Technique

A simplified method of cannulating the intestinal lymphatic of the rat¹

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The examination of intestinal lymph is of value in a variety of experimental studies, including those of intestinal absorption and metabolism, transmural passage of bacterial products, intestinal immune

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mechanisms, and portal circulatory dynamics. In the rat, intestinal lymph flows to the cysterna chyli primarily via a single lymphatic vessel cephalad to and paralleling the superior mesenteric artery. A smaller amount is carried by an accessory lymphatic on the caudad side of the artery (Lambert, 1965). Bollman, Cain, and Grindlay (1948) described the cannulation of the main intestinal lymphatic through an anterior midline incision, suturing the cannula within the lumen. This technique is relatively difficult because of the awkwardness of the anterior approach and because the mesenteric lymphatic and mesenteric arteries are easily damaged during the necessary extensive dissection and placing of the suture. Peters and McMahon (1970) have modified Bollman's method to make it somewhat easier. During studies of intestinal absorption of macromolecules (Warshaw, Walker, Cornell, and Isselbacher, 1971) a simple, rapid, sutureless technique requiring much

Fig. Cannulation of the intestinal lymphatic. Note the additional fixation obtained by passing the cannula behind the vena cava and the kidney. The insert at the left shows the position of the animal and the location of the incision. The insert at the right shows the cannula in the main intestinal lymphatic and the disruption of the accessory lymphatic.

less dissection of the lymphatic was developed in this laboratory and is described here.

Methods

Rats weighing at least 200 g are anaesthetized with intraperitoneal pentobarbital (35 mg/kg). A right subcostal incision is carried back to the flank. The rat is positioned on its left side over a bridge. The duodenum is reflected to the left, and the peritoneum over the mesenteric artery and the lymphatic is teased away with fine forceps. Since it will not be necessary to place sutures around the lymphatic to secure the cannula, dissection is limited to the minimum amount of gentle teasing which allows bulging of the superficial surface of the lymphatic. A curved haemostat, insinuated through the retroperitoneal tissues behind the vena cava and the right kidney, is used to pull the heparin-filled polyethylene cannula (Intramedic PE-50) into position near the lymphatic. A small cut is made with an ophthalmic iris scissors in the free surface of the lymphatic, and the bevelled cannula is threaded about 3 mm into the lymphatic (inserting the cannula too far will cause an obstruction to flow). A drop of tissue cement, methyl cyanoacrylate (Eastman 910), is applied to the hole in the lymphatic to seal it and to fix the cannula in place. For additional fixation the cement is also applied to the point of exit of the cannula from the perinephric fat. The accessory lymphatic is intentionally disrupted and occluded with the cement to increase the return through the cannulated main lymphatic. The completed cannulation is shown in Figure. Simultaneous cannulation of any part of the gut or of the portal vein is easily accomplished through the same incision. With the cannula led out

at the lateral end of the incision, the wound is closed with a running suture to all layers of the abdominal wall except the skin, which is approximated with metal clips or sutures. The animal is kept in a restraining cage for the duration of the study (Bollman, 1948).

Comment

The technique for making an intestinal lymph fistula in the rat as described in this report is faster and simpler than previously published methods. The use of the methyl cyanoacrylate adhesive eliminates the need for suture fixation of the cannula in the lymphatic vessel and, therefore, the need for extensive dissection of a long segment of lymphatic vessel. The lymphatic vessel need not be separated from the mesenteric artery, a step which endangers both structures. The methyl cyanoacrylate adhesive quite adequately secures the cannula in place and seals the hole in the lymph vessel. In our hands, the use of this technique for the preparation of intestinal lymph fistulas in rats has markedly reduced operating time and loss of animals due to technical failures.

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