

CORRESPONDENCE

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In Reply:—We appreciate the comments by Weigand *et al.* concerning our use of ventricular fibrillation to facilitate endovascular stent-graft repair of thoracic aortic aneurysms. The use of adenosine is viable for induced asystole during endovascular stent-graft deployment if the time of anticipated deployment is known with a high degree of certainty and if the period of absolute asystole necessary is less than 15–20 s. Longer durations will result in unpredictable breakthrough ventricular escape beats that may compromise stent-graft positioning. In our experience, commercially produced large angioplasty (valvuloplasty) balloons of 30–40 mm in diameter necessitate inflation and deflation times well in excess of 30 s; the exact duration of asystole necessary for successful deployment may be variable and not easily determinable until the time of stent-graft deployment. This need for a prolonged duration of stent-graft deployment is especially necessary during endovascular repair of the thoracic aortic using angioplasty balloon-activated devices (self-expanding endovascular devices do not necessitate this duration of time for deployment). This variability of stent-graft deployment times often is related to the complexity of the anatomy within the vascular segment being repaired. As described in our report, we have required from 55 to 172 s of asystole.¹ Because of interpatient variability in the action of adenosine, there is a risk of escape ventricular beats. Such unanticipated ventricular escape beats would probably adversely effect stent-graft position.

We agree with Weigand *et al.* that adenosine has some advantages over ventricular fibrillation during endovascular stent-graft deploy-

ment, most notable its consistently benign effect on the patient. The purpose of our case report was not to argue for the replacement of adenosine with ventricular fibrillation, but rather to suggest that induced ventricular fibrillation may be another viable method for providing asystole in a subgroup of patients undergoing endovascular repair in which controlled cardiac arrest was mandatory. We agree that further experience will assist in delineating the indications for each of these modalities.

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Reference

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New Double Intrabronchial Tube (Naruke Tube) for Tracheostomized Patients

To the Editor:—Conventional double lumen intrabronchial tubes are designed for insertion through the oral cavity. They are not designed for use through a tracheal stoma.

In a previous report, Brodsky *et al.*¹ reported a development of a tracheostomy double-lumen tube. However, it was not designed for patients with permanent stoma, and we have encountered circumstances in which the tube did not fit the patient's trachea and bronchus well. We have, therefore, developed a new tube for use in such patients.

Composition of the Tube and Its Assembly

The new endobronchial tube is a silicon, spiral, wire-reinforced double-lumen tube (fig. 1). The tube was made in three individual parts—the distal section beyond the tracheal orifice, the middle section between the tracheal cuff and the point of bifurcation, and the

proximal bifurcated part—and assembled later. Assistance with the design and all tube construction and fabrication work was performed by Koken Medical (Shinjuku-ku, Tokyo, Japan).

The Middle Section

The middle section of the tube is the trunk. It is constructed of two thin-walled silicon tubes that are glued together with an inner diameter of 5.0 mm, reinforced with a stainless spiral wire, and covered in a silicon coating. Two pilot balloons were included that ran within the walls of the two inner tubes, one of which exited the wall of the tube to supply the tracheal cuff, which also is made of silicon.

The Distal Section

The distal section, containing the bronchial lumen and the cuff, is also constructed of wire-reinforced silicon. The dimensions are based

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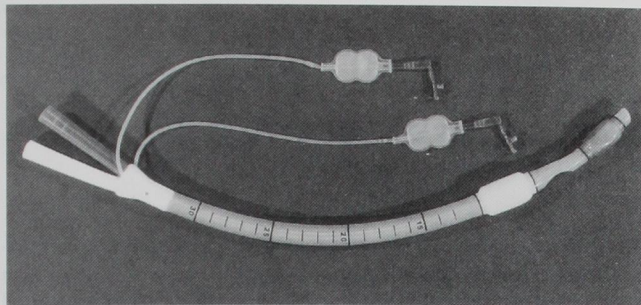


Fig. 1. A picture of the new double intrabronchial tube for patients with permanent tracheal stoma. The tube was invented by one of the authors (T.N.) who realized that a reinforced tube was more beneficial for these patients.

on the Mallinckrodt double-lumen tube. The bronchial cuff is located 1.2 cm from the tip, and the distance between the tip orifice and the tracheal orifice is 4.9 cm. This section initially was made of polyvinyl chloride, but we found it to be too stiff. We, therefore, changed the material to silicone that was reinforced with wire to avoid excessive flexibility (fig. 2).

The Proximal Part

The proximal part connects the double-lumen airway to the anesthetic circuit. This part is made of two cone-shaped tubes. The connection of these two tubes and the mid part are bound with a silicone sheet and a silicone paste (fig. 3). The diameters of the two inner lumens are larger than 5.0 mm. The most proximal lumen has an inner diameter of 9.0 mm.

Because of the size of most patients, we have made only a left-sided 39-French double-lumen tube. The narrowest inner diameter of either lumen is 5.0 mm. The largest outer diameter of the whole tube is 1.3 cm.

Clinical Application

With approval from the Ethics Committee of the National Cancer Center Hospital, we tested this new tube in seven patients with permanent tracheostomies. Six of seven were scheduled to undergo lobectomy or bullectomy, and one patient had a mediastinal abscess which developed after a previous esophagectomy. After induction of general anesthesia, the new double-lumen tube was inserted *via*

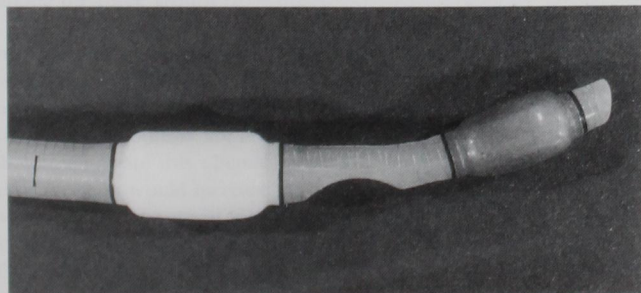


Fig. 2. The tip of the tube. The spiral support wire is less dense in this section.

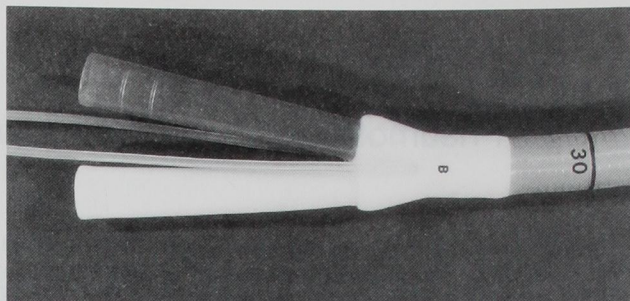


Fig. 3. The proximal end of the tube. A 12 Fr. gauge suction catheter will pass.

the stoma. In patients, we used the left-sided tube. When the tracheal cuff just disappeared inside the stoma, we inserted a thin endoscope through the tube to facilitate further positioning of the endobronchial tube. With the guidance of the endoscope, the endobronchial tube was positioned such that the blue endobronchial cuff was just below the carina. In all seven patients, proper placement was achieved during the first attempt. The whole procedure of intubation and bronchoscopy was accomplished within 10 min. The tube was secured with surgical thread at the patient's stoma. In six patients, bronchial cuff inflation was unnecessary because the airway was sealed satisfactorily. In one patient, we inflated the bronchial cuff with 1 ml air.

During induction of anesthesia, the tubes functioned well with no sign of kinking, no movement, and easy passage of the suction catheter. After extubation, the airway was suctioned carefully using a large endoscope. We saw no sign of gross irritation during endoscopy.

We conclude that this newly designed double-lumen tube may be advantageous in caring for patients with permanent tracheal stomas. We are in the process of developing a commercial version of this tube.

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Reference

1. Brodsky JB, Tobler HG, Mark JBD: A Double-lumen endobronchial tube for tracheostomies. *ANESTHESIOLOGY* 1991; 74:388-9

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