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3755

Further Studies on the Emptying of the Gallbladder.

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(Introduced by E. A. Graham.)

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In previous publications^{1, 2} on the filling and emptying of the gallbladder we came to the conclusion that two factors were especially concerned in the emptying process, namely, the ebb and flow of the bile from the liver, and elastic recoil of the gallbladder wall. While intrinsic muscular contractions were believed to play some part, they could not at that time be demonstrated.

The observations of Boyden,³ and of Sossman, Whitaker and Edson⁴ that following the administration of a fatty meal, preferably of egg-yolk and cream, the gallbladder is frequently found in a collapsed state, has shed further light on this problem, which we have reinvestigated in the experiments reported here.

We have used the method adopted by Whitaker for experimental animals. The gallbladder is exposed at operation and filled with iodized oil (iodipin) and 24 hours later the animal is recovered sufficiently for the experiment. It is then found that if the animal is starved no emptying of the gallbladder occurs for 2, 3, or more days. A meal of egg-yolk and cream, however, causes a fairly rapid discharge of the iodized oil from the gallbladder along the common duct into the duodenum. This emptying ceases usually after 3 or 4 hours at the end of which time the gallbladder, in the cat, may be completely empty. More often traces of the iodized oil are left in the gallbladder, and these may remain until a further meal is ingested.

To exclude elasticity and variations of intra-abdominal pressure, iodized oil was placed in the gallbladder of a cat, and a canula connected with a finger cot was inserted into the cystic duct. This procedure allowed free communication between the gallbladder and the rubber bag. Twenty-four hours after operation the gallbladder

was still full in spite of the fact that elasticity and variations of intra-abdominal pressure had had full play. A fatty meal was given and in 5 hours a considerable quantity of the iodized oil had passed from the gallbladder into the rubber bag. This experiment indicates that a part of the emptying process is due to muscular activity of the gallbladder wall. Other experiments, likewise, demonstrate that changes of intra-abdominal pressure play a minor rôle in the emptying of the viscus. We believe, however, that muscular contraction is not the only factor involved, and that elasticity and the ebb and flow of fresh bile from the liver play an important part.

The presence of pancreatic juice was found necessary for the fatty meal to cause emptying of the gallbladder. The intravenous injection of secretin, insulin and pancreatic juice did not produce a discharge of iodized oil from the gallbladder, nor did alcoholic or acid extracts of the gallbladder wall.

Although no one has observed contractions of the common duct in the human, it is of interest that they can be easily observed in the pigeon. They are of definite peristaltic nature, being preceded by a relaxation phase which travels rapidly down the duct. Iodized oil passes from the common duct of the cat, even if the hepatic and cystic ducts are ligated. This may possibly be due to muscular contraction.

It is well known that water, iron salts, and a few other substances are absorbed by the wall of the gallbladder. We have shown that sodium iodide is rapidly absorbed. This can be demonstrated by the X-ray.

¹ Copher, Glover H., Kodama, Schuichi, and Graham, Evarts A., *J. Exp. Med.*, 1926, xliv, 70.

² Graham, E. A., *Surg., Gyn. and Obst.*, 1927, xliv, 153.

³ Boyden, E. A., *Anat. Rec.*, 1926, xxx, 333-363.

⁴ Sossman, M. C., Whitaker, L. R., and Edson, P. J., *Am. J. Roent, and Rad. Therap.*, 1925, xiv, 495.

3756

The Blood Amylase in Pancreatic Disease.

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The blood amylase of a number of patients was studied, including a few in which pancreatic disease was suspected from the abnormal amylase findings. In each case the suspicion was verified by the