

LONG TERM CATHETERIZATION OF THE PORTAL VEIN IN CATS

S. A. Seleznev and O. P. Khrabrova

Laboratory of Pathological Physiology (Director, Candidate of Medical Sciences, S. A. Seleznev), I. I. Dzhanelidze Research Institute of Emergency Aid (Director, Doctor of Medical Sciences E. G. Tsurinova), Leningrad

(Presented by Academician V. N. Chernigovskii)

Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 55, No. 1, pp. 122-123, January 1963

Original article submitted March 26, 1962

The method of angiostomy, suggested by E. S. London [2], may be used to give a permanent access to a major blood vessel in order to study certain aspects of the hemodynamics and intermediate metabolism. Although possessing many undoubted advantages, this method is technically very difficult and has frequently been modified [1, 3, 5, 8], yet all variants so far proposed still suffer from important defects.

As a result of the development of plastics based on high-molecular polymers, a more reliable method of implantation of catheters in blood vessels is now available for various purposes [6, 9-12].

Until now most workers have used the catheterization method on dogs. When we tested the catheterization of the major blood vessels on cats [4], we discovered that it can be done in these animals in experiments of both short and long duration.

For catheterization we have used catheters made of high-pressure polythene. They are sufficiently strong and elastic, are perfectly compatible with the body tissues [13], and they inhibit clotting of the blood contained in them [7].

Catheters of the required dimensions may be made by drawing from a polythene tube 4-6 mm in diameter in the flame of a Bunsen burner or spirit lamp (if the flame is wide enough). Catheters made in this way have a long, narrow portion 1.0-1.5 mm in diameter and a short wide portion 4-6 mm in diameter, and a total length of 120-180 mm. A stop, made of polythene or organic glass 2.0-2.5 mm thick, is fixed securely to the wide portion of the catheter (Fig. 1, A).

The narrow portion of the catheter, for introduction into the blood vessel, must have an oblique cross section at its tip. The wide end of the catheter, subsequently remaining outside, is fixed over the cannula of a syringe and covered with a firm stopper (it is better to cover it by pushing a rubber stopper, 2.5-3.0 mm in diameter, into the wide part of the catheter). This stopper may remain permanently in the catheter, and blood may be taken or solutions injected by pushing the needle of the syringe through it.

The catheters we have described, when used for catheterization of the portal vein, are introduced by operation, observing the ordinary rules of asepsis. Before operation, the catheters are boiled or, preferably, kept in triple solution for 1 h. Before being introduced into the vessel, the catheters are filled with heparin solution in a concentration of 400-500 units/ml.

The catheter is introduced into the portal vein through one of the branches of the mesenteric vein of the ileum. A segment of this vessel is dissected for a distance of 5-7 mm from the surrounding tissues and taken on a ligature which is not tied. During introduction of the catheter it is desirable not to cut the vessel with scissors, but to use a perforating, round or guttered guide (Fig. 2). By means of this guide, the catheter is inserted into the mesenteric vein, and passed along it into the portal vein. The introduction of the catheter and its position are checked by palpation of the vessel. When the catheter is in situ the peripheral end of the vessel into which it has been inserted is ligated, and the catheter itself is secured firmly, but without compressing it, by tying two ligatures. The wide portion of the catheter is brought outside with as few bends as possible. To prevent the catheter from slipping out, the stop (see Fig. 1, A) is used, the wide part of which rests against the inside of the abdominal wall.

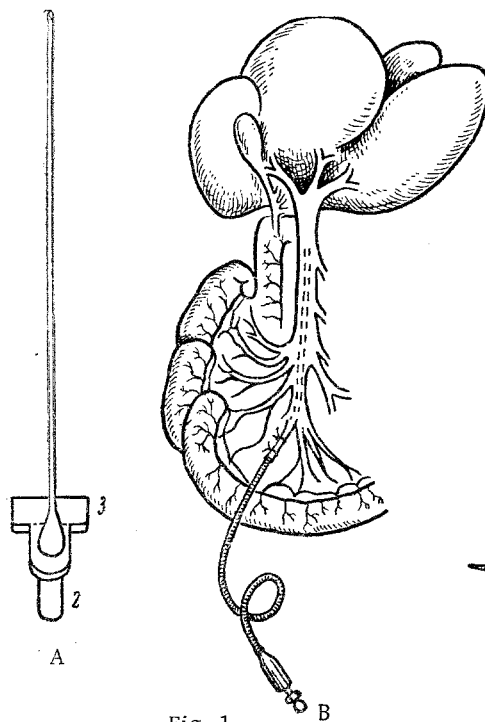


Fig. 1

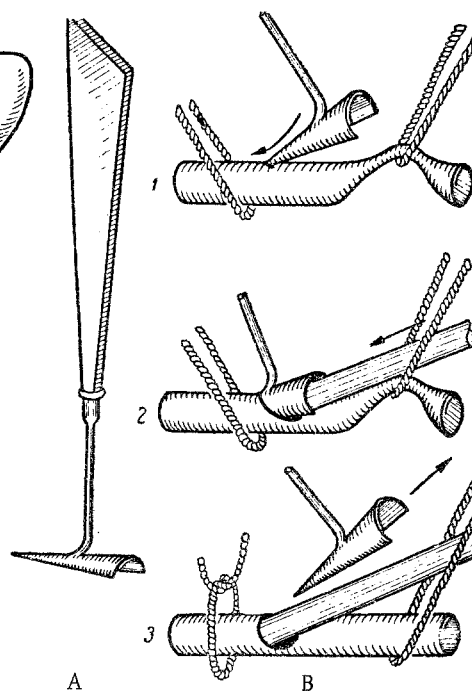


Fig. 2

Fig. 1. Construction of the catheter for long-term catheterization of the portal vein (A) and scheme of its insertion into the vessel (B). 1) Part of catheter inserted into vessel; 2) external part of catheter; 3) stop.

Fig. 2. Guttered guide for insertion of the catheter. A) General view of guide; B) successive stages of insertion of catheter into vessel. 1) Vessel taken on ligatures; 2) the catheter is passed through the conical gutter of the guide into the vessel; 3) guide removed from the vessel.



Fig. 3. Roentgenogram of portal vein after injection of sergosin into it through the implanted catheter.

In the postoperative period, besides the ordinary care of the animal, the catheter must be flushed with heparin solution in a dose of 400-500 units/ml after 2-3 days. The catheters may be used 5-6 days after the operation of insertion.

More than 30 cats have been treated as described above and used in experiments. In nearly every case the catheterization was successful. The animals were used in experiments for 20-30 days or more.

As an illustration we give the roentgenogram of a cat made, on the 30th day after an operation to insert such a catheter, by injecting 2 ml of a 40% solution of sergosin into the portal vein through the catheter (Fig. 3).

SUMMARY

A method of chronic catheterization of the major blood vessels, including the portal vein, may be successfully used for studying the interstitial metabolism and hemodynamics. For catheterization of the portal vein in cats in conditions of chronic experiment we used catheters made of polyethylene, 1-1.5 mm in diameter and 120-180 mm in length with a dilatation at the peripheral end. The catheter was introduced surgically through one of the branches of the mesenteric vein with the aid of a special guide. To avoid thrombosis during the postoperative period the catheters were washed once in 2-3 days with heparin solution (400-500 units/ml).

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All abbreviations of periodicals in the above bibliography are letter-by-letter transliterations of the abbreviations as given in the original Russian journal. *Some or all of this periodical literature may well be available in English translation.* A complete list of the cover-to-cover English translations appears at the back of this issue.