

lar opening and cove. The volume of the lumen of the adapter measures 25 cc.

Before inducing anesthesia the gastrointestinal tube is slipped up through the face piece and socket elbow into the adapter and out through the opening. At this time the opening in the collar is directly over that in the adapter. The slack in the drainage tube is taken up and the several parts of the to-and-fro assembly properly joined. Next, the metal collar is rotated to eliminate the opening until the rubber tube lies in the two coves and is compressed. A set screw maintains the collar in this closed position. Anesthesia is then induced and maintained in the usual fashion (fig. 2). When intubation is performed the collar is loosened and the entire assembly slipped along the drainage tube to a position alongside the patient's

head where it remains during and after intubation to be removed at the anesthetist's leisure.

During use of the adapter, it was found that the gastrointestinal tubes could be aspirated or allowed to drain by gravity without loosening the set screw or interfering with the airtight system. Its only disadvantage is the 25 cc. increase in dead space introduced into the rebreathing system. Its advantages in technically permitting more even control of the course of anesthesia far outweigh this in safety to the patient.

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IMPROVED METHOD FOR RAPID REPLACEMENT OF BLOOD *

Surgery has advanced so rapidly that more radical procedures are being devised each day. At times severe hemorrhage rapidly occurs before it can be controlled. In such cases the problem of replacement of blood becomes of paramount importance. Despite the fact that a large caliber needle may already be present in the vein, it usually requires some time for as little as 500 cc. of blood to be administered, even with "stripping." For some time a "blood pump," consisting of a B-D bulb, a short piece of rubber tubing and an adapter to be inserted into the needle airway of the blood bottle, was used at this hospital. This made it necessary for a second person to be at the foot of the table or for the anesthetist to leave his post at the head of the table and go to the foot to pump the blood into the patient's vein. With the apparatus to be described, the anesthetist may remain at the head of the table and have complete control over the flow of blood into the vein in the patient's foot. This apparatus has been used for the past year and has proved of great aid to the anesthetist.

* Tubing, rubber and adapter kindly supplied by Baxter Laboratories, Inc.

The apparatus * consists of a B-D blood pressure bulb, 12 feet of $\frac{1}{4}$ inch plastic tubing with a short section of rubber at either end and an adapter to fit a needle of standard hub (fig. 1A). The adapter is inserted into the needle which is used as an airway in transfusion bottles (fig. 1B). The tubing is placed along the table and the bulb at the head of the table within easy reach of the anesthetist (fig. 1). If the blood is merely to be dripped, the needle valve on the bulb is left open to prevent vacuum formation in the blood bottle. If an emergency arises and blood is needed rapidly, the needle valve is simply closed and the bulb is pumped so that a steady stream of blood is rapidly forced into the patient's vein.

It has been found that by using a 15 gage needle in the vein, 500 cc. of blood can be administered in three or four minutes. If, during an intended operative procedure the anesthetist expects an extreme amount of blood to be lost, two 15 gage needles are placed in the medial malleolar veins and remain in readiness while 5 per cent dextrose in physiologic saline solution is allowed to drip slowly. This apparatus has

* Courtesy of Baxter Laboratories.

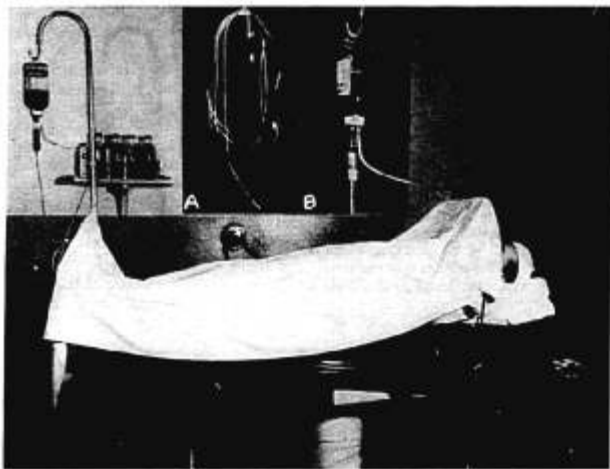


FIG. 1. Tube extending from transfusion bottle to anesthesiologist at head of table. (A) Apparatus consists of tubing, rubber ends, adapter and bulb. (B) Method of insertion of adapter to needle in airway of transfusion bottle.

enabled us to replace blood as rapidly as it is lost in almost all cases.

Certain precautions must be exercised to prevent the occurrence of air embolism. It is of supreme importance that the level of blood be watched closely so that as soon as the bottle becomes empty the infusion tubing is clamped with a hemostat and the pressure in the bottle released by opening the thumb screw on the bulb and removing the adapter from the needle in the bottle. Then a fresh bottle of blood is placed on the filter and the apparatus connected again. If the infusion tubing is not clamped and the pressure is not released from the bottle, a column of air will be forced into the venous system and produce air embolism.

SUMMARY

A convenient method is described for rapid transfusion of blood which eliminates the necessity for additional personnel and at the same time allows the anesthesiologist to remain at the patient's head. To prevent air embolism, care must be taken to clamp the infusion tubing with a hemostat and release the pressure in the bottle as soon as the bottle becomes empty.

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