

Lung Isolation in Infants using Bronchial Intubation Facilitated by Fluoroscopy

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Introduction: With increasing use of thoracoscopic surgery in neonates and infants, anesthesiologists are regularly being asked to provide one-lung ventilation to improve the operative conditions during these surgical procedures. The bronchial and tracheal diameters of these children prohibit the use of double lumen endotracheal tubes or commercially available bronchial blockers. Because of previous difficulties with proper placement and lung isolation using endobronchial intubation with fiberoptic bronchoscope guidance in these small patients, we elected to trial a method of placing the endotracheal tube using fluoroscopic guidance. We present our experience with this technique.

Methods: After IRB approval, the charts of 10 infants (age range 5 weeks – 2 months) who had undergone thoracoscopic surgery for resection of CCAM and pulmonary sequestration using lung isolation via fluoroscopic guided endobronchial intubation were reviewed to analyze time to achieve one lung isolation, adequacy of surgical exposure, and radiation exposure.

The technique of endobronchial intubation includes standard mask induction, direct laryngoscopy, and oral endotracheal intubation with a 3.0 or 3.5 Magill endotracheal tube. With the patient in the supine position, the endotracheal tube is advanced with fluoroscopic guidance until the desired mainstem bronchus is intubated. The tube is directed into the desired bronchus by turning the head position (to right or left) or rotating the endotracheal tube. The position of the tube is confirmed with fluoroscopy with visualization of inflation of the isolated lung and lack of ventilation in the surgical lung. The patient is then positioned in the lateral position and tube position and desired ventilation pattern is reconfirmed with fluoroscopy.

Results: Lung isolation via fluoroscopic guided endobronchial intubation is an efficient, effective method of achieving excellent surgical exposure. In this series of 10 patients, the time from intubation to one lung isolation confirmed in lateral position ranged from 4 to 26 minutes with the average time of 14.5 minutes (standard deviation +/- 6.45). Fluoroscopic times were only a small portion of this time. Of these 10 cases, 7 were completed thoracoscopically, and in 3 of the 10 cases the procedure was converted to an open thoracotomy. There were two events of tube migration during the surgery which required intermittent hand ventilation due to desaturation events. Both of these procedures were successfully completed thoracoscopically.

Discussion: Correct position and confirmation of endobronchial intubation is essential for thoracoscopic surgical exposure. With the endobronchial technique, one avoids the intricacies of the small neonatal flexible bronchoscope with a small visual field. Additionally, bronchial damage by or malpositioning of a bronchial blocker balloon is also circumvented. The Magill 3.0 or 3.5 endotracheal tube may prevent gas escape via the Murphy eye into the operative field. While the major advantage of this technique is that it is both efficient and reliable, the infant's exposure to additional radiation is a disadvantage. However, the efficiency of this technique and may provide better functional evaluation of proper endotracheal tube placement for one-lung isolation and decrease the overall anesthetic time for the child.

