Estimation of Vital Capacity Without Patient Cooperation

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Two useful measures in predicting respiratory performance following a period of mechanical ventilation are maximum inspiratory pressure (MIP) and vital capacity (VC). MIP is useful in determining the patient's ability to maintain an unobstructed airway. We measure it routinely at the end of anesthesia prior to tracheal extubation, especially if neuromuscular blockers have been used. VC is a determinant of ability to ventilate adequately, and sometimes its measurement is crucial in patients with borderline respiratory ability.

MIP is obtained without patient cooperation. However, it is not always possible to obtain VC because the patient may be anesthetized, have central nervous system deterioration, or be simply obstinate. The following procedure has been developed to overcome this problem. An inspiratory pressure meter (commonly called, incorrectly, "inspiratory force meter") is connected to the tracheal tube. An anemometer such as the Wright Respirometer is attached to this. At end-expiration the flow of air is obstructed and MIP is measured during a few attempted breaths, for a period of time compatible with the patient's condition (see fig. 1). Then the obstruction is removed and the volume of the first breath (either inspiratory or expiratory)

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FIG. 1. A Wright respirometer is attached to the inspiratory pressure device. The operator supports the device with one hand and obstructs inspiration with the other. Here the inspiratory pressure is ~34 cm H₂O. When the obstructing hand is removed the volume of the first breath is recorded as modified vital capacity.

is observed. While this is really maximum inspiratory volume, it approaches VC, and we record it as modified VC to distinguish it from true VC.

This simple technique has been of great use in the care of an occasional patient, and may be of use to those caring for small children.