Images in Anesthesiology: Severe Unilateral Atelectasis during Induction of Anesthesia

Pranjali P. Kainkaryam, M.D., Praveen Prasanna, M.D., Donald A. Schwartz, M.D.

A 11-yr-old scoliotic female presented for posterior spine fusion. After IV induction with an \( \text{F}_{2}\text{O}_{2} \) of 1.0, mask ventilation briefly failed and her oxygen saturation dropped to 60%. Intubation took multiple attempts. Severe right-sided atelectasis was noted on chest x-ray (fig.), predominantly in the middle and lower lobes. The case was cancelled and she recovered uneventfully in a pediatric intensive care unit. Elective bronchoscopy performed 2 months later revealed moderate bronchomalacia of the bronchus intermedius.

Atelectasis during general anesthesia occurs in approximately 90% of individuals, usually as microatelectasis particularly in alveoli in dependent regions, affecting intra- and postoperative pulmonary function.\(^1\) Severe atelectasis after anesthesia induction, as was seen in our patient, is uncommon. Mechanisms of atelectasis include compression (morbid obesity), absorption (bronchial obstruction), and surfactant deficiency. Absorption atelectasis may result from either complete or partial airway obstruction. In a partially obstructed airway, if the ventilation/perfusion ratio decreases below a critical value with less ventilation in than alveolar gas removal by capillary blood flow, then atelectasis can occur. We hypothesize that our patient developed absorption atelectasis as a result of partial bronchial obstruction from bronchomalacia, exacerbated by brief hypoventilation during masking. Alveolar gas composition may also contribute to atelectasis formation. Induction with 30% oxygen promotes less atelectasis when compared with 100% oxygen because of nitrogen’s slower blood diffusion.\(^2\) This may, however, cause quick and severe desaturation should apnea occur. Application of positive end-expiratory pressure or continuous positive airway pressure during anesthesia induction can also prevent atelectasis formation.\(^3\) When severe atelectasis is diagnosed, bronchoscopy and selective single-lung manual ventilation with high inflating pressures should be considered.

Competing Interests
The authors declare no competing interests.

Correspondence
Address correspondence to Dr. Schwartz: donald.schwartz@bhs.org

References