

Transillumination for Correct Tube Positioning: Use of a New Fiberoptic Endotracheal Tube

To the Editor:—Endotracheal tube movement with manipulation of the head and neck and verification of endotracheal tube position are recurrent problems in both the ICU and OR environment.¹ The usual means of confirming appropriate tube and cuff placement include physical examination, estimation of depth requirement based on average distances recorded for adults and children or preoperative inspection, direct visualization with a flexible fiberoptic bronchoscope, and chest x-ray.² We would like to describe a new method that we have investigated for adult patients. This uses a modified endotracheal tube that has a fiberoptic strand that terminates just proximal to the cuff (the Heller device—NCC). The strand passes through a channel in the wall of the tube that is similar to that for cuff inflation. When a light source is connected, a bright light appears at the end of the strand just proximal to the cuff. With proper cuff positioning, the maximum point of transillumination will be visible just distal to the cricoid cartilage. If the tube is advanced too far into the trachea, risking endobronchial intubation, the light disappears. If the tube is withdrawn, the point of maximum illumination will appear above the cricoid cartilage or in the larynx. Once tube position has been verified, movement can be assessed by observing the light during extension and flexion of the neck.

We have employed this technique in the operating room on 20 adult patients. Endotracheal intubation is no more difficult than with other endotracheal tubes. Transillumination was demonstrated in all patients using an Olympus CLE-4U fiberoptic light source. It was more obvious in a darkened room but could be demonstrated easily in a brightly illuminated operating room by stretching the skin of the neck over the trachea or sternal notch between two of the examiner's fingers. The group included average adults and several obese individuals with short, thick necks.

A Device for Applying CPAP to the Nonventilated Upper Lung during One-lung Ventilation. I

To the Editor:—Adequate oxygenation, during one-lung ventilation, may be difficult to achieve in some patients. Benumof has suggested the use of CPAP for the nonventilated upper lung as the first step to improve oxygenation in these patients.¹ We also have used the above technique in six patients and found it to be effective in

This technique of tube positioning offers major advantages. Tube position can be rechecked frequently, especially in the ICU environment where tube movement is a recurrent problem. The transilluminating tube presents a noninvasive, accurate, and cost-effective alternative to repeated chest x-rays. Our initial experience with this tube system leads us to believe that it could markedly reduce the frequency of unrecognized tube malposition. Since the Heller-modification cuffed endotracheal tube is available in prototype only, we cannot predict production cost and reliability at this time. The increased cost of a speciality tube system like this must be weighed against the much greater cost of routine chest x-rays for tube position, which, themselves, pose the risk of tube misplacement. We plan to initiate a multicenter trial for further evaluation.

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all except one, who required in addition PEEP to the dependent lung. We have successfully developed a simple circuit utilizing a pediatric system,* an endotracheal cuff

* Vital Signs. Modified Jackson-Rees. Cat. #5101.

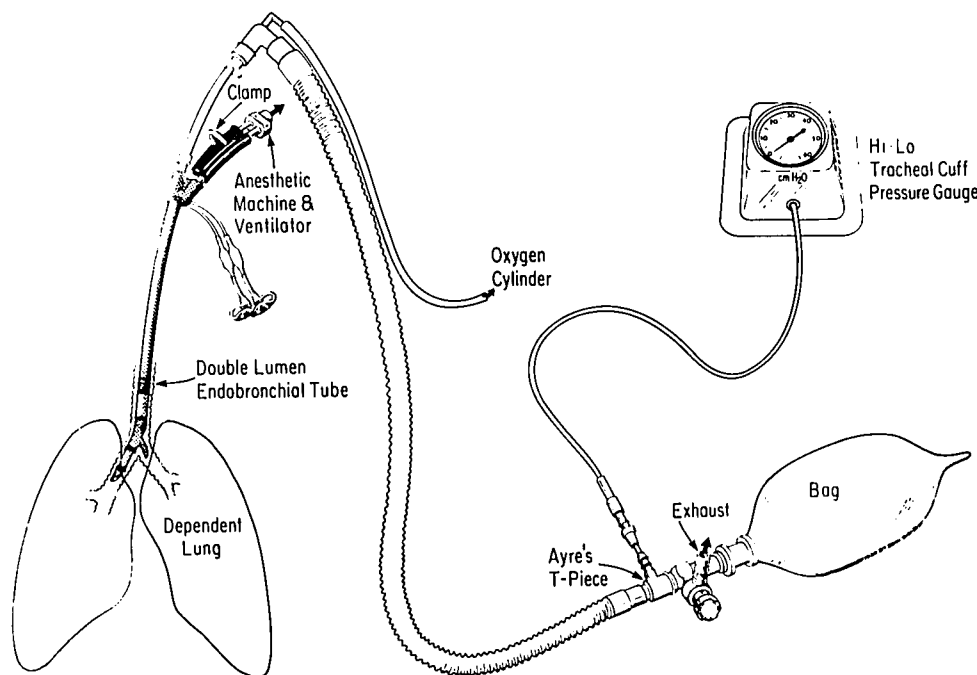


FIG. 1. The device, consisting of a pediatric system, endotracheal cuff pressure gauge, and an exhaust valve, for applying CPAP during one-lung ventilation.

pressure gauge,[†] Ayre's T piece,[‡] and a standard oxygen cylinder with pressure gauge and a flow meter (fig. 1). Using this system, we found that by adjusting the exhaust valve and the oxygen flow, the CPAP can be monitored and quantitated as required.

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[†] National Catheter Company. Hi-Lo Tracheal Pressure Gauge. Cat. #518.

[‡] Vital Signs. Ayre's T piece with fresh gas flow at 90° angle. Cat. #518.

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A Device for Applying CPAP to the Nonventilated Upper Lung during One-lung Ventilation. II

To the Editor:—Unilateral pulmonary ventilation through an endobronchial tube frequently produces significant hypoxemia. There has been great interest in methods for maximizing arterial oxygenation when 100% oxygen and adjustments to ventilatory pattern do not suffice. Among these maneuvers are unilateral pulmonary artery occlusion¹ and application of PEEP to the dependent lung.² Capan *et al.*³ recently demonstrated that simple insufflation of oxygen to the nondependent lung was ineffective in improving arterial oxygenation during one-lung ventilation, but that oxygen insufflation with 10

cmH₂O CPAP applied to the nondependent lung resulted in marked improvement in PaO₂. This maneuver alone appeared to be more effective than other combinations of dependent lung PEEP and insufflation in improving oxygenation and did not reduce cardiac output.

We have constructed a device for application of nondependent lung CPAP from equipment readily available in our anesthesia workroom. It is a convenient method of applying the technique suggested by Capan.³ Our device is designed for use with the Bronchocath endobronchial tubes (National Catheter Co., Argyle, New York)

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