In section (A) of the figure, the experiment of MacIntosh is verified: a length of tubing is interposed between drip chamber and flask, and a clamp affixed there. Pressure within tubing and chamber is negative everywhere below the clamp, and air enters through all three manometers below the clamp (which correspond to "holes" in the intravenous tubing). Only above the clamp is the pressure positive.

Sections (B) and (C) of the illustration consider the modern disposable intravenous set, wherein the drip chamber plugs directly into the solution flask. In (B), the clamp is placed just below the chamber. Negative pressure is present within the tube from the clamp to a short distance above the needle (the latter distance being equivalent to the venous pressure). Air enters through all manometers below the clamp, even though the clamp is below the drip chamber. The presence of a small hole or patent crack anywhere in this section of tubing will cause the patient to be infused with air.

Section (C) illustrates the only safe way to apply the flow-controlling clamp: the clamp must be at or below the level of the needle. Pressure within the system is now positive everywhere. A crack or pinhole anywhere in the set will result in egress of fluid rather than ingress of air.

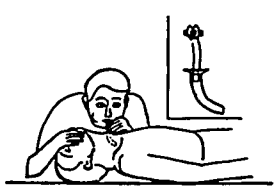
The hazard of air embolism from high clamp placement exists even when plastic blood bags are used. All that is needed to produce air embolism is a hole in the tubing below the clamp, no matter what type of infusion set is used.

Mouth-to-Tracheotomy Tube Resuscitation

Drs. Peter Safar and Chung J. Park of Baltimore, Maryland, believe that reoxygenation of apneic asphyxiated patients in the absence of equipment can be performed most rapidly by intermittent inflation of the lungs with expired air. Vital seconds should not be wasted searching for equipment. Not infrequently respiratory resuscitation must be performed on tracheotomized patients in hospitals. In such emergencies, in the past, nurses and physicians at the Baltimore City Hospitals have inflated the lungs of tracheotomized patients by one of the following two methods: (1) Direct mouth-to-mouth breathing while the tracheotomy cannula was occluded with one finger. (2) Mouth-to-tracheotomy tube breathing by placing the mouth over the anterior aspect of the patient's extended neck including the tracheotomy opening.

Method (1) is difficult to perform because both hands are necessary to support the patient's mandible. It may also fail if the tracheotomy was performed to by-pass upper airway obstruction. Method (2) proved not to be very aesthetic, particularly in the presence of secretions in the trachea or when there was blood or pus at the tracheotomy tube or the surrounding skin.

They recommend the method illustrated. The inner cannula of the regular tracheotomy tube is withdrawn partially so as to leave only its tip in the outer cannula. The inner cannula turned to the side for easier accessibility serves as the operator's mouthpiece. The patient's head is tilted backward, preferably by elevating the shoulders with



Recommended method for resuscitation in tracheotomized patients.

a rolled sheet. Air leakage is minimized by closing the patient's mouth and nose with one hand. If air leakage around the cannula is excessive, the skin is approximated about the outer cannula with the other hand and the force and volume of blowing is increased.

With this method the lungs of obese patients and of patients with pulmonary disease (reduced lung distensibility) could be ventilated adequately with intermittent forceful blowing into the cannula. The efficacy of ventilation is judged by observing the movements of the patient's chest, as during the performance of mouth-to-mouth breathing. (Safar, P.: J. A. M. A. 166: 335, 1958.)

Topical Tracheal Analgesia with Lidocaine

Dr. John B. Stetson, Johnson City, Tennessee, remarks that little has been written about the use of lidocaine 4 per cent for topical tracheal analgesia. He is not familiar with any material available in English other than that of Power (Power, D. J.: Canad. Anaesth. Soc. J. 4: 89, 1957).

When it is deemed wise to intubate a patient's trachea while he is awake (as with full stomach, anatomical abnormalities of the mouth or neck, trauma to the face, etc.), lidocaine 4 per cent can be used with excellent results. The analgesia obtained is almost instantaneous in onset and marked in degree as judged in observation of the patient. Only a small volume is necessary. For tracheal intubation by the oral route using a MacIntosh blade for exposure, generally 4 cc. of 4 per cent lidocaine is necessary. If the transtracheal route is to be used, 4 cc. of 4 per cent lidocaine should be injected rapidly. The ensuing cough distributes enough lidocaine throughout the mouth so that little or no additional spray of the oral cavity is needed to augment the transtracheal block. If the trans-nasal route is used, lidocaine affords good analgesia, but will not shrink the nasal mucosa. In patients being prepared for bronchoscopy, 6 cc. of 4 per cent lidocaine is generally sufficient to allow insertion of the bronchoscope. In an attempt to see how quickly analgesia develops, the bronchoscope was inserted into the trachea less than two and one half minutes after the application of lidocaine 4 per cent in several patients. Occasionally it is necessary to administer additional spray through the bronchoscope into the right and left main stem bronchi. All of the lidocaine sprayed into the trachea is evidently absorbed rapidly.

Dr. Stetson has placed an arbitrary limit of 8 cc. upon the amount of 4 per cent lidocaine that can be used. No evidences of toxicity have been seen in a limited series, but many of the patients do show signs of sedation. A virtue of lidocaine over cocaine for trans-tracheal injection is that tissue necrosis or slough will not follow its inadvertant injection into tissue.

Dr. Stetson has not carried out double blind or controlled studies, but believes that lidocaine is worthwhile when administered with a good atomizer or by transtracheal block.

GADGETS

Adaptor for Connecting Tracheostomy Tubes

Capt. Stuart Steinberg, MC, and Mr. Louis Stilwell of Fort Carson, Colorado, remark that there occasionally arises a need to connect a tracheostomy cannula to an anesthetic machine or a resuscitation apparatus. They describe a simple, effective and easily constructed connecting adaptor. They believe that commercially made tracheostomy adaptors for this purpose are satisfactory, but such adaptors are not often found in hospitals because of the expense. Shortened endotracheal catheters also can be effectively used in establishing a connection between tracheostomy tube and resuscitation equipment. The disadvantages, however, of catheter connection are poor fitting, clumsiness of manipulation, and reduction of the lumen of the airway connector by the catheter. The two occasions when an adaptor for a tracheostomy is needed are: when it is necessary