A Tracheal Divider for Differential Lung Ventilation in Dogs

To the Editor—Many investigators are aware of technical difficulties inherent in the differential lung ventilation in dogs.1-2

In a previous report,3 we used a right-sided Robertshaw tube which was passed into, and seated in, the left main bronchus for differential lung ventilation. However, at autopsy, only 55% (22 cases among a total of 40) of the tubes were confirmed to be in the proper location. In the remaining cases, there was partial obstruction of the left upper lobe bronchus.

To develop a tube which would more reliably separate the lungs in studies requiring differential ventilation, measurements of the tracheo-bronchial tree near the carina were performed in 18 dogs. Mean distances (±SD) in mm from the carina to right upper lobe orifice (a), to left upper lobe orifice (b), to left middle lobe orifice (c) are shown in table 1 and figure 1. A striking anatomical feature of the canine tracheal bifurcation is that the mean

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**Table 1. Distance from the Carina to Proximal Edge of Each Lobe Orifice (Mean ± SD) (fig. 1, a–d) in mm**

<table>
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<th>Mean ± SD (mm, n = 18)</th>
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<tbody>
<tr>
<td>a</td>
<td>-4.4 ± 3.3</td>
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<tr>
<td>b</td>
<td>12.4 ± 7.0</td>
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<tr>
<td>c</td>
<td>24.4 ± 6.5</td>
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<tr>
<td>d</td>
<td>17.9 ± 1.9</td>
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**Fig. 1.** Diagram of trachea and major bronchial divisions in dogs, showing the measured positions and distances from the carina to the origin of the right upper lobe orifice (a), to the left upper lobe orifice (b), to the left middle lobe (lingula) orifice (c), and the diameter of the trachea (d).

**Fig. 2.** A scale drawing of the tube (MKP-divider). The tube is made of polyvinyl chloride (PVC) of medical grade, and is soft and pliable, yet has sufficient stiffness to allow manipulation and control during placement. To prevent the tube from being displaced laterally and passing too far into the tracheobronchial tree, a carinal crotch, which is formed by the distal end of the right side of the tube and the projection to the left, is indispensable. The larger balloon separates the right lung from the outside, while the left main-stem bronchial balloon separates the left lung from the right. The length of the right lung ventilation slot (c) is 15 mm (table 1, mean value of a plus 3 × SD), to prevent partial obstruction of the right upper lobe orifice.
In six dogs, the trachea was intubated with a normal tube and with an MKP-divider, alternately, and values for $P_{aO_2}$ were compared. Changes in $P_{aO_2}$ were small and insignificant, suggesting that the MKP-divider was inserted with little risk of lobar obstruction.

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REFERENCES


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