Pediatric Anesthesia

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Pediatric endobronchial blockers in infants: a refinement in technique

Sir—The Arndt endobronchial blocker (AEB) (Cook Medical, Bloomington, IN) is commonly used to facilitate one-lung ventilation in pediatric patients (1–5). Extraluminal AEB placement is used in infants and small children because endotracheal tubes (ETT) with internal diameters less than 4.5 mm cannot simultaneously accommodate a pediatric fiber-optic bronchoscope (FOB) and 5 French AEB. Extraluminal placement has the added advantage of increasing the endotracheal cross-sectional area available for ventilation.

Four strategies have been previously described for positioning of the extraluminal AEB into the desired mainstem bronchus. First, Hammer, *et al.* proposed intubating the desired mainstem bronchus with an ETT, placing a guidewire into the bronchus, exchanging the ETT for an AEB, reintubating the trachea, and checking final AEB position using a FOB through the ETT (1). Second, Bastien, *et al.* describe simultaneous intubation with AEB and ETT such that the AEB's guide loop encircles the tip of the ETT, guidance of the FOB into the mainstem bronchus of choice, and deployment of the AEB and guide loop over the FOB (4). Third, Stephenson *et al.* describe tracheal intubation with AEB and ETT, threading the FOB through the AEB guide loop *in situ*, advancing the FOB into the desired mainstem bronchus, and deploying the AEB and guide loop over the FOB (5). Fourth, after intubating the trachea with AEB and ETT, Stephenson *et al.* describe their preferred method of using head movements and twisting the cuffed ETT to direct the AEB into the desired

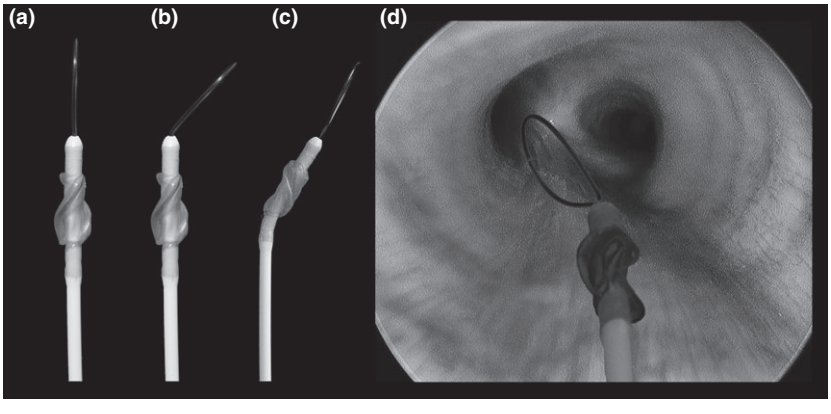

Figure 1 (a) 5 French Arndt endobronchial blocker (AEB); (b) The AEB is prepared by making a sharp bend at the base of the monofilament guide loop; (c) for added rigidity, the bend may be made in the AEB itself; (d) An illustration of the fiber-optic view during placement of the endobronchial blocker into the left mainstem bronchus. The guide loop directs the AEB to the left side of the carina as it is advanced into position. For right mainstem placement, the loop is turned toward the right prior to advancement (not shown).

bronchus under fiber-optic visualization (5). The major limitation of these four techniques is that, should the AEB need to be redeployed, as in the case of dislodgement with repositioning the patient or inadvertent wrong-sided placement, it is difficult to rethread the scope through the guide loop *in situ*. In addition, repositioning the AEB without using the guide loop over FOB may be more difficult when left mainstem placement is desired due to the steeper angle of takeoff from the tracheal axis. Finally, using head movements to guide the AEB may be made difficult or impossible with the patient placed in the lateral position for surgery.

Herein, we describe a novel technique that results in rapid AEB positioning and easy redeployment *in situ* if necessary. First, a sharp crease is made in the monofilament guide loop (Figure 1a) such that the loop lies approximately 30–45 degrees off the AEB axis (Figure 1b). The AEB is threaded through a nare and under direct laryngoscopy advanced into the trachea using McGill forceps. Oral endotracheal intubation then proceeds in usual fashion, using a cuffed ETT half size smaller than usual for age to allow room for the extraaxial bronchial blocker. Downsizing the ETT in this way ensures adequate room for AEB manipulation. A fiber-optic bronchoscope swivel adapter or Arndt multiport adapter is used to facilitate ventilation while a 2.2 mm scope (Olympus America, Center Valley, PA) is placed into a supracarinal position. Under fiber-optic vision, a simple counterclockwise or clockwise twist of the AEB directs the guide loop toward the left or right mainstem bronchus (Figure 1d). When advanced, the AEB follows the loop into the desired bronchus. The supracarinal ETT tip position is essential since a lower "peri-carinal" position could block rotational positioning of the AEB. As long as the guide loop is not withdrawn from the AEB, it can be used to easily and quickly reposition the AEB into either mainstem bronchus. While the bent guide loop is sufficient for directing the AEB when tracheal anatomy is normal, an even more rigid configuration (bending the AEB proximal to the cuff, Figure 1c) is helpful when distorted tracheal anatomy is anticipated (e.g. vascular ring). Once the AEB is in its final position, the ETT cuff is inflated and the AEB is secured to the nose. Having the AEB taped to the nose as opposed to the ETT (as would be the case if the AEB was placed per orem) provides a more stable anchoring point and affords lower risk of accidental ETT dislodgement when untaping and retaping the AEB should depth adjustment become necessary for any reason.

In conclusion, creating a bend in the monofilament guide loop or bronchial blocker simplifies the positioning of the 5 French AEB into the mainstem bronchus of choice under fiber-optic visualization. The technique is an improvement over previous methods because, should the AEB become displaced after initial positioning, the AEB may be easily redeployed into either mainstem bronchus without the difficult and often time consuming step of threading the FOB through the guide loop *in situ*.

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Conflict of interest

No conflicts of interest declared.

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