functional requirements of each patient.

Figure 1 shows the inspiratory pressure-volume half loops recorded on an X-Y recorder in a patient with the adult respiratory distress syndrome who was intubated and ventilated with a volume-controlled ventilator delivering a constant inspiratory flow (Monaagah M250). For comprehension, pressure-volume loops are drawn taking into account increases in FRC subsequent to increasing levels of PEEP. Volumes were obtained by integration of flow (Fleisch pneumotachograph). Airway pressure was obtained with a pressure transducer (Statham P23Db). Air trapped above baseline FRC (ie, above zero end-expiratory pressure and flow) was measured by passive exhalation (passive expiratory spirogram).

With a constant inspiratory flow, overdistention occurring during inspiration is immediately detected by the decrease in dynamic compliance (Fig 1, arrows). This can occur if inspiratory flow is too high (Fig 1, a) or if the combination of the air trapped and the TV is too large (Fig 1, d) (or both). The changes in total respiratory compliance occurring with varying TV or PEEP (or both) become evident (slopes of segments AB and BC in Fig 1). Thus, the combination of TV, inspiratory flow, and PEEP that provides the maximum alveolar recruitment without overdistention (Fig 1, c) can be promptly determined and monitored. The fastidious measurement of static compliance usually prescribed becomes unnecessary. If the patient remains hypoxic, PEEP sometimes can be successfully increased. This is the field of "super PEEP," where overdistention is evident (Fig 1, e) and increases pulmonary barotraumas and deleterious hemodynamic consequences.

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Figure 1. Inspiratory pressure-volume half loops recorded during mechanical ventilation with different inspiratory flows and different levels of PEEP.

REFERENCES


To the Editor:

The assessment of the elastic properties of the lung and the total respiratory system can be used to adjust the ventilatory mode to meet the following goals: (1) improve pulmonary gas exchange by obtaining maximum alveolar recruitment without overdistention of other pulmonary segments; (2) minimize energy and pressure applied to airways and pulmonary parenchyma, thereby hopefully decreasing the risk of barotraumas; and (3) decrease the cardiovascular side effects of mechanical ventilation.

To monitor the elasticity of the lung, total respiratory compliance is frequently used because it is easier to measure. This may be adequate as long as the contribution of the wall of the chest and the abdomen to the total compliance are constant for the range of pressure or volume examined; for instance, in the obese patient, this may not be true. The technique utilized to estimate the elastic properties can be static and dynamic compliance or, as proposed by Thomas et al, the pressure-volume loop. Each of these methods has its advantages and shortcomings. Real "static" compliance will best reflect the elasticity, but static conditions are difficult to achieve during mechanical ventilation, when muscular relaxation is not used. An inspiratory hold of at least 1.2 seconds (better, 2.0 seconds) should be used to obtain meaningful values.
Dynamic or “effective” compliance is easier to measure, and it will reflect the elastic forces with some satisfaction, when a slow inspiratory flow is used; however, airway resistance, as well as differences in regional compliance and inspiratory time constants, will influence this variable to a great extent.

The pressure-volume loop appears to be an attractive alternative to the previously discussed measures, because it eliminates some of their listed disadvantages. The problems with this measurement are twofold: (1) it demands sophisticated equipment; and (2) it requires developed skills for the interpretation of the curves. More experience with the pressure-volume loop must be gained to confirm its value for the management of mechanical ventilation, but its potential application seems promising.

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Treatment of Arrhythmias in the Wolff-Parkinson-White Syndrome

To the Editor:

Disopyramide phosphate (Norpace) is similar in its pharmacologic action and clinical effectiveness to quinidine and has been used in Europe since the 1960s for the treatment of supraventricular and ventricular arrhythmias. Like quinidine, this medication produces prolongation of the QRS complex and Q-T interval, as well as syncope.

Recently, Frieden and Dhurandhar et al have described patients who developed ventricular fibrillation and tachycardia associated with therapy with disopyramide. The episodes occurred while the patients were receiving therapeutic dosages of disopyramide.

In patients with the Wolff-Parkinson-White syndrome and atrial fibrillation (type A of the syndrome being more frequently associated with atrial fibrillation than type B), rapid transformation of the atrial arrhythmia into ventricular fibrillation has been discussed frequently in the literature. When given during an atrial arrhythmia, disopyramide may cause a paradox increase in the ventricular rate. Ventricular depolarization can occur via two pathways of conduction during atrial fibrillation, either the atrioventricular nodal-His system or the accessory pathway. The tract with the shorter refractory period (less than 220 msec) will be dominant. An R-on-T phenomenon is thought to be the mechanism for ventricular fibrillation.

In view of these two facts (the transformation of atrial fibrillation into a ventricular arrhythmia and the ventricular fibrillation associated with therapy with disopyramide), the treatment of choice for atrial fibrillation with anomalous conduction is intravenous therapy with lidocaine. For the prophylactic measure, oral administration of quinidine or procainamide hydrochloride is equally effective.

Ventricular fibrillation has been demonstrated following administration of digitals. Anomalous conduction may be accelerated, and therapy with digitals should be avoided in the Wolff-Parkinson-White syndrome associated with atrial fibrillation.

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References


To the Editor:

Dr. Forester has selected the few reports which lend support to his prejudices as to the best drugs for the treatment of arrhythmias due to the Wolff-Parkinson-White syndrome. Certainly, therapy with lidocaine (lignocaine) may reduce the ventricular response to atrial fibrillation, but a return to sinus rhythm is unlikely. Procainamide hydrochloride and quinidine are very important drugs; however, even as slow-release preparations, they can be difficult to use, and it is hard to see how Forester can advocate their use in preference to disopyramide when they may lead to the particular problems that concern him. Both quinidine and procainamide (but not disopyramide, as mistakenly stated by Forester) have been reported to cause a paradox increase in the ventricular rate during atrial tachyarrhythmias, and ventricular fibrillation is better documented as a complication of therapy with quinidine than with disopyramide.

My report (Chest 74:624-628, 1978) and those to which I referred have shown that disopyramide is a useful drug in the management of patients with the Wolff-Parkinson-White syndrome. Disopyramide, too, can occasionally cause problems, mainly due to its anticholinergic properties, and I would not go so far as to say that it is the drug of choice, especially as experience with other drugs, such as amiodarone, increases.

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Spirometric Screening for Early Obstruction of the Airways

To the Editor:

I read with great surprise the editorial by Macklem and Becklake entitled "Is Screening for Chronic Limitation of Airflow Desirable?" (Chest 74:607-608, 1978). As a private practitioner of pulmonary medicine, I rely heavily on screening spirometric studies in order to detect early obstructive disease of the airways, particularly in smokers. In utilizing this test and showing the graphs to the patient, I find myself