

Modified and Newly Designed Right-sided Double-lumen Endobronchial Tubes Are Complementary

To the Editor:—We read with great interest the case report¹ on the application of a newly designed right-sided, double-lumen endobronchial tube (R-DLT) in patients with a very short right mainstem bronchus.

However, in citing our work² on the improvement of the endobronchial positioning of the R-DLT, Hagihira *et al.* stated that we modified the design of the bronchial cuff and that these changes seem to offer little improvement. This statement is inconsistent with our published manuscript which demonstrates, on a randomized series of 80 patients, that the modified enlarged area of the lateral orifice (and not the bronchial cuff as stated by Hagihira *et al.*) improve the success rate of final positioning from 74 to 97% with a $P < 0.0109$. These two new versions of the R-DLT are not intended to solve the same problem, but the final objective, improvement of the use of R-DLT, is similar.

The reported modification of a right-sided double lumen tube is the object of patent applications 11/950,832 in the United States, 2,610,933 in Canada, and 06761048.5 in Europe, filed by University Laval on behalf of Jean Bussi eres, M.D.

We thank Dr. Hagihira for this interesting case report. While this new R-DLT may become a useful tool for thoracic anesthesiologists, we would first encourage them to validate its use with a randomized study.

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In Reply:—We appreciate the comments by Fishler and Lalo e regarding our article.¹ Their remarks are important to evaluate the dimensions of the tracheobronchial tree. To choose the double-lumen tube (DLT) size, the diameter of the mainstem bronchus and the diameter of the trachea are important. Usually, the ratio of occipitofrontal diameter and transverse diameter is within 0.9 to 1.1. However, in some patients, its ratio is beyond this range. In such cases, measurement using three-dimensional reconstructed images would be ideal, but it would not always be available. In that case occipitofrontal diameter in computed tomographic images would be the next choice. Brodsky *et al.*² reported that the width of the trachea and the width of the left mainstem bronchus were closely correlated. Considering this, selecting the DLT size by the diameter of the trachea would be the third choice.

In our article we discussed the availability of a right-sided DLT. From this point of view, the length rather than the diameter of the right mainstem bronchus was important. As compared with the diameter, the length of right mainstem bronchus could be accurately measured from an x-ray image. The ratio of magnification can be calculated by the width of the endotracheal tube on the x-ray image and real tube width. Thus, our method was adequate for our purpose.

In our routine practice, we carefully examine the computed tomographic image as well as the x-ray image, and then we decide the type and the size of DLT in each patient, considering the side and the type of operation. Careful preoperative image examination is essential for thoracic anesthesia.

We thank Dr. Bussi eres *et al.* for having an interest in our article¹ and for providing comments on the modification of the bronchial tip of the right-sided DLT.³

Some anesthesiologists seemed to consider that fiberoptic bronchoscopy (FOB) was best for examining the adequacy of the DLT's positioning. Of course, FOB is most useful in positioning the DLT; however, we thought that the adequacy of the DLT's positioning should be confirmed by quality of ventilation. If we could adequately ventilate the lung (each lobe), the tube's position should be considered to be adequate. Here we illustrate the most distal acceptable position (fig. 1A) and the most proximal

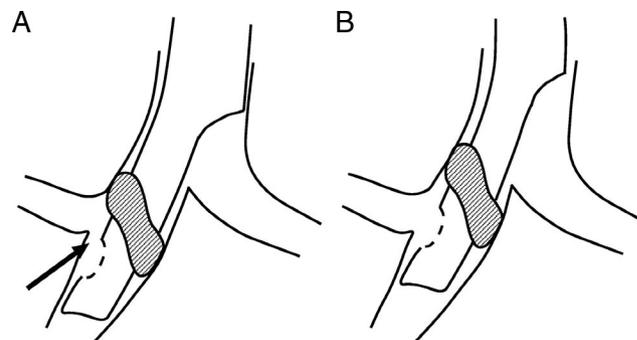


Fig. 1. Scheme for the most distal acceptable position (A) and the most proximal acceptable position (B) of a right-sided double-lumen tube, as defined by Benumof *et al.*³ The arrow indicates the space between the wall of the bronchial tip and the bronchial wall.

imal acceptable position (fig. 1B) of the right-sided DLT as defined by Benumof *et al.*⁴ In figure 1A, the ventilation slot seemed to be blocked by the bronchial wall. However, when we selected an adequate size of DLT, namely the diameter of the bronchial tip was smaller than the diameter of the bronchus in some extent, air could flow from/to the right upper lobe through the space between the bronchial wall and the bronchial tip of DLT (indicated by the arrow). As a result, we could probably ventilate the right upper lobe through this space. Of course the modification of the bronchial tip by Bussi eres *et al.*³ could increase the visibility of the orifice of the right upper bronchus through FOB, which would have an advantage for anesthesiologists. But their modification would not alter the most distal acceptable position of the right-sided DLT. Similarly, it would not alter the most proximal acceptable position either. The positions are only determined by the length of the right mainstem bronchus and the length of the bronchial cuff, with the conventional concept of definition for positioning the DLT by Benumof *et al.*⁴ Finally, we stated that their modification seems to offer little improvement in positioning and applicability of a right-sided DLT.

We should also pay attention to the rotation of the tube position. In such cases, we sometimes found it difficult to exactly fit the ventilation slot to the orifice of the upper bronchus. However, in most cases we could maintain adequate oxygenation and ventilation beyond all expectations. Thus, exact matching of the ventilation slot to the orifice of the upper bronchus is not always required to obtain proper oxygenation and ventilation. If an exact match was required, we could not properly use the right-sided DLT in most cases.

The purposes of our modification of the bronchial tip and the cuff shape were to increase the applicability of a right-sided DLT for more patients, to increase the safety margin in positioning, and to increase usability. To archive these purposes, we proposed our new concept and devised the new tube. We believed that our design achieved our purpose.

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Infection Control Practices by the Anesthesiologist

To the Editor:—We read with interest the article by Dr. Randy W. Loftus *et al.*, entitled “Transmission of Pathogenic Bacterial Organisms in the Anesthesia Work Area.”¹ The authors reported contamination of the anesthesia workspace and the sterile stopcocks. This is an important study that highlights the risks of contamination and the potential role that the anesthesiologist may have in the spread of disease. The authors state that it is a “reasonable assumption that the aseptic practice by anesthesia providers at our institution reflects practice elsewhere.” However, I do not believe that this is a valid assumption, and would like to know what it is based on. It would have been important to describe the actual anesthesia practice, and if there is a standardized protocol of the anesthesia practitioner.

In our institution, we have been in the process of implementing a system that is practiced as a standard throughout the department, which consists of using a front “dirty” table, and a back “clean” table. The front table is the work table of the anesthesia machine. It is covered for each patient with a disposable sterile drape. Only items specifically for the current patient are placed on the drape. Additional medications that have been prepared, but are not definitely being used, are kept on the back table, which is the tabletop of the anesthesia cart.

Rather than just having the surface of the anesthesia machine tabletop wiped down as a terminal cleaning procedure as in the study reported, it is wiped down before each patient. Additional measures include wearing a gown for patients already on contact isolation, which is removed after the case. A bag is used to isolate the controlled substances which have already been used and handled, and to keep them separate from the other unused controlled drugs. We are currently evaluating stopcocks with sealed valve ports that do not require caps, which would be a closed system and may be less likely to be contaminated. We are also evaluating central line dressings impregnated with chlorhexidine to reduce the incidence of central line-related infections.

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In Reply:—We appreciate the thoughtful criticism provided by Drs. Neustein and Williams regarding our article entitled “Transmission of Pathogenic Bacterial Organisms in the Anesthesia Work Area.” They raise an interesting question regarding the likelihood of interinstitutional variability in infection control practices of anesthesia providers, a question inspired by our comment that “it is a reasonable assumption that the aseptic practice by anesthesia providers at our institution reflects practice elsewhere.”

In the 1970s, the Centers for Disease Control and Prevention initiated the National Nosocomial Infection Surveillance Study (NNIS) to continuously monitor infection control rates in hospitals across the United States. Data derived from the NNIS provided statistical evidence for the need to improve preventative measures and generated a set of guidelines for recognition and management of infection. Our statement was based on the NNIS quartile ranges of our institution, which suggest that our overall infection control practices are excellent; as good as or better than the majority. We are at the 50th percentile for new cases of Methicillin-resistant *Staphylococcus aureus* and the 25th percentile for Vancomycin-resistant *Enterococcus*. The NNIS is now known as the National Health-

care Safety Network, and it continues to serve as a reasonable comparative measure of interinstitutional infection control practices.¹

That being said, we agree that there is a possibility of both intra- and interinstitutional variability in infection control practices that would be unaccounted for by gross estimates as presented by NNIS quartile ranges. This could impact intraoperative bacterial transmission magnitude and patterns, making multiinstitutional studies evaluating intraoperative bacterial transmission an important consideration for further work in this area. We hope to address this important question with a recently funded study.

Interestingly, the infection control practices at Dartmouth-Hitchcock Medical Center largely reflect those at Mount Sinai. We too encourage designated dirty and clean areas in the anesthesia work area. The front area, the table connected to the anesthesia machine, is to remain clean (in theory), while the back of the medication cart is designated for placement of dirty health care tools into a disposable plastic bag. Like all infection control practices, there is not a 1:1 correlation with guidelines and actual practice.

The front area is decontaminated between patients with a quaternary ammonium compound, as described in our article, and similar to