Unexplained Hypoxemia

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A 56-year-old white female was referred to our sleep center upon dismissal from the hospital following an episode of hypercapnic respiratory failure secondary to neuromuscular weakness in the setting of newly diagnosed inflammatory myopathy. She was started on azathioprine and 60 mg of prednisone, along with dapsone for *Pneumocystis jiroveci* prophylaxis, as treatment for her inflammatory myopathy.

A deviated nasal septum and crowded oropharynx with reduced lateral dimension were noted on oral-nasal exam. Chest exam, chest radiograph, and echocardiogram were normal. Pulmonary function testing showed a restrictive pattern, with a vital capacity of 26% (0.81) and decreased maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP) of 50% and 34%, respectively. Arterial blood gas analysis during wakefulness at this stage revealed pH of 7.44, and PaCO₂ of 42. Signs of hypercapnia were noted during wakefulness when nocturnal oxygen therapy at 2 liters/minute was started due to signs of sleep related hypoxemia (based on overnight oximetry findings) by the primary care team (pH 7.43, PaCO₂ 51).

The patient was referred to our sleep center a few days after she was started on immunosuppressive therapy (her symptoms of weakness were improving by then) for further evaluation of sleep disordered breathing (for possible sleep related hypoventilation/hypoxemia) and for possible bilevel positive airway pressure (BPAP) titration. Overnight polysomnogram (PSG) performed revealed no evidence for sleep disordered breathing or sleep related hypoxemia. An arterial blood gas analysis the following day during

Figure 1

wakefulness showed: pH 7.51; PaO₂ 78; PaCO₂ 38; HCO₃ 29; and SaO₂ 98%.

She returned a week later in follow up relating modest improvement in her symptoms of dyspnea, fatigue, and sleepiness. Repeat overnight oximetry was performed (SpO₂ 88%) prior to a scheduled PSG, in the anticipation that she may have developed sleep disordered breathing and a need for BPAP (**Figure 1**). An arterial blood gas analysis (ABG) during wakefulness was performed based on the abnormal findings on the overnight oximetry, which revealed pH 7.43; PaO₂ 84.1; pCO₂ 41.9; HCO₃ of 27; and SaO₂ 88.5%.

What is the explanation for the low baseline arterial oxygen saturation (SaO₂)?