TRANSFUSION BY THE SYRINGE METHOD.*†

BY

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(With two illustrations.)

SINCE the resurrection of transfusion by Dr. George Crile, the technic has been simplified and modified until we now employ the above procedure. The first method employed consisted in connecting the lumen of an artery to the lumen of a vein by suturing the cut edges together and this was modified by substituting one of the many instruments for the suture in connecting them together, such as the cuffing cannula of Crile, Elsberg's instruments, etc., or by the interposition of a cannula, such as Brewer's glass tubes or Bernheim's metal tubes, these being coated by paraffin, or vaseline. Dr. Dorrance and Dr. Ginsburg next advocated connecting a vein to a vein instead of a vein to an artery for the following reasons. First, it is easier; second, less injury to structures; third, it more nearly follows the laws of the body.

The connection can be made by one of the above-described methods. The syringe method has been reintroduced by Cooley, Edwards, Lindeman and others. During the past seven years, I have used practically all of the methods and now use the syringe method which has the following advantages. First, there is no chance for carrying infection from the infected recipient to the healthy donor. Second, one is sure that the procedure is successful. Undoubtedly many of the failures laid to the door of transfusion are due to no blood passing the connection. Third, known quantity of blood transfused. Fourth, the technic is easy enough for any physician to perform. In working with blood or blood-vessels, the method must be simple and so arranged that if clotting occurs in one part the syringe can easily be removed and another substituted. A complicated apparatus is usually not satisfactory.

The instruments required are as follows: All glass syringes, four

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of 50 c.c. each, two of 100 c.c. each, two small and two large cannulas with round-pointed trocar, and two sets of the usual instruments for venesection.

To avoid accidents, this operation should be considered a major one and performed, if possible, in a hospital operating room. The positions of the patients, operator, assistants and nurses are important and make the greatest difference in ease of operating. The arrangement most satisfactory is as follows: Two operating-tables of equal height placed parallel (Diagram I), about 3 feet apart.

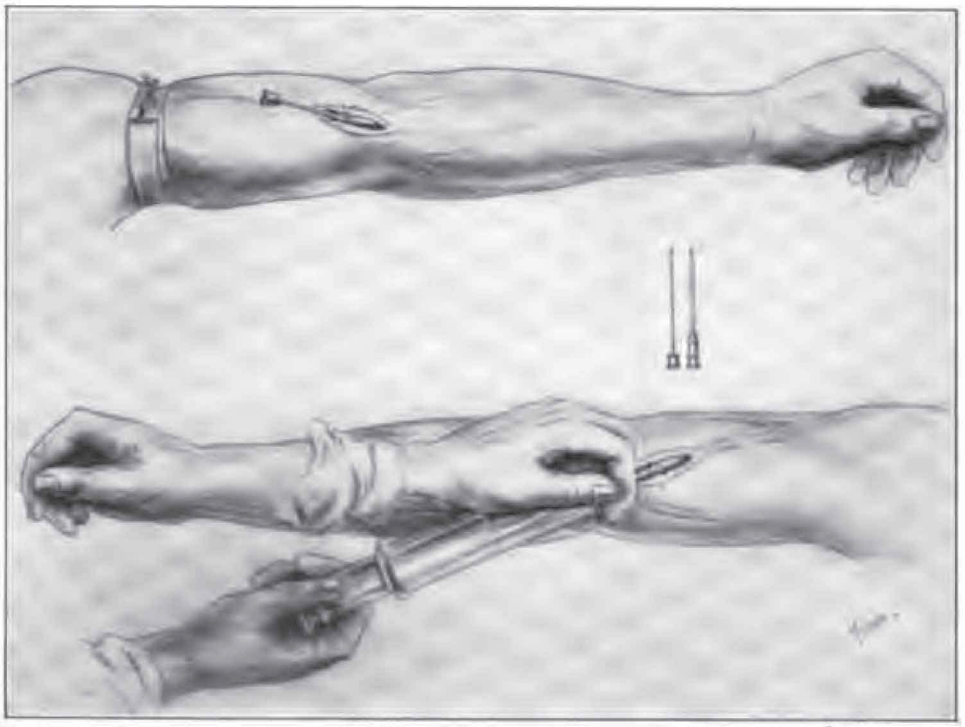

FIG. 1.

An instrument table of the same height as the operating-tables placed between the operating-tables. The donor is placed on table No. 1 with his left arm extended on table No. 3; the recipient on table No. 2 with his right arm on table No. 3. The operator stands to the left of the donor's head at No. 4, the assistant to the left of the recipient's abdomen at No. 5. The operating nurse to the left of the recipient's head at No. 6 with her table with the instruments and solutions back of her at No. 7. A second assistant may be placed opposite the opera-

tor to assist with the cannula. A second sterile nurse to wait upon the operating nurse is essential. One person to manage the tourniquet on the donor is necessary and should stand to the right side of the donor and reach over the patient in attending to the tourniquet. The operation is performed by Dr. Lindeman without exposing the vein by introducing a special trocar and cannula into the vein through the skin. This is frequently possible but in the

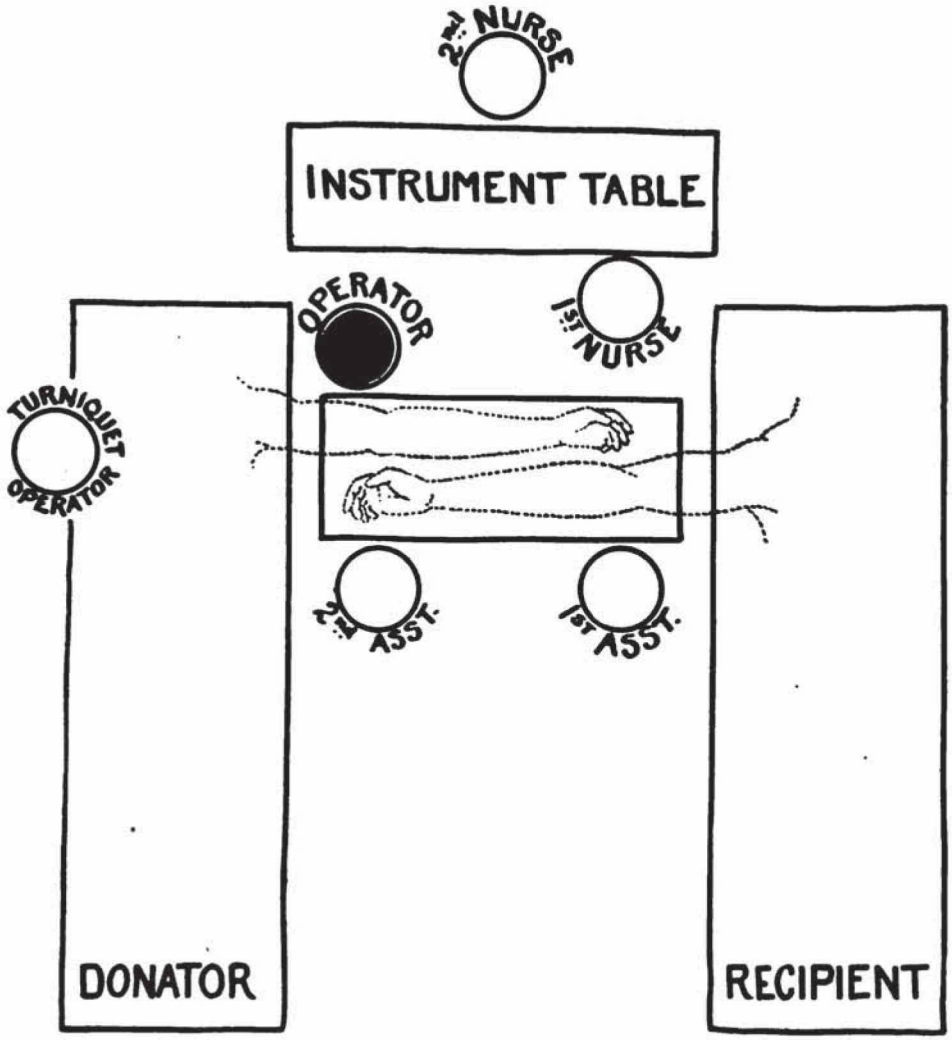

FIG. 2.

untrained and frequently in the trained, the needle will not be satisfactorily introduced. Too much hit or miss has already been used in this operation. It seems a surer, safer, and better surgical technic to expose the vein under local anesthesia. The nurse requires on her table besides two sets of venesection instruments, ligatures, sutures, needles, a local anesthesia set, three basins of

fresh sterilized salt solution at a temperature of 100 to 105° which should be changed by the second nurse as soon as the solution becomes dirty from cleansing the syringe, one small basin of sterile warm melted vaseline for lubrication of trocars and syringes. This is best kept in a basin of hot water. Sterile oil may be used in place of vaseline if desired. The nurse places the cannula in the vaseline and introduces the trocar several times to be sure the interior is well covered and the excess is then wiped off. Next the syringes are lubricated by drawing in some vaseline and pulling the plunger up and down until the interior is well lubricated and the excess is then expressed. The syringe is filled and emptied several times with warm salt solution to wash out the excess of vaseline. The operation is best explained by describing the steps as they are actually performed (Diagram 2). The donor and recipient are placed on tables 1 and 2 respectively. The operator and assistants take their places as previously assigned to them. A rubber tourniquet is now applied to the left arm of the donor, the median cephalic vein is exposed by an incision over and parallel with the vein and a ligature is placed beneath. A vaseline-coated trocar and cannula is pushed into the vein with the point toward the fingers and the ligature tied around the cannula. The assistant, at the same time exposes the median cephalic in the recipient and introduces the trocar and cannula into the vein, the point this time being toward the heart. He then removes the trocar and introduces by means of one of the syringes a small amount of warm salt solution to see if the recipient's venous channel is clear. If so, the trocar is re-introduced. The tourniquet on the donor's arm is now tightened sufficiently to distend the vein but not sufficient to obstruct the arterial flow. The nurse now fills a 50-c.c. syringe with fresh warm salt solution and expresses all the air and salt solution excepting 10 c.c. and hands it to the operator who then extracts the trocar from the donor's cannula and introduces the tip of the syringe in the cannula losing some salt solution in the procedure, and gradually pulls on the plunger with the right hand at the same time keeping the syringe in place with the left until the blood reaches the 50 c.c. marks. The syringe is then removed with the right hand and passed to the assistant while the left forefinger covers the end of the cannula at the same time the tourniquet is temporarily relaxed but tightened when the next syringe is connected, and so on with each syringe. The nurse then passes the operator another syringe filled with salt solution to the 10 c.c. and the tip is introduced into the cannula and the syringe filled and so on until you have enough blood or some clot

or obstruction occurs. When the assistant receives the full syringe, he removes the trocar, introduces the tip of the syringe into the cannula and gradually empties it and passes it to the nurse. She then washes it with salt solution and if it becomes clean reintroduces more vaseline and it is ready for use. If it does not clean it is discarded. Care must be used that the operator does not get ahead of the assistant, but the reverse does not matter. After about five to ten syringefuls have been transfused, it is well to remove the cannulas and clean them but if everything goes well, this is not absolutely necessary. When the desired amount has been obtained, the cannulas are removed, the veins ligated and the wounds closed. Apparently the introduction of moderate or even large amounts of air is not harmful. The special points in technic are gentleness, cleanliness and well-vaselined cannulas and syringes. Be sure to have sufficient assistants.

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