

Anesthesiology  
77:1236, 1992

## Another Use for Pulse Oximetry

*To the Editor:*—The article by Severinghaus and Kelleher<sup>1</sup> on recent developments in pulse oximetry was remarkably complete in the discussion of the uses and pitfalls of this device. One of the most striking uses of pulse oximetry not mentioned was the use of the pulse oximeter to gauge pulmonary blood flow in the medical and surgical management of infants and children with cyanotic congenital heart lesions and decreased pulmonary blood flow. For example, pulse oximetry permits the prompt diagnosis and medical management of "tet spells" in infants with tetralogy of Fallot. In the operating room, the pulse oximeter has become useful in assessing efficacy of maneuvers used to balance ventilatory and circulatory support following the creation of palliative shunts during "closed" procedures, such as the Blalock-Taussig shunt, or "open" cardiac procedures, such as the Norwood first stage repair for hypoplastic left heart syndrome. Anatomically, the goal of these palliative procedures designed to augment pulmonary and/or systemic perfusion is to have a single ventricle supply blood flow to both the aorta and pulmonary artery, in parallel. Blood flow through one great artery therefore occurs at the "expense" of flow through the other, the relative flows being determined solely by the resistance in each vascular bed (systemic *vs.* pulmonary). It is therefore crucial for the anesthesiologist to manage ventilation and oxygenation in such a way as to manipulate pulmonary vascular resistance to provide the optimum balance between pulmonary blood flow (which oxygenates the blood) and systemic blood flow (which delivers oxygen to the tissues). Similarly, systemic vascular resistance may be managed with vasoactive drugs toward the same endpoint. Intraoperatively, adequacy of systemic blood flow in these infants is typically evaluated using arterial blood pressure, whereas pulmonary blood flow is estimated by systemic oxygenation,

which, in turn, is monitored by the hemoglobin oxygen saturation, as measured by the pulse oximeter ( $SpO_2$ ). If systemic blood flow is inadequate, pulmonary blood flow can be reduced, by decreasing the  $FiO_2$ , decreasing minute ventilation, or changing the ventilatory pattern to increase mean airway pressure. The  $SpO_2$  serves as a beat-to-beat measure of the efficacy of these maneuvers, since as pulmonary blood flow decreases, so does systemic oxygenation and the  $SpO_2$ . The converse is also true in the event of insufficient pulmonary blood flow and systemic oxygenation.

It is important to stress that medical management of pulmonary vascular resistance cannot substitute for a technically adequate shunt and that infants with palliative shunts allowing insufficient pulmonary blood flow would be expected to have an unacceptable  $SpO_2$  despite the use of the physiologic manipulations described above.

LEO I. STEMPE, M.D.

*Cardio-Thoracic Anesthesiology/G3-203  
The Cleveland Clinic Foundation  
One Clinic Center  
9500 Euclid Avenue  
Cleveland, Ohio 44195-5076*

## REFERENCE

1. Severinghaus JW, Kelleher JF: Recent developments in pulse oximetry. *ANESTHESIOLOGY* 76:1018-1038, 1992

(Accepted for publication September 12, 1992.)

Anesthesiology  
77:1236-1237, 1992

## An Aid in Oral Fiberoptic Intubation

*To the Editor:*—When nasal tracheal fiberoptic intubation is contraindicated or controlled ventilation is required during fiberoptic intubation, the Patil-Syracuse mask has been used with success.<sup>1,2</sup> We have devised a system using components that are readily available in the operating room to achieve a similar result. First, an endotracheal tube is placed into a face mask and the cuff inflated to form a seal (fig. 1); then a fiberoptic swivel connector is attached between the endotracheal tube and the anesthesia circuit. In this way, positive-pressure ventilation may be performed in the apneic patient during fiberoptic intubation (fig. 2). After successful passage of the bronchoscope into the trachea, the cuff is deflated and the endotracheal tube advanced.

In our experience, we have found that shortening the length of larger endotracheal tubes allows easier manipulation of the bronchoscope. We also recommend using a clear mask, as it allows external visualization for ease of endotracheal tube passage. We have used both Williams and Berman oral airways with equal success. An advantage of the Williams is that it provides a central groove that guides the bronchoscope and a slotted end that allows easy manipulation of the bronchoscope tip.<sup>3</sup> Finally, we find that it is occasionally helpful to



FIG. 1. Endotracheal tube inserted into anesthesia mask with inflated cuff providing airtight seal.

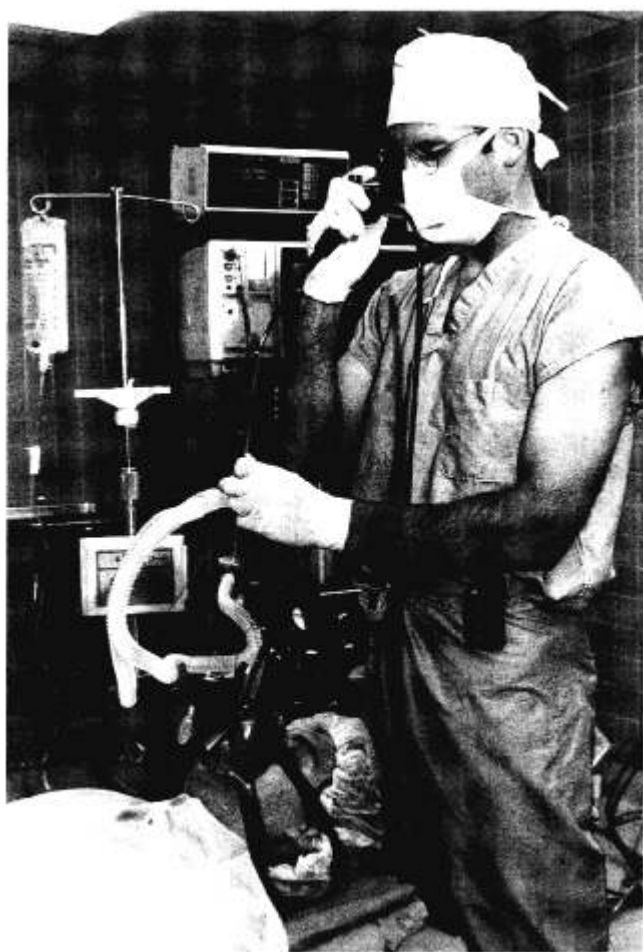


FIG. 2. Fiberoptic intubation *via* the swivel connector-endotracheal tube-anesthesia mask.

have a second anesthesiologist assist with airway maintenance and ventilation during fiberoptic bronchoscopy with this technique.

MICHAEL S. HIGGINS, M.D.

*Clinical Fellow*

*Department of Anesthesiology and Critical Care Medicine  
The Johns Hopkins Hospital  
600 North Wolfe Street  
Baltimore, Maryland 21205*

ALAN P. MARCO, M.D.

*Assistant Professor*

*Department of Anesthesiology and Critical Care Medicine  
The Johns Hopkins School of Medicine  
Director of Clinical Anesthesia Services  
Francis Scott Key Medical Center  
4940 Eastern Avenue  
Baltimore, Maryland 21224*

#### REFERENCES

1. Patil V, Stehling LC, Zauder HL, Kock JP: Mechanical aids for fiberoptic endoscopy. *ANESTHESIOLOGY* 57:69-70, 1982
2. Rogers SN, Benumof JL: New and easy techniques for fiberoptic endoscopy-aided tracheal intubation. *ANESTHESIOLOGY* 59: 569-572, 1983
3. Williams RT, Maltby JR: Airway intubator. *Anesth Analg* 61:309, 1982

(Accepted for publication September 15, 1992.)