METHOD FOR SIMULTANEOUS FISTULIZATION OF SEVERAL ORGANS OF THE ABDOMINAL CAVITY THROUGH A COMBINED CANNULA

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The metal or rigid plastic cannulas of different designs used for studying the functions of the organs of the digestive system frequently cause pressure sores and drop out, and are also subjected to the action of the digestive juices. Furthermore, having a high thermal conductivity, they have a cooling effect on the fistulous canal.

The method of fistulization with the use of metal cannulas of standard shape requires drawing together and subsequent union of the visceral and parietal peritoneum for forming a natural fistulous canal around the rigid cannula [2, 4, 5, 7]. But when approximating the organ with the abdominal wall its natural position changes and the neurovascular and lymphatic connections are disturbed, which can affect the functions of the investigated organ. In addition, when forming fistulas of a number of organs it is necessary to use several rigid cannulas and extract them through independent incisions or punctures of the abdominal wall, and sometimes to carry out the operation in several stages.

In connection with this, elastic cannulas of soft rubber were tested, but they did not become widely used in view of the number of complications that arose in the postoperative period [5].

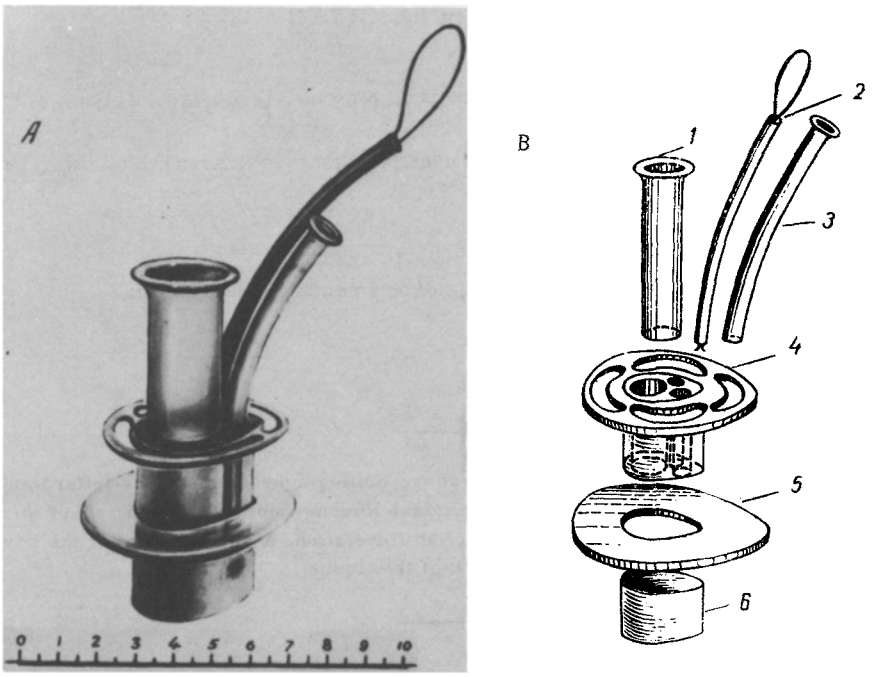
Recently elastic polymerized plastics—polyethylene and polyvinyl chloride-have begun to be used for the manufacture of fistular cannulas [1, 3, 5, 8]. Such cannulas do not have many of the above-indicated faults, but the authors proposing them nevertheless achieved approximation of the organ with the abdominal wall.

Using polyvinyl chloride tubes for forming the fistula, we considered it possible to avoid adhesion of the organs with the abdominal wall, thus retaining their natural position and mobility in the abdominal cavity. The use of these materials has made it possible to perform simultaneous fistulization of several organs by means of one cannula.

The combined cannula we developed was used in experiments on dogs. It was assembled from several polyvinyl chloride fistular tubes and a common protective plexiglas ring with an aluminum cap. Depending on in what organs the fistulas were made, the design of the combined cannula was somewhat modified but the components always remained the same.

As an example we will describe a combined cannula for simultaneous formation of fistulas of the stomach and gallbladder, and a looplike obturator for the cystic duct, (see figure). The obturator can be replaced by a fistular tube for any other organ. Cannulas of a similar design were used also for forming fistulas in various regions of the small intestine. The production of the cannulas does not require special equipment.

The fistular tubes were manufactured from polyvinyl chloride brand PM-1 by the Okhtinskii Chemical Combine. This plastic, produced specially for medical purposes, is distinguished from other brands by high elasticity. Even when tubes of polyvinyl chloride PM-1 are in tissues for a long time they do not completely lose their properties, although they lose a part of the plasticizer which enters their composition. Polyethylene tubes, which are characterized by a greater stability in an organism, are unsuitable for the given method owing to their rigidity. At present there are no polymers more suitable for fistular tubes produced by Soviet industry than PM-1. For forming gastric fistulas we used tubes with a diameter of 20 mm, and for the gallbladder and small intestine, 7 mm. On one



Combined cannula. A) General view; B) its parts: 1) Gastric fistular tube; 2) looplike obturator; 3) bladder fistular tube; 4) protective ring; 5) external disk; 6) aluminum cap.

end of the tube a disk was made by a simple mold, for which the tube was preliminarily heated to 160-170° in the flame of an alcohol burner with a wide wick.

The protective rings was made from plexiglas. For this purpose holes were drilled in a mold corresponding to the number and size of the fistular tubes, and then it was ground to the required shape. As our experiments showed, the best shape is ellipsoidal. Approximation of the edges of the incision was facilitated by using a ring of such shape, and subsequently better healing of the surgical wound was achieved. On one end of the ring was attached and glued the disk with the large openings.

During the operation the disk was inserted into the incision of the organ, which was $1\frac{1}{2}$-2 times smaller than the diameter of the fistular tube, and it was fastened with a double purse-string suture, reliably fixing the tube. All fistular tubes were assembled in a protective ring, the outside end of which was removed from the abdominal cavity through the upper corner of the surgical incision, and the inner end with the disk was pressed to the parietal peritoneum. The surgical wound was sutured tightly. On the outside end of the ring was set a disk so that during the first days postoperation the ring would not sink into the abdominal cavity. The fistular tubes were closed with plugs, and the free section of the ring was closed by an aluminum cap from a section of a thin-walled aluminum tube, which protected it from damage by the animal.

Elastic fistular tubes of polyvinyl chloride take a comfortable position in the abdominal cavity and are nicely overgrown by connective tissue. The protective ring, owing to the presence of openings in the inside disk, strongly adheres to the abdominal wall.

In the postoperative period the usual care in operations on organs of the digestive tract is followed on the animals. On day 3-5 postoperation the outside disk is removed, since there is no longer any danger of the ring sinking into the abdominal cavity. On the 6-7th day the sutures are removed. From this time on the animals go on an ordinary diet (the dogs received unground meat with bones).

On the basis of a 3-year experiment in using the combined cannulas, this method can be recommended for studying functions of the gastrointestinal tract.

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