A POLYETHYLENE CANNULA WITH FIXING DEVICE FOR INSERTION INTO ANIMALS' BLOOD VESSELS

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The suggested cannula consists of a polyethylene tube and a fixing device. The outer end of the cannula is closed by a cap which is screwed into the fixing device. The bottom of the cap contains a hole covered with a rubber membrane which is pierced by the needle of the syringe when blood is taken from the cannula.

* * *

Plastic cannulas or catheters have been used by many workers in chronic experiments [1-10], but because of several disadvantages in the construction of the catheters used they have had only a very limited life.

The suggested cannula with fixing device (Fig. 1) can be used repeatedly for many months for taking any volume of blood flowing from an internal organ without the need for anesthetizing the animal. The polyethylene cannula is curved so that it does not kink when brought out onto the outer surface of the animal's body. The length of the tube depnds on the animal's size. Near its end inserted into the blood vessel, the cannula is constricted so that it can be fixed into the vessel by ligatures. After the constricted part the cross-section of the tube gradually increases. It reaches a maximum at the cylindrical end brought out onto the surface of the animal's body. The thickness of the tube walls varies throughout its length: it is thinnest at the end introduced into the blood vessel, and the walls of each succeeding section are thicker than those of the preceding section. The outer cylindrical end of the cannula has the thickest walls. This has an external cylindrical thickening into which the top edge of the fixing device fixed on the polyethylene cannula rests.

The fixing device consists of a metal tube (from a nonrusting metal), the lower half of which is pressed into a plastic tube with a broad base. Eight equal round holes are made in the base at equal intervals. The plastic base is placed between the skin and the muscles, to which it is sutured.

The upper half of the metal tube is threaded on its outer surface, and on to it is screwed the nonrusting metal cap with a knurl and a round hole in the bottom. A rubber membrane is fitted inside the cap so that it covers the hole and the orifice of the cannula.

The metal tube into which the end of the polyethylene cannula is inserted is brought outside, and the metal cap screwed on to it severely protects the outer end of the cannula from being chewed by the animals. Since the orifice of the cannula is closed, not by a stopper but by a rubber membrane covering the hole in the bottom of the cap, which can easily and quickly be replaced by a new one if necessary, the period of useful life of the cannula is unlimited.

Before insertion into the blood vessel, the polyethylene cannula, fixing device, cap, and rubber membrane are sterilized in ethyl alcohol and rinsed with sterile physiological saline. Then, observing sterile precautions, the polyethylene cannula is inserted with its narrow part into the fixing device (from the side

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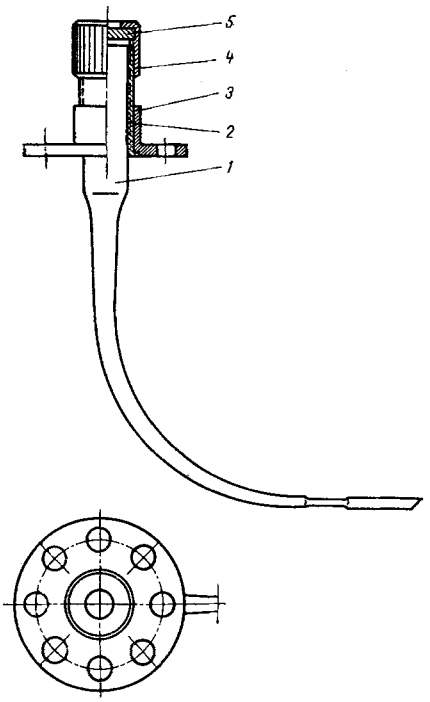

Fig. 1. Diagram showing construction of polyethylene cannula with fixing device for insertion into blood vessels. 1) Polyethylene cannula; 2) metal tube of fixing device; 3) plastic tube of fixing device; 4) metal cap; 5) rubber membrane.

of the metal tube) and pushed on as far as the cylinder. The bottom of the cap is covered by the rubber membrane and the cap is tightly screwed on to the metal tube of the fixing device so that the rubber membrane is compressed and the lumen of the polyethylene cannula very tightly closed.

The needle of a syringe, filled with sterile physiological saline containing heparin (50-100 i.u. heparin/ml solution) is then passed through the hole in the cap by piercing the rubber membrane, and the lumen of the cannula is filled with this solution.

The cannula, prepared in this manner, is introduced into the blood vessel through any small tributary. The cannula is fixed (at its narrowest part) in this small tributary by ligatures. The plastic base of the fixing device of the cannula is inserted between the skin and muscles, to which it is fixed by sutures passing through its holes, and the top part of the metal tube (with the cap screwed on it) is brought out on the outer surface of the animals' body.

To take blood from the cannula, the rubber membrane covering its lumen is pierced by the sterile needle of a syringe which passes through the hole in the metal cap. At first physiological saline with heparin (with which the cannula was filled) escapes through the needle, followed by blood. After the required volume of blood has been obtained, the cannula is washed with sterile physiological saline by means of the syringe, and again filled with physiological saline containing heparin.

The writer has made several such polyethylene cannulas with the fixing device for insertion into blood vessels and they have been successfully implanted into the left renal vein of rabbits and dogs.

The use of the polyethylene cannula with fixing device, as described above, for insertion into blood vessels allows investigations to be carried out on clinically healthy animals without disturbing the flow of blood into the organs, because the area of cross-section of the cannula at its end introduced into the blood vessel is many times (20-25) smaller than the area of cross section of the blood vessel.

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