

effect has been confirmed.<sup>7</sup> This case illustrates that re-induction of hypotension may be of value to control reactionary hemorrhage if it occurs following deliberate hypotension.

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## An Unexpected Complication (Hyperthermia) While Using the Emerson Postoperative Ventilator

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The introduction of the Emerson Postoperative Ventilator in 1965 has contributed substantially to the effective management of patients with acute or chronic respiratory insufficiency. This piston type, volume limited, pressure variable respirator has many advantages, including great flexibility in volume, rate and pressure settings; a built-in "sighing device" to provide increased inflation at regular intervals; excellent humidification provided by a reflux type, heated vaporizer; independent controls for inspiratory and expiratory rate and the ability to administer oxygen at concentrations from 20 to approximately 90 per cent. The disadvantages of this respirator are its inability to function as an assistor and the great bulk of the equipment which makes its use cumbersome in a crowded patient area. We have successfully used this respirator at the University of Michigan Medical Center in many types of patients ranging from 1 week to 70 years in age and from 5 to 300 pounds in weight. This report concerns a hazard inherent in the use of the Emerson Postopera-

tive Ventilator which may lead to serious complications in some patients.

## CASE REPORT

The patient was an 18 month old white male child, admitted from another hospital with the diagnosis of Guillain-Barre syndrome. On admission the child was found to be acutely ill showing evidence of generalized profound muscle weakness and absent deep tendon reflexes.

Shortly after admission a tracheostomy was performed under local anesthesia and the child's lungs were ventilated with a pressure-limited ventilator. During the next 30 days, the patient had repeated bouts of atelectasis and bronchopneumonia. During this entire period, artificial respiration was provided with the pressure-limited respirator, with the exception of one long and one brief period of time when an attempt was made to provide adequate ventilation with a Drinker-type, tank respirator. These attempts were unsuccessful and the patient developed increasingly severe respiratory distress. He eventually developed pneumonia and was quite obviously in serious difficulties. At this time it was decided to switch from the pressure-limited device to the Emerson Postoperative Ventilator. Within 30

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minutes, the patient showed definite signs of improvement. He became much less restless and roentgenograms taken at this time revealed a distinct improvement in aeration. Blood gases were maintained within normal limits, first with the addition of oxygen and on the second day with room air only.

The patient's temperature at the time of changing respirators was 99.3° F. rectally. Over the next few hours the rectal temperature rose to 102° F. The patient was restless and appeared flushed. The hyperthermia responded to aspirin but within a few hours returned to increasingly higher levels and on the third day, a peak temperature of 103° F. was reached. During this time the child was extremely restless and became a serious management problem. The pediatricians found no cause for this hyperthermia but believed that antibiotic therapy was indicated, and the patient was given large doses of procaine penicillin and methicillin (Staphicillin). On the third day, one of the nurses suggested that the air delivered by the ventilator was too hot. Measurements at the tracheostomy connector revealed that the temperature of the air delivered by the ventilator was 105° F. The ventilator was immediately replaced by a different type which does not use a heated vaporizer. Over the next 45 minutes, the patient's temperature declined to 98.8° F.

#### COMMENT

In view of this event, a series of measurements were performed on this Emerson Postoperative Ventilator, on the same respirator with a new heating element, and on another, newer model of the same respirator. It was found that the temperature of the delivered air depended to a very large extent upon the ambient temperature of the room in which the machine was used, and also upon whether the door of the cabinet was open or closed. In another series of measurements it was found that by changing the ambient temperature of the room and dependent upon whether the door of the cabinet was open or closed, the temperature of the air delivered by the ventilator could be varied from 85° to 105° F. Having made these observations, it was easy to recall several other patients who developed unexplained hyperthermia while ventilated with the Emerson Postoperative Ventilator.

It is evident from these findings that the Emerson Postoperative Ventilator, in spite of its many excellent qualities, must be used with great caution in all areas where the ambient temperature is high or where the respirator is located near a source of heat. Physicians using this type of equipment should be careful to measure not only the volume and the pressure of delivered air but also its temperature in order to avoid serious and potentially fatal complications.

### Relief of Arterial Spasm by Epidural Block in a Sympathectomized Patient

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Following lumbar sympathectomy, vasomotor paralysis of the lower limbs is usually complete and permanent. In approximately 10 per cent of patients, however, a slight degree of

recovery appears after an interval of two or three years.<sup>1</sup> In the following case there is evidence of strong reflex vasomotor activity four years following lumbar sympathectomy.

A 58 year old woman was admitted to the hospital for breast biopsy and possible radical mastectomy. She had arteriosclerosis obliterans with severe vascular insufficiency of the lower extremities of several years duration.

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