prior to 1943. In examining data obtained more recently, Joseph found the mortality rate appears to be 1/250,000! (Joseph, J. H.: Mortality Due to Blood Transfusions, Letters to the Editor, Lancet 2: 709, 1960).

Blood should be given, optimally, to prevent morbidity from loss of blood. When signs of impending trouble from hemorrhage (pallor, hypotension, tachycardia, etc.) appear, blood should generally be administered. One unit may or may not suffice, and this may be more or less than the estimated loss.

## GADGETS

### Syringe with Self-Retaining Plunger

Dr. Benjamin I. Schneiderman of Beverly Hills, California, notes that when the ordinary syringes are connected to manifolds or similar devices without interposed valves, the plunger of the syringe is often pushed back by fluid under hydraulic pressure from the suspended bottle.

A number of devices are available to prevent this back flow. Retaining devices can be used to hold the plunger in place. More simply, a hemostat or clamp can be applied to the tube connecting the syringe with the intravenous set. A commercially prepared disposable set with an incorporated check valve is available, as are re-useable check valves. Each of these has certain disadvantages. They may be inconvenient, as when repeatedly applying and removing a clamp. They are not always reliable and even when they are reliable, they are an added expense.

A new, unbreakable, autoclavable polypropylene syringe retains its setting without the use of clamps, check valve, or other devices. In laboratory tests, the syringes were filled with water and suspended from an eight-foot length of tubing attached to an intravenous solution container. No motion of the plunger occurred, upon standing for twenty-four hours. A more severe test was to depress the plunger fully, then quickly withdraw it to the 5 cc. mark (in 5 cc. syringes), while under an eight-foot head of water. Again, the plunger remained stationary.

Ten syringes were filled with water and connected to an air pressure valve. An average pressure of 9.6 p.s.i. was required to cause the plunger to move, with a minimum of 5 p.s.i. (equivalent to a water head of 10.8 feet). When the pressure test was applied to disposable plastic syringes of 10 cc. and 20 cc. size, 25 per cent of the plungers failed to hold at 5 p.s.i. These syringes were therefore regarded as unsuitable for the purpose.

Although the plunger is self-retaining when used as described, it can easily be depressed to discharge the syringe contents, without excessive thumb pressure.

Clinically, the new polypropylene syringes have now been used in 200 operations, with complete satisfaction. The plungers held their settings at all times. Only the 5-cc. size is currently available, but it is contemplated that larger sizes will be developed in the future.

### Modified Endotracheal Catheter

Drs. Bernard M. Carr, Perry F. Crawford, and Robert E. Lau, of the Lackland Air Force Base Hospital in Texas, believe that there is some advantage in facilitating the removal of secretions collecting above the cuff on the usual endotracheal catheter. They have modified an endotracheal catheter to permit the withdrawal of secretions.

The original suction tube (fig. 1) consisted of a one-quarter inch wide semicircular piece of clear plastic material, which engaged the entire circumference of the endotracheal tube above the inflatable cuff. Oval-shaped holes had been cut on the outer convex surface of the plastic collar. Connected to the plastic collar was a fifteen-inch piece of size 8 plastic

tubing. The plastic tubing from the suction collar was adjacent to the rubber tubing used to inflate the cuff. Attached to the open end of the suction tubing was an adapter which can be attached readily to the suction machine. Clear plastic tubing was chosen for hygienic reasons and for ease in cleaning.

A second design (fig. 2) used a fifteen-inch piece of size 8 clear plastic catheter without the attached plastic collar. The closed end was held in place underneath the inflatable cuff. Small holes were cut into the plastic tubing above the inflatable cuff in addition to those already incorporated in the catheter at its blunt edge. A three-quarter inch band of Penrose drain was placed halfway up the length of the endotracheal tube over the two tubes for stabilization. An adapter was inserted in the open end of the plastic catheter for attachment to a suction machine.

The technique of insertion of the above

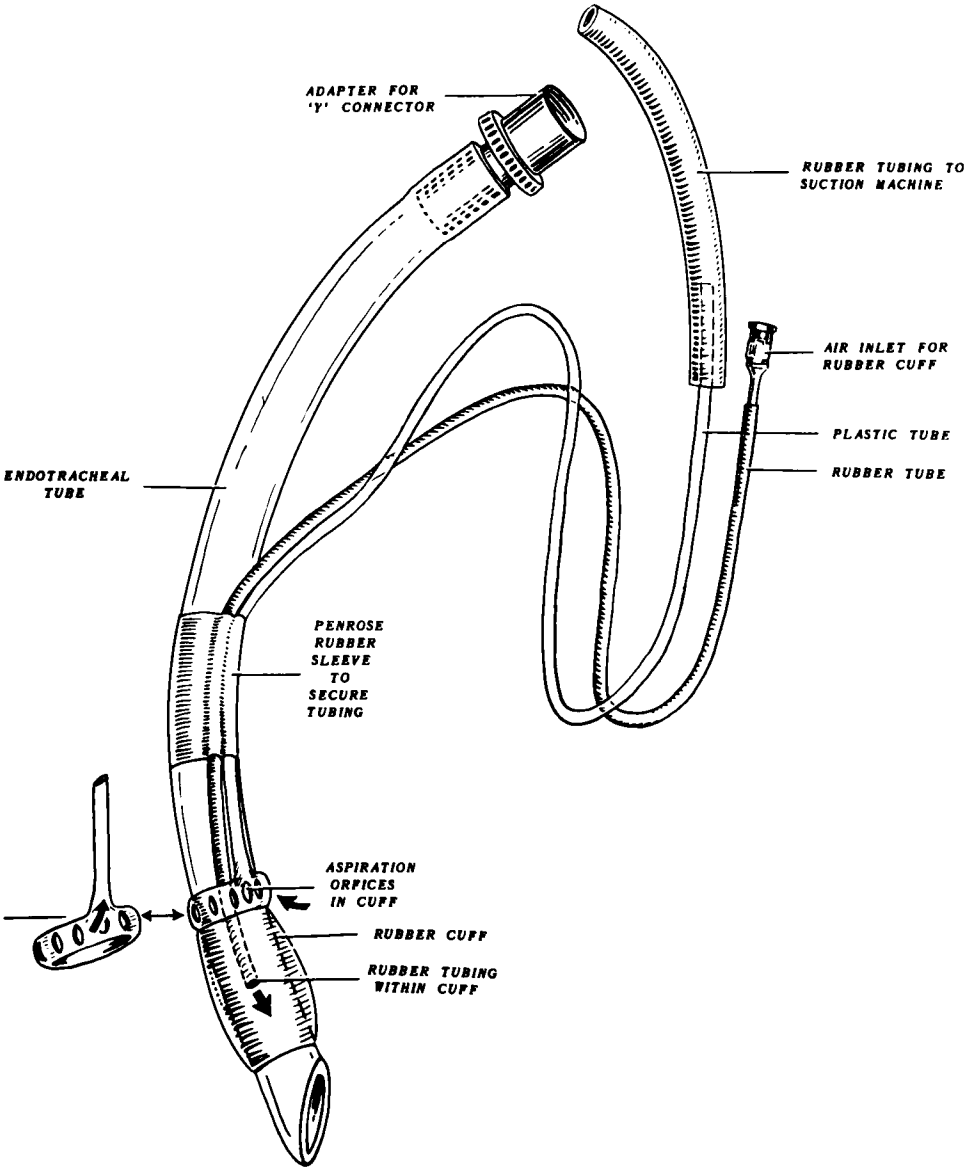


FIG. 1. Drawing of the original design.

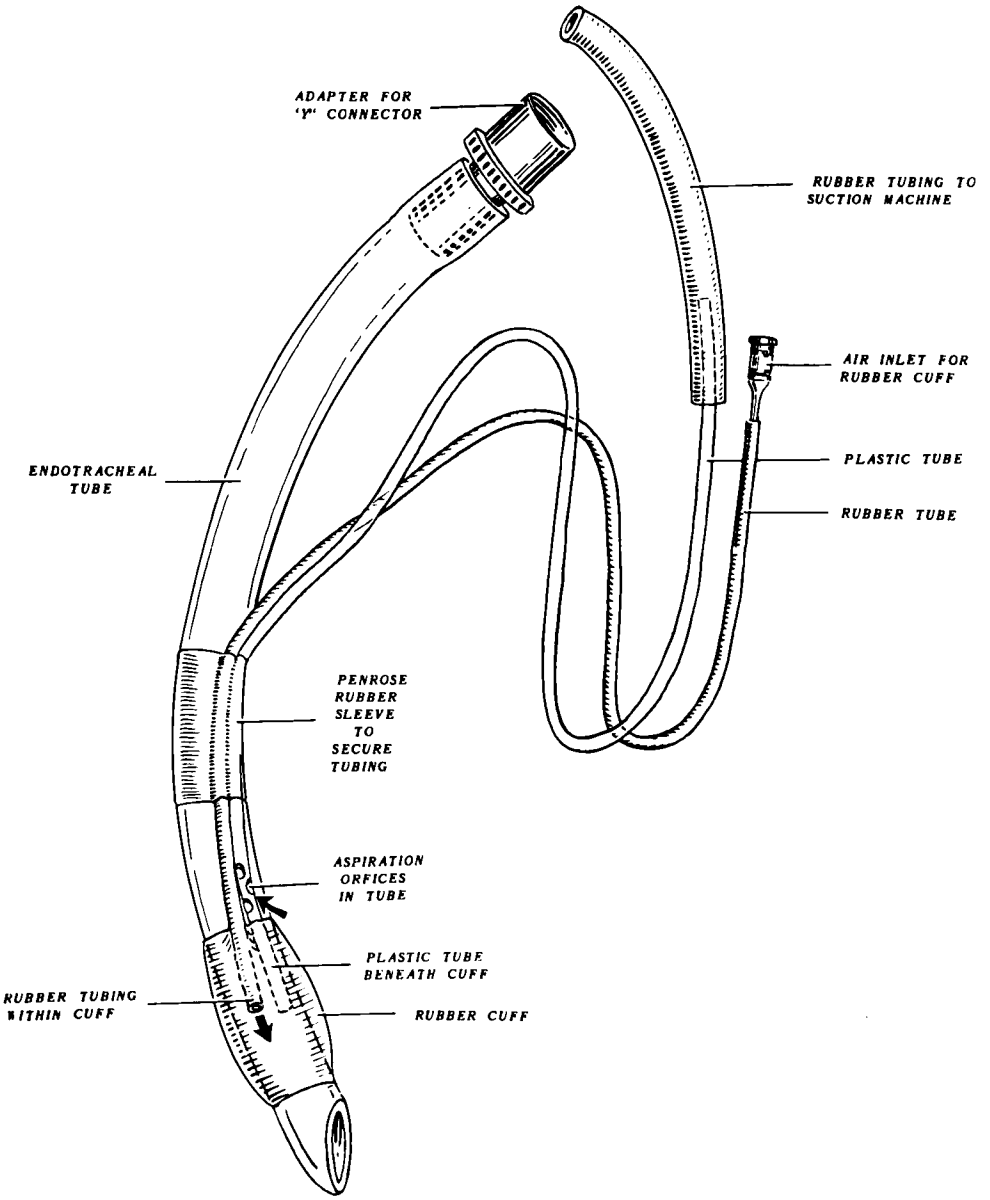


FIG. 2. Drawing of the prototype of the original design.

endotracheal tube into the trachea does not require any modification.

The addition of the suction catheter to the endotracheal tube is presumed to have several advantages. Proper inflation of the cuff can be determined with the use of the suction tubing. While air is being injected into the cuff a moist finger placed a quarter of an inch from the end of the plastic suction tubing will detect the escape of air until the cuff seals off the trachea. A defective cuff can also be detected in a similar manner during anesthesia. Aspiration of secretions may diminish aspiration. Heart sounds are heard through the catheter.

[These comments represent the personal viewpoint of the authors and are not to be construed as a statement of official Air Force policy.]