more effective against *Staph. aureus* (gram+) while metaphen gave a better score against *E. typhosa* (gram—).

The toxicity-index indicates the relative efficiency of germicides. It does not mean that a germicide with a low toxicity-index will be harmless to living tissue-cells at any concentration. Due consideration should be given to the killing dilutions of the germicides, in the presence of organic matter, on both tissue and bacteria. The germicides, when actually used, should be diluted to the proper strengths. It may be seen from the results that a 1:100 dilution of iodine would be more toxic to tissue than a 1:100 dilution of mercurochrome. However, if a 1:1,000 solution is used, the iodine would be harmless to tissue but still bactericidal, whereas mercurochrome, though not harmful to tissue, would exert no bactericidal effect. On the basis of the results, mercurochrome and merthiolate cannot be relied upon as germicides to kill *Staph. aureus* in the presence of organic matter as used in the above experiments. However, the two germicides rate considerably better against *E. typhosa,* mercurochrome giving a lower toxicity index than merthiolate.

9699

A New Method of Arterial Anastomosis for Acute Experiments Without Use of an Anticoagulant.

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In cross-circulation experiments and in acute transplantation experiments, it is often necessary to use coagulable blood because surgery is contemplated after the blood vessels have been connected. Various methods have been proposed to avoid thrombosis and assure adequate blood flow in such arterial anastomoses.[1] End-to-end anastomosis with silk sutures is satisfactory but is too time-consuming for acute experiments. Arterial anastomosis by means of Payr cannulae, the method recommended by Heymans and his coworkers,[2] proved unsatisfactory in our laboratory.

The method of arterial anastomosis to be described is very simple and can be performed rapidly. It has been successful every time it

[1] Markowitz, J., *Experimental Surgery,* Wm. Wood and Co., 1937.

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

was attempted and has been found to provide adequate blood flow for many hours. This method involves the use of a wire eversion frame (a, Fig. 1). One artery is pulled through the loop of the frame, is everted over the loop and then tied to the frame. The everted artery is now placed within the lumen of the second artery, which is also tied to the frame. The flowing blood touches only endothelium so that thrombosis does not occur.

The eversion frame (a, Fig. 1) is made very simply by bending a piece of piano wire. The loop of the frame over which the artery is everted, should be approximately equal in size to the diameter of the artery. The 2 arteries to be anastomosed should also have about the same diameter. The frame is about 3 cm. in length and has a small loop on the far end to which threads holding the arteries are tied.

An Eversion Frame for Acute Anastomosis of Arteries

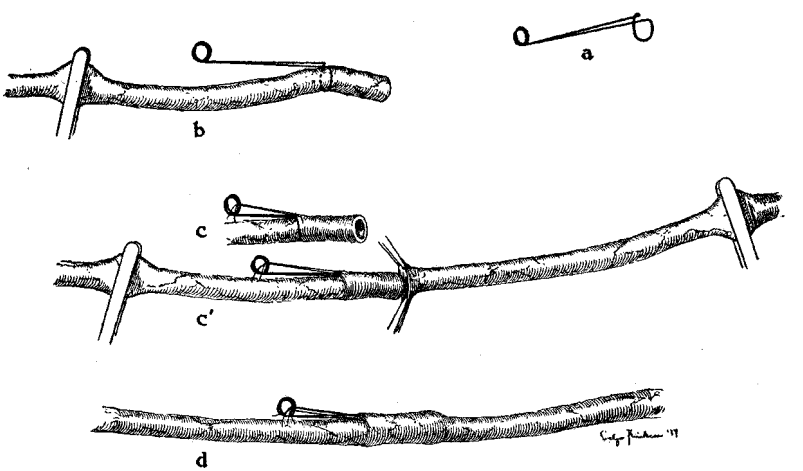

FIG. 1.

This method has been employed to connect the common carotid artery of one dog to the common carotid artery of another dog. The arteries are first exposed throughout their length and cleaned of adherent fascia. The carotid of the perfuser is clamped below and ligated high in the neck. The carotid of the perfused animal is clamped above and tied low in the neck. The artery of the perfuser is cut just below the ligature and the contained blood is milked out. A thread is then put through the wall of the artery near the cut end. The artery is then pulled through the loop of the ever-

sion frame (b, Fig. 1). With as little tension on the artery as possible, forceps are now applied and the artery is everted over the frame and the thread is tied to the far loop of the frame (c, Fig. 1). Cotton soaked in warm saline is now placed around the everted artery to protect the endothelial lining. The artery of the other dog is now cut across and a thread put through the wall near the cut end. The lumen of the artery is enlarged by means of forceps and the everted artery is placed inside of the artery of the second dog (c′, Fig. 1). The outer artery is now fixed to the far loop of the eversion frame by means of the thread and the anastomosis is complete. The artery clamps are now removed and the blood flows through the anastomosis (d, Fig. 1). The pulse is practically as strong distal to the anastomosis as it is proximal to it.

It should be pointed out that there is no ligature holding the 2 arteries together. The arteries are only bound to the eversion frame and not to each other. No hemorrhage occurs, however, since the 2 arteries are held together by the arterial blood pressure. Usually a few drops of blood seep out between the 2 arteries and a small clot soon forms at the edge of the anastomosis. Since the arteries are held together only by the arterial blood pressure, it is essential that the blood flow from the everted artery into the outer artery to avoid hemorrhage.

In cross-circulation experiments using chloralose anesthesia, the carotid arteries of one dog were connected to the carotid arteries of another dog by this technic. The external jugular veins of the 2 animals were anastomosed in a somewhat different way. The cut vein of one dog was pulled through a short glass cannula, everted over it and tied to the cannula by a ligature. The everted vein was then placed inside of the vein of the other animal and this vein was also ligatured firmly to the cannula. A glass cannula is more satisfactory for venous anastomosis than is the eversion frame.

After the arteries and veins of the 2 dogs were anastomosed, the head of the perfused animal was completely isolated from its body surgically. Adequate blood flow to the isolated head was maintained for hours, since the corneal reflex was active and rhythmic respiratory movements were evident after many hours of cross-circulation. The circulation through the brain of the isolated head was adequate when only one carotid artery and one jugular vein were anastomosed to the corresponding vessels of the perfusing animal.