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A Simple Method for Mixing Air and Oxygen

To the Editor:—We were interested in the clinical report by Teeple and Pavlov which appeared in the December 1981 issue of *Anesthesiology*.[1] We have all been involved with neonates and been justifiably concerned with administering the proper inspired concentration of oxygen ($F_{I_{O_2}}$). In this regard, the table provided by Teeple and Pavlov is very good and is the first one we have seen which deals with a 3-gas mixture. Frequently, however, one does not wish to utilize nitrous oxide but does desire to mix proper flows of oxygen and air so as to arrive at an $F_{I_{O_2}}$ between 0.20 and 1.0. Nomograms exist but are subject to being misplaced and somehow never seem to be handy when you need them.[2] We would like to describe a simple method to accurately determine the proper flow rates of oxygen and air when using a 2-gas mixture. The method is called Alligation Alternate.[3] Alligation applies to the mixing of liquids or solids in volume to volume or weight to weight proportions, respectively. It is useful if one has, for example, two liquids of the same chemical content but of differing percentage concentrations and wishes to compound a third liquid with a percentage concentration of that chemical between those two. This method is equally applicable to mixtures of gases. It can be performed quickly in the following manner (fig. 1).

One simply draws two vertical lines. On the left, the percentages of oxygen in the two gases to be mixed are indicated with the highest percentage at the top. In the middle the percentage of oxygen desired is written. In this illustration, we want to mix 100 per cent oxygen and room air (which we will presume to be 20 per cent oxygen for simplicity of calculation) to arrive at a mixture which contains 40 per cent oxygen. After placing the numbers in the appropriate locations, subtract diagonally from the lower number to the higher number. Thus, 20 from 40 is 20 and that number is placed in the upper right corner. Forty from 100 is 60 and that number is placed in the lower right corner. These two numbers indicate the proportions of the two known gases to flow in order to arrive at the concentration of 40 per cent. Thus, flowing 100 per cent oxygen and air in a 20:60 ratio will always result in a 40 per cent mixture.

It is important to realize with Alligation Alternate: 1) the concentration of gas desired must be somewhere between the concentrations of the gases to be mixed, and 2) the two gases being mixed should not undergo any chemical interactions. Our residents have found this method helpful and we felt we should pass it on to others.

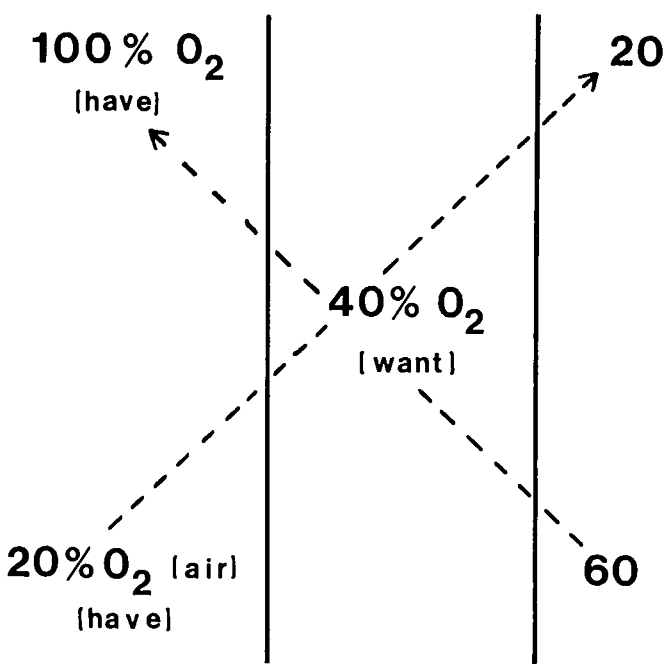

FIG. 1. Alligation Alternate.

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A Modified Uterine Displacement Device

To the Editor:—Left uterine displacement during cesarean section usually is accomplished with a stationary uterine displacement device or a preformed wedge or roll under the right hip. Redick[1] described the use of an inflatable polyvinyl chloride bag (container for sterile urologic irrigation fluids) to which was attached a rubber tubing and a sphygmomanometer bulb and control valve. While obtaining the necessary parts for such a bag, it was suggested that an easier approach would be to use the bladder from a large blood pressure cuff. This device (fig. 1) has been used in the obstetric department at our hospital for nearly two years and has been found to provide an acceptable degree of left uterine displacement.

Proper placement under the patient is necessary and we agree with Redick that the caudal edge of the bag should be at the level of the greater trochanter and the medial edge at the patient's midline. Placement under a draw sheet which is then tucked under the mattress at the edge of the table secures the balloon under the patient. The inflating bulb can be brought to the head of the table and the degree of uterine displacement adjusted without disturbing the obstetrician, the patient, or the sterile field.

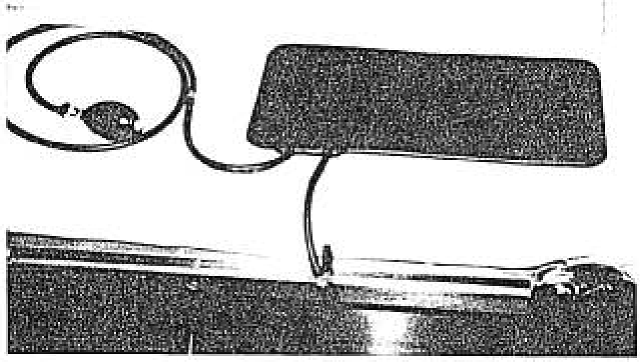

FIG. 1. A modified uterine displacement device.

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