narrowing and symptoms of obstruction after correction of mediastinal shift may necessitate reoperation for resection of the softened bronchus.

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Update on bronchoesophageal fistula in adults

To the Editor:

In our earlier letter to the editor (*J THORAC CARDIOVASC SURG* 1990;99:756-7), we advocated closure of the bronchoesophageal fistula by simple stapling. We reported on two patients. One year after the operation both were well, with fistulas remaining closed. Since then it has come to our attention that both patients have had a recurrence of the fistula. They have been operated on by another surgeon. We have discontinued this approach and have returned to complete separation of the esophagus from the respiratory tract and interposition of muscle between the separated structures.

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Penetration of intravenous antibiotics from the lung into the pleural space after pulmonary resection*

To the Editor:

Little information concerning penetration of antibiotics into the pleural space after pulmonary resection is available. If there are differences among the methods of lung resection in the pen-

etration of antibiotics into the pleural space, different doses of antibiotics should be administered according to the method used.

To determine the penetration of intravenous antibiotics into the pleural space, we administered Flomoxef sodium (Shionogi & Co. Ltd., Osaka, Japan) intravenously. We then measured the concentration of Flomoxef sodium sequentially in pleural effusion of patients who underwent lobectomy or pneumonectomy. Flomoxef sodium is an injectable oxacepham antibiotic that possesses a broad antibacterial spectrum effect against gram-positive and gram-negative bacteria.¹ The lung remains after lobectomy but does not remain after pneumonectomy. The concentration of Flomoxef sodium in pleural effusion thus indicates the penetration of antibiotics occurs from both the lung and the parietal pleura in a patient who undergoes lobectomy but from only the parietal pleura in a patient who undergoes pneumonectomy.

The concentration of Flomoxef sodium in pleural effusions were measured in the lobectomy group (five patients [66 ± 13 years] who underwent lobectomies for malignant tumors of the lung [two for adenocarcinoma, one for small-cell carcinoma, one for alveolar cell carcinoma, and one for metastatic lung tumor from osteosarcoma]) and in the pneumonectomy group (five patients [61 ± 2 years] who underwent pneumonectomies for bronchogenic carcinomas [two for squamous cell carcinoma, two for small-cell carcinoma, and one for adenocarcinoma]). Informed consent was obtained from each patient before the operation.

We maintained general anesthesia with halothane (1% to 3%), nitrous oxide, and oxygen. There was no difference between the period needed for lobectomy (190 ± 51 minutes) and that needed for pneumonectomy (260 ± 71 minutes). At the end of the operation, we rinsed the pleural space with 1500 to 2000 ml of normal saline solution and wiped it up. Then two 28F trocar replacement catheters (Argyle, Sherwood Medical Company, St. Louis, Mo.) with an end hole and a side hole were placed in the pleural cavity. Pleural effusion was drained through the catheters and continuous suction with negative pressures of 10 cm H₂O or 5 cm H₂O, in the lobectomy and pneumonectomy groups, respectively.

We administered 2 gm Flomoxef sodium dissolved in 100 ml normal saline solution intravenously during 1 hour at 3 hours after lung resection. Pleural effusion and arterial blood were collected before the injection and at 0.5, 1, 2, 3, 4, and 6 hours after the beginning of intravenous administration.

Collected samples were centrifuged at 3000 rpm for 15 minutes. Supernatant was stored at -80°C . Several days later, 0.5 ml supernatant mixed with 0.5 ml ethanol and 1.0 ml chloroform was centrifuged at 4000 rpm for 10 minutes. Concentrations of Flomoxef sodium in supernatant were then measured with high-performance liquid chromatography. A Nucleosil 10 C₁₈ (Chemco Co. Ltd., Tokyo, Japan) (4×300 mm; particle 5 μm) was used with ultraviolet detection 268 nm and a tracer phase of 0.5 mol/L phosphate-buffered water and acetonitrile.

To determine the permeability of pleural effusion, we measured total protein concentration in pleural effusion and plasma by the Biuret method just before administration of Flomoxef sodium. The ratio of pleural effusion to plasma total protein concentration was calculated. To detect hemorrhage in the pleural space, hemoglobin concentrations in pleural effusion and plasma were measured by the oxyhemoglobin method just before administration of Flomoxef sodium.

*Shionogi Research Laboratories, Osaka, Japan, measured the concentration of Flomoxef sodium.