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# The Univent® Tube: Bronchial Cuff Inflation

*To the Editor:*—The Univent® tube is an endotracheal tube with a movable bronchial blocker that is available for single lung ventilation.[1] The blocker is retracted into a designated small lumen during tracheal intubation. After the trachea has been intubated, the tube is rotated 90° to the side to be occluded, and the blocker is advanced into the corresponding mainstem bronchus. Fiberoptic bronchoscopy is used to guide the depth of insertion of the blocker. Inflating the bronchial cuff isolates the lung supplied by that bronchus. The tube reportedly facilitates one-lung ventilation compared to conventional double-lumen tubes* and obviates some of their potentially life-threatening complications, such as bronchial rupture.[3] It also has a distinct advantage over conventional double-lumen tubes for long-term intubation.[1]

I would like to bring to the attention of the users of the Univent® tube one of the properties of its bronchial blocker's cuff. The cuff's characteristics are described as low-pressure–high-volume.[2] I believe that this is not accurate. By definition, a high-volume–low-pressure cuff provides a seal of the patient's trachea or bronchus at less than its resting diameter. The cuff resting diameter or volume is the diameter or volume when the cuff is inflated just to its natural shape.[3] If inflated any further, it becomes a high-pressure cuff. When the Univent® tube was tested, it was found that the resting volume of its bronchial cuff was less than 2 ml and that its resting diameter was 5 mm, which is smaller than the diameter reported for any adult left or right mainstem bronchus.[4] This means that the bronchial cuff of the Univent® tube behaves like a high-pressure cuff when inflated to seal any adult bronchus.

The manufacturer of the tube recommends inflating the cuff with 6–7 ml air to block the bronchus.† Since bronchial diameter varies widely among individuals,[4] inflating the high-pressure bronchial cuff with the same volume of air for all patients risks overinflation and bronchial damage in small individuals. The following technique was, therefore, developed to optimally inflate the bronchial cuff of the Univent® tube to the volume that would just produce bronchial seal.

After correct placement of the tube in the trachea and the blocker in the bronchus, the tracheal cuff is inflated in the usual manner, and the patient's lungs are ventilated with 100% oxygen for a few minutes *via* a conventional circle system. Ventilation then is discontinued; the overflow valve in the circle system is opened fully; and a fresh gas flow of 5–6 l/m is delivered to the system. The reservoir bag will then fully distend. Using a 10-Fr suction catheter, negative pressure is applied to the proximal end of the lumen of the blocker. With the bronchial cuff deflated, the distal end of the lumen of the blocker will be freely connected with the trachea and the circle system. The suction pressure then is increased until the volume of oxygen suctioned out of the system is more than the volume delivered to it. The reservoir bag will then begin to deflate (fig. 1). At this point, the bronchial cuff is inflated slowly with 1-ml increments of air, and the breathing bag is watched carefully until it ceases to deflate. This will indicate that there is no longer any communication between the tip of the blocker, where the negative pressure is being applied, and the rest of the breathing system. Complete sealing of the bronchus will have been accomplished at this point. This is confirmed by auscultation of the breath sounds initially and later by observation of the lung's actual collapse, with continued suction, when the chest is opened. In our experience a seal usually is achieved with less than 6–7 ml air. Once the bronchial cuff is optimally inflated, ventilation is resumed. Since the diameter of the bronchial blocker's lumen is only 2 mm, complete collapse of the lung frequently requires some assistance. Therefore, the suction through the blocker's lumen is continued until complete collapse of the lung is achieved.

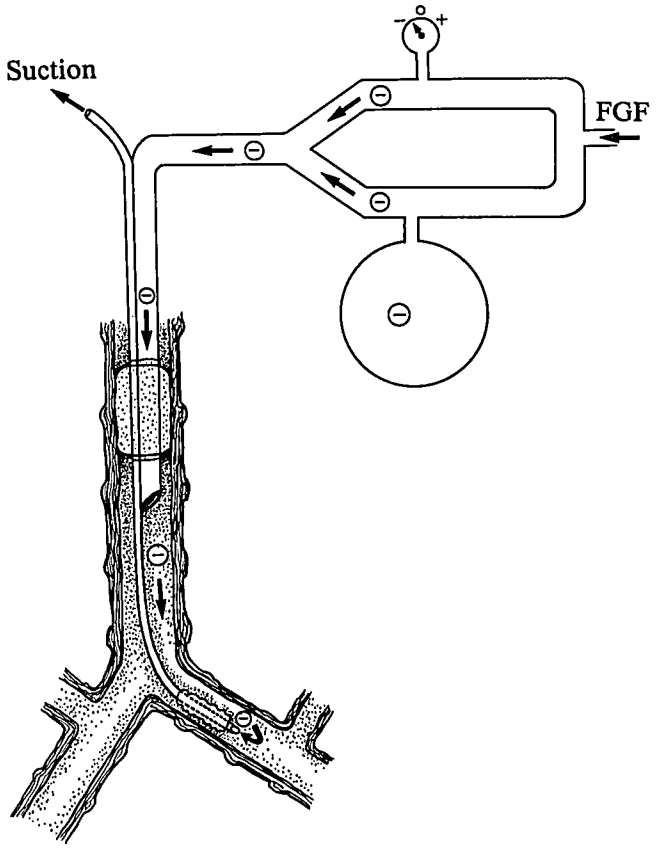


FIG. 1. When the bronchial cuff is deflated, negative pressure applied at the proximal end of the lumen of the blocker is freely transmitted to the reservoir bag of the breathing system. FGF = fresh gas flow.

In summary, the bronchial cuff of the Univent® tube is a high-pressure cuff that should be inflated carefully and only to the point at which an airtight seal is obtained. The technique described to achieve this is simple and reliable and may decrease the chance of complication with the use of this tube.

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* Hultgren B, Krishna P, Kamaya H: A new tube for one-lung ventilation: Experience with Univent tube (abstract). ANESTHESIOLOGY 65:A481, 1986.

† Fuji Systems Corporation: Univent®. (promotional brochure). 23-14, Hongo 3-Chome, Bunkyo-Ku, Tokyo, 113 Japan.

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## REFERENCES

1. Kamaya H, Krishna P: New endotracheal tube (Univent Tube®) for selective blockade of one lung. ANESTHESIOLOGY 63:342–343, 1985
2. Karwande S: A new tube for single lung ventilation. Chest 92: 761–763, 1987
3. Steen J: Impact of tube design and materials on complications of tracheal intubation, Problems in Anesthesia, Volume 2. Edited by Kirby R, Brown D. Philadelphia, JB Lippincott, 1988, pp 211–224
4. Jesseph J, Merendino K: The dimensional interrelationships of the major components of the human tracheobronchial tree. Surg Gynecol Obstet 105:210–214, 1957


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# Proper Needle Size for Performing Cervical Epidural Injections

*To the Editor:*—The case report by Jackson and Rauck[1] describing possible air embolism complicating a therapeutic cervical epidural steroid injection in a sitting patient deserves comment.

Anesthesiologists must clearly differentiate the needles and techniques required for single-shot epidural injections from those used with continuous catheter epidural injections. For therapy in our Pain Clinic, unless a catheter is used in an attempt at breaking up epidural scarring, we cannot justify using a needle larger than 0.7 mm (22-G). With a loaded syringe attached, this needle is inserted through an introducer to identify and enter the epidural space. In the case described, the authors used a spade-tipped, 16-G Tuohy needle. With that needle, the tissue area vulnerable to injury is almost six times as large as with our technique (2.26 *vs.* 0.385 $mm^2$). Thus, sequelae such as backache, headache from inadvertent dural puncture, and injuries to nerves, arteries, veins and other tissues will be more frequent and severe.

Our personal experience with thousands of epidural injections of all types during the past 45 yr indicates that therapeutic epidural steroid injections properly performed and instrumented to match the requirements should be relatively benign procedures. *Primun non nocere!*

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## REFERENCE

1. Jackson KE, Rauck RL: Suspected venous air embolism during epidural anesthesia. ANESTHESIOLOGY 74:190–191, 1991


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*In Reply:*—We agree with Dr. Goffen that larger needles generally are more likely to cause greater injury to delicate structures such as arteries and nerves. However, for the following reasons we believe that 16-G Tuohy needles are appropriate for cervical epidural placement. Using the "hanging-drop technique" to identify the epidural space requires reliable transmission of the negative pressure through the needle to the hub. Increasing resistance through a needle's progressively smaller internal diameter will result in a loss of the sensitivity seen when the drop is drawn into the needle hub. It is our experience that using 18-G Tuohy needles results in less sensitivity than with 16-G needles, and thus it is our conclusion that using 22-G needles are even less useful.

Although it is certainly possible to identify the epidural space through the loss of resistance technique by using 22-G needles, this can be a source of complications. Also, to the best of our knowledge, a 22-G Tuohy needle is not available.

Certainly, an anesthetic procedure can result in acute complications. However, cervical epidural anesthesia is well documented in terms of overall safety,[1] and we still believe that the technique of this procedure is easiest in the sitting position with at least a 16–18-G Tuohy needle.

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## REFERENCE

1. Waldman SD: Complications of cervical epidural nerve blocks with steroids: A prospective study of 790 consecutive blocks. Reg Anesth 14:149–151, 1989


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