

Post-Polio Breathing and Sleep Problems

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New breathing and sleep problems in aging polio survivors can be insidious and often not recognized by either polio survivors themselves or health care professionals. Polio survivors who were in an iron lung or barely escaped one during the acute phase should be aware of potential problems and educate themselves in order to avoid acute respiratory failure. Polio survivors who did not need ventilatory assistance during the acute phase may also be at risk for respiratory failure, and should likewise be aware of problems with breathing and sleep.

Simply stated, the major problem for polio survivors is hypoventilation (commonly referred to as underventilation). Not enough air reaches the lungs, producing an imbalance in the gas exchange in the blood: too little oxygen, too much carbon dioxide (CO₂) or hypercapnia. Hypoventilation is caused by one or a combination of the following: chest wall deformities such as scoliosis (see page 1 article by Augusta S. Alba, MD), respiratory muscle weakness due to the poliomyelitis (see page 1 article by Ann Romaker, MD), and sleep apnea (an interruption of breathing during sleep) which can be central, obstructive, or mixed, and occurs in the general population as well.

Other factors contributing to a polio survivor's problems are a history of smoking, obesity, lung disease, and diminished vital capacity (VC). As aging occurs in anyone, vital capacity (VC) diminishes, but this decrease in VC is more serious in an aging polio survivor with limited musculature remaining to produce adequate ventilation. Many polio survivors had impairment of the diaphragmatic and intercostal muscles, and the normal changes due to aging may cause them to lose VC at a greater rate, thus exacerbating the development of hypoventilation.

Signs and symptoms include: fatigue, daytime sleepiness, morning headaches, need to sleep sitting up, sleep disturbances (including dreams of being smothered, nightmares, restless sleep, interrupted sleep), snoring, poor concentration and impaired intellectual function, shortness of breath on exertion, claustrophobia and/or feeling that the air in the room is somehow bad, anxiety, difficulty in speaking for more than a short time, quiet speech with fewer words per breath, use of accessory muscles to breathe, and a weak cough with increased susceptibility to respiratory infections and pneumonias.

Polio survivors experiencing more than one of the above signs and symptoms should seek a respiratory evaluation by a pulmonologist, preferably one experienced in chronic neuromuscular disorders. (If your pulmonologist is unfamiliar with post-polio, you may wish to provide copies of pertinent literature listed under References, or offer to connect him or her with a physician in the I.V.U.N. Network.) Pulmonary function tests should include at least: VC, air flow, MIF (maximum inspiratory force) and MEF (maximum expiratory force), and ABG (arterial blood gases). A sleep study should also be considered, however, strong anecdotal evidence from polio survivors indicates that a

sleep study may miss detection of hypoventilation. A sleep study is designed to detect sleep disturbances, such as sleep apnea; it does not measure CO₂.

Management of breathing and sleep problems can be achieved largely through the use of nocturnal noninvasive ventilation, in the form of mouth intermittent positive pressure ventilation, nasal intermittent positive pressure ventilation (a variety of commercial and custom nasal/face masks are available — see References), and negative pressure body ventilators. However, polio survivors may find themselves gradually extending periods of ventilator use. In some cases, as a last resort, invasive tracheostomy positive pressure may be necessary.

Medical literature regarding the management of breathing problems often includes a warning about the use of oxygen therapy. Respiratory failure in polio survivors is usually due to hypoventilation which can be aggravated by the short and long term use of oxygen. When the brain senses an excess concentration of CO₂ in the blood it instructs the body to increase breathing, ridding it of the CO₂ and increasing the oxygen. When oxygen is supplied, the mechanism in the brain detecting the CO₂ eventually turns off. Hypercapnia is best treated with assisted ventilation.

Polio survivors with different problems, such as COPD or pneumonia, may benefit from short term oxygen therapy under careful supervision. □

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