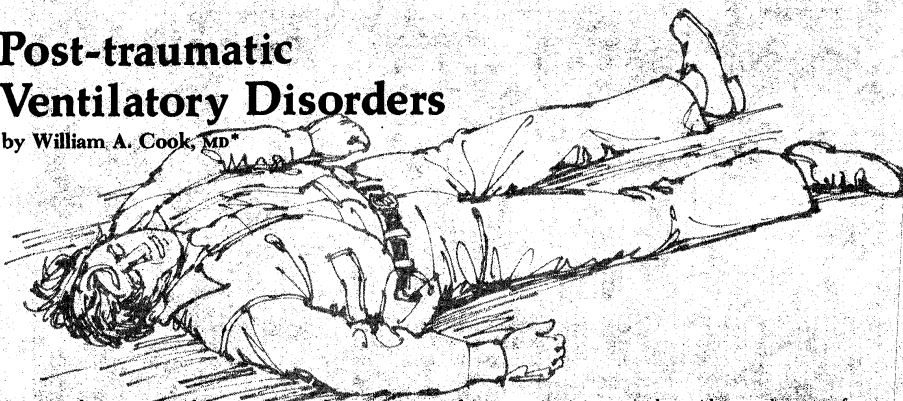


Post-traumatic Ventilatory Disorders

by William A. Cook, MD*



Among the most widely investigated—yet incompletely understood—ventilatory phenomena is sudden pulmonary failure following surgery or traumatic injury. Various post-traumatic ventilatory disorders may arise in severely injured patients. Examples are the so-called “low flow” lung syndrome or shock lung, pulmonary burns, wet-lung syndrome, pulmonary fat embolism, ventilator pneumonia, and hematogenous pneumonia. Therapeutic difficulties may arise from either a confused or an inadequate differential diagnosis. For clinical emphasis, therefore, these disorders will be discussed in the order in which their manifestations are seen clinically.

Pulmonary burns and wet lung are each caused by a direct injury to lung tissue so that their onset is immediate. Low-flow lung and fat embolism each have an intermediate onset, whereas ventilator pneumonia and hematogenous pneumonia are the last to occur, and may become superimposed on any pre-existing ventilatory disorder.

IMMEDIATE ONSET

Wet-Lung Syndrome

This type of post-traumatic pulmonary disorder results from a severe bruise to lung tissue itself. During World War II, Brewer and coworkers³ observed the post-traumatic wet-lung syndrome in casualties who were exposed to a blast or who had suffered a crushing blow to the thorax or abdomen. In such instances, compressive energy is transmitted via the chest wall or diaphragm to the lung confined, as it is, in the thoracic cage. The sudden compression of lung tissue ruptures the small vessels and produces hemorrhage and edema, both interstitial and intra-alveolar. Wet lung is suspected when there is a history

of compression injury together with an early onset of pulmonary symptoms. Ordinarily this disorder can be identified when the patient is admitted to the emergency department.

In a patient with the wet-lung syndrome, the chest x-ray shows diffuse haziness—either local or widespread—in one or both lung fields. Upon physical examination, one finds rales and rhonchi; and, if the lung is badly injured, there may be evidence of consolidation. Hemothorax or pneumothorax, or both, may be present (Fig. 1a). The bruised lung may be identified by reexpanding the collapsed lung that is on the injured side of the body (Fig. 1b). Arterial blood-gas analysis reveals hypoxia whose severity is consistent with the severity of lung-tissue injury. Hypoxia is related to a loss of compliance that results from the exudation of plasma and which, consequently, interferes with surfactant function. Factors that contribute to hypoxia include:

- Mechanical restriction secondary to pulmonary-tissue edema
- “Physiologic shunt” effect in perfused but nonaerated lung tissue
- Restrictive effect of injury on the chest wall

Fortunately, most patients who suffer from the wet-lung syndrome will respond well to appropriate treatment (Fig. 1c).

Pulmonary Burns

Pulmonary burns are usually associated with facial burns or with burns sustained in a confined space, and are therefore suspected in any patient who has suffered severe burns under those conditions. Cytologic examination of the sputum (ie, exfoliative cytology) helps to pinpoint the diagnosis. Furthermore, such patients often require tracheostomy; visual inspection of the airway at that time may confirm the diagnosis by disclosing edema, erythema, or actual scorching of the tracheal mucosa.

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