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Blood Vessel Anastomosis with Payr Cannulæ and without Anti-Coagulant, in Acute Experiments.

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Kabat recently stated[1] that, "arterial anastomosis by means of Payr cannulæ, the method recommended by Heymans and his co-workers,[2] proved unsatisfactory in our laboratory." Inasmuch as we have been using this method, without anticoagulant, entirely satisfactorily for the past 15 years for such varied cross-circulation experiments as perfusion of the isolated head or brain, isolated carotid sinus and perfusion of acutely transplanted spleen, kidney, leg, intestine, carotid sinus and suprarenal, we wish to describe in detail our procedure in blood vessel anastomosis so that this technique may be successfully applied by other workers.

The Payr cannulæ, made of thin brass tubes with 2 external grooves (Fig. 1, A), vary in size from 2 to 8 mm. in diameter,

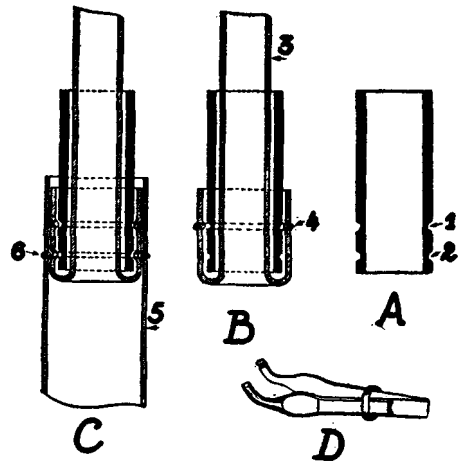

FIG. 1.

A, shows the appearance of the cannula in sagittal section and indicates the position of the grooves (1, 2).

B, shows the position of the first ligature (4) on the everted vessel (3).

C, shows the second vessel (5) drawn over the first and the position of the second ligature (6).

D, shows the cannula holder. Note the grooved prongs of this holder.

1 Kabat, Herman, PROC. SOC. EXP. BIOL. AND MED., 1938, **37**, 698.

2 Heymans, C., Bouckaert, J. J., and Regniers, P., *Le sinus carotidien et la zone homologue cardio-aortique*, G. Doin et Cie, Paris, 1933.

and from 8 to 16 mm. in length. The cannula, corresponding in diameter to the size of the smaller of the 2 blood vessels to be connected (be they arteries or veins) is selected and fixed in the special cannula holder (Fig. 1, D). The ligated vessel is pulled through the cannula and a "bull dog" clip is placed below the ligature. The vessel is then cleanly cut between the ligature and the clip and the severed edge is carefully grasped by 3 delicate ocular forceps and everted over the edge of the cannula (Fig. 2, A). As soon as the vessel has been pulled down far enough over the cannula one forceps is removed from the edge and is placed about the vessel and cannula to hold it for tying. It is then firmly tied in the second groove (Fig. 1, B, 4).

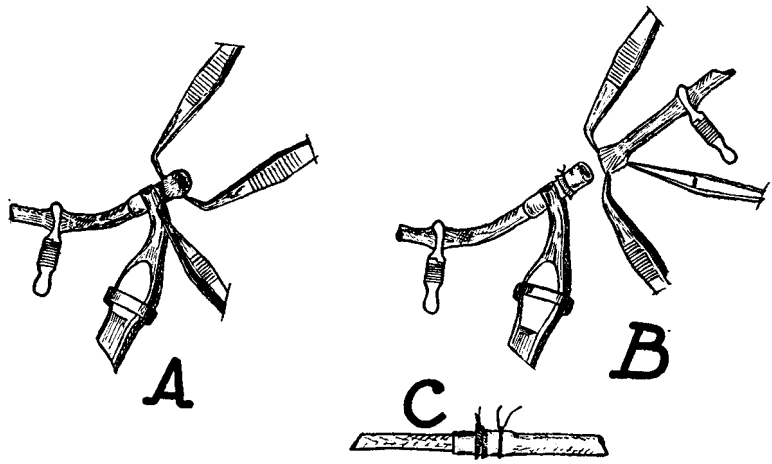

FIG. 2.

Shows, in A, the method of grasping and everting the first vessel over the cannula with the cannula holder in place. B, shows the method of slipping the second vessel over the first, everted one. C, shows the completed anastomosis from the outside.

The inside of the vessel, so secured, is washed with physiological saline to the level of the "bull dog" clip, care being taken not to injure the intima. The everted intimal surface is also carefully washed. For this procedure a round, blunt, hypodermic needle on a syringe has been found very useful.

The vessel to be connected is ligated and divided. A short distance below the ligated end to be connected, a "bull dog" clip is placed, as in the first vessel, and the vessel is cleanly severed between the ligature and the clip. The severed edges are grasped by the 3 ocular forceps. At this time the lumen of this vessel, as far as the level of the "bull dog" clip, is washed with physiological saline, as before, and the vessel is pulled over the previously tied

and everted vessel (Fig. 2, B). As soon as the vessel has been pulled down far enough, one forceps is removed from the edge and is placed about the vessel and cannula to hold it for tying. The outer vessel is tied in the first groove, at 6, Fig. 1, C. The "bull dog" clips may now be removed from both vessels.

The anastomosis, thus completed, approximates endothelium to endothelium without the possibility of metal or thread coming into contact with the blood flowing through the anastomosis (Figs. 1, C and 2, C).

This method of blood vessel anastomosis is very simple, can be performed in a few minutes and is always successful if properly done. Neither thrombosis nor leakage occur after many hours of blood flow. It should also be pointed out that with the above described technique not only can anatomically similar vessels of quite different calibre be anastomosed together, be they arteries or veins, but artery may be anastomosed to vein, or *vice versa*.

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Conversion of Succinic Acid to Glucose in the Phloridzinized Dog.

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Koranyi and Szent-Györgyi have reported[1] that succinic acid will decrease the ketosis in diabetes. Although other investigators[2, 3] have been unable to confirm this observation it has renewed interest in the behavior of succinic acid in metabolism. Ringer, Frankel and Jonas in a widely quoted study[4] found that extra glucose was excreted when sodium succinate was fed to the phloridzinized dog. It seemed desirable to reëxamine this point for various reasons. Our experiments are summarized in Table I. All pertinent data are included with the exception that 6 gm. of NaCl were administered daily by stomach tube in order to obtain good urine volumes. The bladder was emptied by catheter at the end of each 24-hour period of urine collection. Urine ketones were determined

1 Koranyi, A., and Szent-Györgyi, A. V., *Dtsch. med. Wschr.*, 1937, **63**, 1029.

2 Lawrence, R. D., McCance, R. A., and Archer, N., *Brit. Med. J.*, 1937, **2**, 214.

3 Dunlop, D. M., and Arnott, W. M., *Lancet*, 1937, **233**, 738.

4 Ringer, A. I., Frankel, E. M., and Jonas, L., *J. Biol. Chem.*, 1913, **14**, 539.