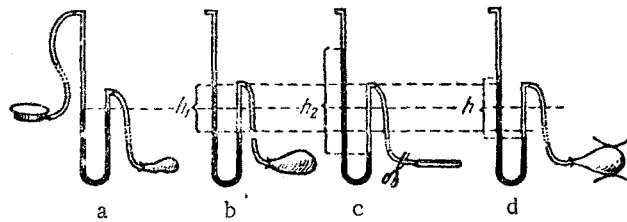


Diagram illustrating recording of motor function of the gastro-intestinal tract. For description, see text.

The method we have described has worked well in prolonged experiments on many dogs with a gastric fistula. In a comparison of the results of experiments performed on different days by means of this modified method we have found more constant values of gastric contractions in intact dogs (baseline values) than when the normal method is used. This procedure may be employed for recording movements and tone, not only of the stomach, but of any hollow organ.

SUMMARY

A modification of the method of recording gastric motor function enables the force of contraction and tonic tension of the musculature to be compared on different days even at long time-intervals. It may be used for studying the motor function not only of the stomach but of any hollow muscular organ. The method was found to be effective in long-term experiments on many dogs.