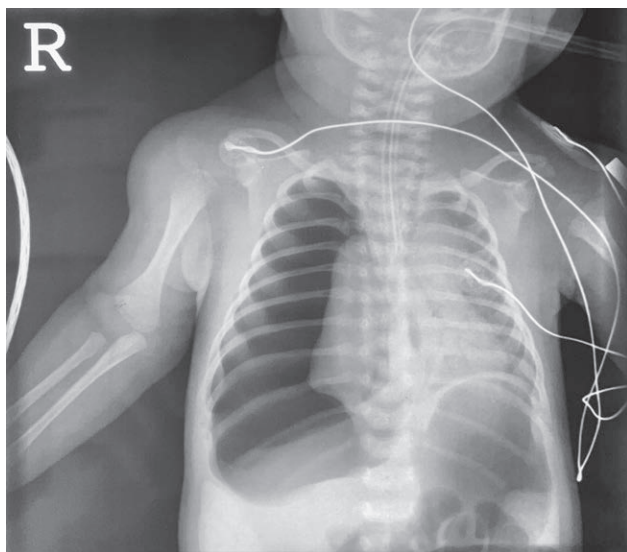


# Too Much of a Good Thing: Iatrogenic Pediatric Pneumothorax from Engagement of the Oxygen Flush Valve

Shelly H. Pecorella, M.D., L. Daniela Smith, B.S., Timothy E. Smith, M.D., T. Wesley Templeton, M.D.



Iatrogenic pneumothorax during anesthesia remains uncommon but can occur as a result of elevated airway pressures in the setting of anesthesia and airway management. Infants, because of their small size and highly compliant chest, are at greater risk of lung trauma from even briefly elevated airway pressures.<sup>1</sup> The oxygen flush valve is sometimes used to rapidly refill the bag for manual ventilation or the ventilator bellows. When open, it delivers oxygen at high pressure at a rate of 35 to 75 l/min.<sup>2</sup> If the valve is open during mechanical ventilation, the airway pressure can reach as high as 70 cm H<sub>2</sub>O as the pressure-limiting valve of an operating room ventilator is usually set at 70 cm H<sub>2</sub>O. If it is open in spontaneous breathing mode or during manual bag ventilation, the airway pressure can reach 68 cm

H<sub>2</sub>O if the adjustable pressure-limiting valve is completely closed or dysfunctional. The Supplemental Digital Content (<http://links.lww.com/ALN/C758>) demonstrates that air pressure can reach 68 cm H<sub>2</sub>O within 2.6 s when the oxygen flush valve is pushed with a pediatric bag and the adjustable pressure-limiting valve is closed. Such high pressures can occur with a single flush and resulted in a pneumothorax in this infant (fig.; R indicates right). As many anesthesia machines may allow the oxygen flush valve to function during mechanical ventilation, a flush to refill the ventilator bellows can render airway pressures as high as 70 cm H<sub>2</sub>O and lead to catastrophic harm in children.<sup>3</sup> Therefore, refilling the bellows or the manual ventilation bag by pushing the oxygen flush valve should be discouraged.

## Competing Interests

The authors declare no competing interests.

## Correspondence

Address correspondence to Dr. Templeton: [ttemplet@wakehealth.edu](mailto:ttemplet@wakehealth.edu)

## References

1. Neumann RP, von Ungern-Sternberg BS: The neonatal lung—physiology and ventilation. *Paediatr Anaesth* 2014; 24:10–21
2. Petty C: Understanding your machine: O<sub>2</sub> flush valve key to safety. *APSF Newsletter* 1993; 8:31
3. Sherwin MA, Eisenkraft JB: Anesthesia hazards: What is the role of the anesthesia machine? *Int Anesthesiol Clin* 2020; 58:27–31

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