

# METHOD OF OBTAINING PURE PANCREATIC JUICE FROM PUPPIES\*

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Until recently no experimental investigation had been done on digestion in the duodenum of puppies. Neither is there any information concerning methods of obtaining pure pancreatic juice from young animals. The main difficulty is to establish a fistula which would enable juice to be obtained in long-term experiments from normal healthy animals over a sufficiently long period.

The fistula tube for young puppies must be light, flexible and appropriate to the dimensions of the intestine (in a 6-7 day puppy the width of the duodenal lumen is 5-7 mm). It must be remembered that in puppies the muscular layer of the intestine is poorly developed, and that before the 18-20th day the puppies do not stand erect but drag their body on the ground, pressing on and shaking loose the lower end of the fistula tube if it projects ever so slightly over the abdominal surface. Experiments have shown that metallic fistula tubes or tubes of stiff plastic cannot be successfully used for operation on puppies in the early days of life.

The essential feature of our method is to incorporate a device for forming a fistula of the pancreatic gland, as proposed by O. B. Sobieva and V. E. Robinson [1]. Also we have made use of the experience of Z. M. Sosina [2] in preparing flexible fistula tubes from polythene.

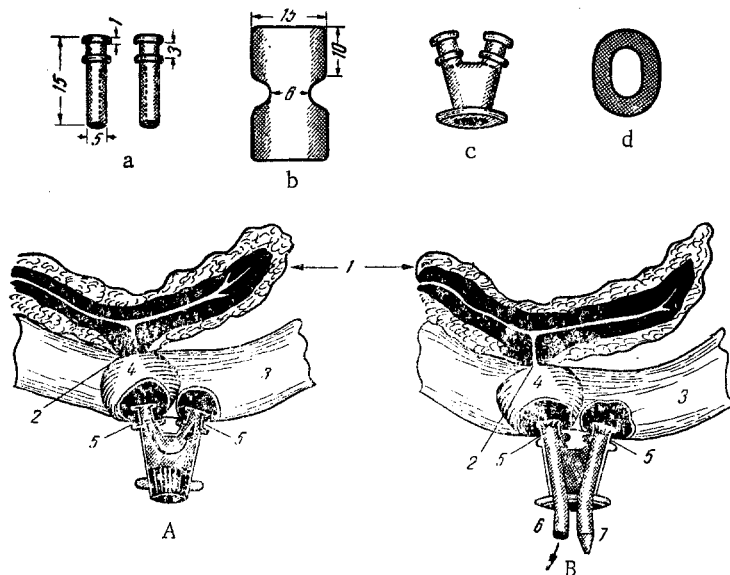
Two polythene tubes as used for electrical insulation were used having a diameter of 5 mm and a length of 1.5 cm; a small pair of heated pliers was used to weld two polythene flanges of width and thickness 1-1.5 mm onto the ends (see the figure). The distance between the flanges (which were subsequently to be held in the intestine with a purse-string suture) was 2-3 mm.

The tubes with the flanges were inclined at a small angle so that the distance between the upper flanges was 4 mm and between the lower flanges 2.5 mm; onto the lower ends was placed a common sleeve cut out of wide-bore polythene tube. The sides of the sleeve were welded in the same way, and then the sleeve was welded to the upper ends of the tubes. The inner sides of the lower ends of the tubes were cut out before the sleeve was fitted and the outer sides were fitted to the sides of the outer tube from within. In the lower part of the fistula tube there is a common chamber through which when the fistula tube is closed by a common rubber plug juice passes from the one branch through the other into the intestine. Onto the outer lower end of the fistula tube there is fixed a wider ring made of the same plastic material, 2.5 mm wide and 2 mm thick. The fistula tube is somewhat narrower below and its common portion is somewhat flattened from before backwards.

When no experiment is taking place the tube is closed by a rubber plug and the juice enters the intestine. During an experiment a polythene tube 4 cm long and 3 mm in diameter is inserted in the "juice" branch. Juice flows along it into a test tube. A similar tube is inserted into the intestine; if the experimenter collects the whole of the juice for analysis, because of its small amount in the first days of life the tube is closed. Alternatively it is connected by means of a rubber tube to a funnel. The juice obtained during the experiment is poured into the funnel, and then along a tube through the intestinal branch into the intestine. A puppy fitted with this kind of fistula loses a minimum amount of juice even during the experiment.

Dogs whose puppies are intended for the operation are carefully freed from flat worms before giving birth. The puppies are separated from the mother at the age of 5-6 days, three hours before the operation. The operation is carried out under ether anesthesia and 0.25% novocaine is injected into the radix of the mesentery in order to avoid

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Intestinal and pancreatic fistula tube for young puppies, showing its position in the intestine. a) polythene tubes with flanges fused on (the dotted line indicates the portion which has been removed); b) sleeve for fistula tube; c) tubes with flanges approximated; a sleeve is placed over their lower ends; the dotted line indicates the point of attachment; d) view of the fistula tube from below, as it appears on the puppy's belly; A) diagram of the intestinal fistula tube when no experiment is in progress; B) diagram of the intestinal fistula tube during an experiment; 1) pancreas; 2) main pancreatic duct; 3) duodenum; 4) isolated duodenal pouch; 5) branches of the fistula tube; 6) tube for running of the juice; 7) tube closing entry to intestine.

invagination. Aseptic precautions must be observed. No tourniquet is applied to the intestine, because to do so causes considerable trauma. The purse-string suture must run between the blood vessels so as not to constrict them.

The puppies are restored to the mother 8-10 hours after the operation when they have completely recovered from the anesthetic. For the first four days the amount of milk they take from the mother is somewhat restricted, and 5% subcutaneous glucose and physiological saline is injected; also 15,000-30,000 units of penicillin are given daily. Subsequently the puppies return to a normal diet. The operated animals are kept separately and are given to the mother only at 2-2½ hour intervals for feeding (except for a 4-5-hour break during the night). In the puppies the wound heals extremely quickly. The stitches may be removed as early as 5-6 days after the operation, and the first experiment may be performed on the 7-8th or 10-12th day.

Puppies operated on the 6th-10th day by this method which makes use of a soft fistula tube live normally and develop for 2-3 months or more.

The method we have described enables studies to be made of pancreatic secretion in puppies during their normal growth and development. A completely pure pancreatic juice is obtained, and its gross amount and the enzymes may be measured and related to age and to the type of food.

#### SUMMARY

A method of obtaining pure pancreatic juice from young puppies is described.

#### LITERATURE CITED

1. O. B. Sobieva and V. E. Robinson, *Fiziol. zh. SSSR*, 5, 629 (1953).
2. Z. M. Sosina, *Fiziol. zh. SSSR*, 11, 1391 (1959).