Other injection masses have been found satisfactory. The important factor seems to be to select one that is not readily miscible with the body fluids.

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A Method for Making Quantitative Intestinal Studies.

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The intestinal loop devised by Thiry[1] and modified by Vella[2] has been used by numerous workers in studying the absorption of various materials from the intestine. Either the original method or its modification permitted observation of qualitative changes in the introduced material in an unanesthetized animal. Furthermore, the loop is more or less permanent and permits repeated experiments on the same animal under similar and varying conditions.

The Thiry loop has one fistulous opening on the anterior abdominal wall while the Vella modification consists of a fistulous opening at each end of the intestinal loop. The chief objection to either of these methods is the inability to prevent leakage. In an attempt to overcome this difficulty Gumilewski[3] placed rubber balloons in both ends of a Thiry-Vella loop. One balloon served as a plug while the other was penetrated by a short rubber tube which permitted filling and emptying of the loop. Modifications of the Gumilewski method have been used by Nagano,[4] Cobet,[5] and White and Rabinowitch.[6] The Gumilewski technique has 2 definite disadvantages. A single balloon placed within the loop has a tendency to be drawn in or pushed out by peristalsis, and it is difficult to anchor the balloons sufficiently to make an effective seal. With a short tube in the end of the loop the fluid tends to pocket in segments making complete emptying almost impossible. Loops prepared by the old Thiry technique, in which the gut is brought through the abdominal wall, have a tendency to prolapse through the fistulous opening. In order to obviate certain of the difficulties

[1] Thiry, *Sitzgsber. d. Wiener Acad. Math.-naturhist.* Abth. L. 1864, 77.

[2] Vella, S., *Moleschotte unters, Z. Naturlehre,* 1882, **13**, 40.

[3] Gumilewski, D., *Arch. Pflüger,* 1886, **39-40**, 556.

[4] Nagano, J., *Arch. Pflüger,* 1902, **90**, 389.

[5] Cobet, R., *Biochemische Zeitschrift,* 1921, **114**, 33.

[6] White, H. L., and Rabinowitch, J., *J. Biol. Chem.,* 1927, **74**, 449.

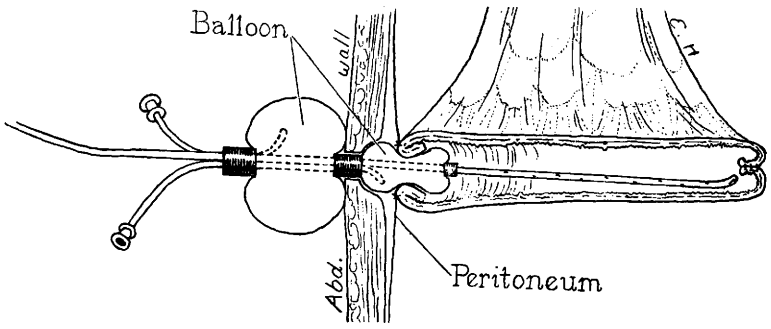

FIG. 1.

of the older methods we have modified the technique both from the standpoint of the method of making the loop and of sealing it for studies of a quantitative character.

Dogs have been used in all of our work, but the method is suitable for any animal where loop studies are desired. The initial part of the operation consists essentially of a Thiry fistula. The length has varied from 20 to 50 cm. After the continuity of the bowel has been reestablished by end-to-end anastomosis, the distal end of the loop segment is closed by a continuous suture and the stump inverted and oversewed by an interrupted seromuscular suture. The proximal end of the loop is then carefully inverted around a fairly large rubber tube which extends partly into the loop. The inversion is obtained by 2 purse string sutures so that approximately 3 cm. of the proximal end of the loop are inverted. Interrupted sutures of silk are placed at 4 equidistant points on the loop and the ends are left long. At a convenient point on the abdominal wall a small stab wound is made and the free end of the rubber tube is brought through this. When this is done the loop is snug against the anterior parietal peritoneum so that visceral and parietal peritoneum are adjacent. The double ends of the 4 sutures attached to the proximal end of the loop are then threaded on a straight skin needle and passed through the thickness of the abdominal wall in such a manner as to emerge about a centimeter from the tube. One end of each pair of sutures is passed through a piece of rubber tubing and the 2 ends tied so that there is no tendency for the sutures to cut through the tissues. When this is completed a piece of omentum is wrapped around the point where the loop is attached to the abdominal wall and held with 2 or 3 interrupted sutures. The abdominal wall is then closed. No dressing is placed over the tube, so that any material accumulating in the loop may have easy egress and the animal is not soiled. Every 24 hours the loop is washed

out with warm normal saline solution. For about one week the animal is kept on a very smooth diet, being fed frequently but in small amounts. After this period he is put on the routine animal house diet. Within 2 weeks the rubber tube is so loose that it can be easily withdrawn.

Loops prepared by this method do not intussusept. A soft Nelaton catheter is inserted daily along the fistulous tract and the loop is gently irrigated. The loop is ready for study, as a rule, in about 2 weeks from the time of the operation. The length of the loop is measured at the operation so that when the animal is ready for study it only remains to provide it with a catheter, fitted with balloons which will prevent leakage; that will completely empty the loop. For this purpose we have again modified existing techniques.

A No. 14 French soft rubber catheter is perforated freely along that portion which is to lie within the loop of intestine. Along the side of this catheter are cemented 2 short No. 8 catheters, one ending at a point about 1.5 cm. distal to the place where the catheter meets the skin and the second one terminating at a similar point proximal to this same place. Small balloons made from the fingers of a latex glove are placed around the main catheter at the points where the 2 smaller catheters terminate.

The catheter with the balloons deflated is inserted into the intestinal loop so that the lower balloon lies just within the loop and the upper one lies partly within the fistulous tract in the abdominal wall and is partly exposed on the abdominal wall. The inner balloon is then inflated with a small amount of air, an amount just sufficient to allow it to be pulled easily into the fistulous tract but not out of it. The outer balloon is then inflated so that the balloon lies wholly upon the abdominal wall. As the outer balloon is inflated it draws out of the fistulous tract completely, pulling the partially inflated inner balloon into the opening in the abdominal wall. The buried balloon snugly closes the proximal end of the loop but does not cause distention of it. The proximal balloon when distended prevents peristaltic action from pulling the catheter into the loop. If the catheter has been made properly, one can introduce fluids and recover them quantitatively with an accuracy closely approximating 100%. Each animal has its own set of catheters which are examined daily to make sure that they are in perfect shape.

The investigator is naturally concerned as to whether or not loops of this type function as normal intestinal membranes over a considerable period of time. If Nagano[4] was correct when he stated that intestinal loops very easily become the seat of "catarrhal in-

flammation" some evidence of this should be easily obtained. Examination of Nagano's data will disclose that on the basis of it the statement is not correct. Subsequent to the period at which his data were interpreted as the result of catarrhal inflammation he, in each instance, obtained data nearly identical with the data obtained from a loop at a time when he considered the membrane normal.

We have demonstrated normal peristalsis in loops prepared as described as long as 7 months after their preparation. At this period sodium chloride and glucose, in various concentrations, were being absorbed at a rate which was within the limits of error of the rates of absorption of these substances in the same animal some months previously. The rate of secretion from a loop does not increase with time. There is a considerable variation in the rate of secretion in different intestinal levels as there is at the same level during various periods of the day, but there is no evidence of a weekly or monthly variation when taken as a whole. Furthermore, histologic examination of the loop wall even months after preparation of the loop discloses no microscopic change in any of its structures.

These are criteria upon which one should be able to obtain some evidence of the change in the wall as a membrane. We have failed to find any evidence which would lead us to believe that these intestinal loops are not normal and that this condition does not continue over many months with ordinary care. Secretion from the loops 7 months after their preparation discloses enzyme activity.

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Note on the Failure of Anterior Lobe Extract to Pass from Fetus to Mother.*

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In a previous paper[1] we showed that ovulation can be induced in the pregnant rabbit by intravenous injection of concentrated human urine of pregnancy or anterior lobe extract of beef.† This observation was the basis of further experiments here reported.

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[1] Snyder, F. F., and Wislocki, G. B., *Johns Hopkins Hosp. Bull.*, 1931, **49**, 103.

† The concentrated urine of pregnancy referred to is the so-called "luteinizing" hormone prepared by Parke, Davis & Co. The extract used was stated to contain 50 rat units per cc. The experiments with anterior lobe were carried