Division of the Pulmonary Ligament After Upper Lobectomy is Less Effective for the Obliteration of Dead Space than Leaving It Intact

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Abstract

Purpose. To investigate whether division of the pulmonary ligament after upper lobectomy obliterates dead space.

Methods. Thirty-five patients scheduled to undergo upper lobectomy (23 right, 12 left) were randomly assigned to two groups, according to whether the inferior pulmonary ligament was divided (11 right, 12 left) or preserved (6 right, 6 left). To assess upward movement of the nonoperated lobes, plain chest X-ray films (posterior-anterior) were done at end-inspiration preoperatively and 1 month postoperatively, and the ratio of dead space in the longitudinal axis was measured. To assess the change in the angle of the main bronchus, chest X-ray tomography films were done preoperatively and 1 month postoperatively. The angles formed by the main bronchus and the truncus intermedius on the right side, and by the main bronchus and the lower bronchus on the left side, were measured, and the postoperative changes were calculated.

Results. The dead space ratio did not differ significantly between the divided group and the preserved group (3.5% vs 5.5%) or between sides. The change in the angle of the main bronchus did not differ significantly between the two groups on either the right (36.4° vs 36.3°) or the left side (72.5° vs 60.0°).

Conclusion. Division of the pulmonary ligament after upper lobectomy is less effective for the obliteration of dead space than leaving it intact.

Key words Upper lobectomy · Preservation of pulmonary ligament · Residual bronchus deformity

Introduction

Many surgeons believe that division of the pulmonary ligament is useful for obliterating dead space, stopping air leakage, and preventing subsequent bronchial fistula formation, despite the morbidity associated with crushing the phrenic nerve or breaking the lymph channels.1 We examined the effectiveness of dividing the pulmonary ligament after upper lobectomy by assessing chest X-ray films.

Patients and Methods

The subjects of this study were 35 consecutive patients who underwent upper lobectomy for lung carcinomas between November 1995 and April 1997 at Hyogo Medical Center for Adults. The patients were preoperatively assigned randomly to a divided group (n = 17), in which the inferior pulmonary ligament was divided, or a preserved group (n = 18) in which the ligament was preserved. Closure of the bronchial stump was performed by Sweet’s method. For right upper lobectomy, there were 11 patients in the divided group and 12 in the preserved group, and for left upper lobectomy, there were 6 patients in each group.

The effect of division was assessed on chest X-ray films by examining the upward movement of the nonoperated lobes, and the change in the angle of the main bronchus on the operated side.

Movement of Nonoperated Lobes

Plain chest X-ray (posterior-anterior) films were done at end-inspiration, preoperatively, and 1 month postoperatively, and the ratio of the dead space in the longitudinal axis was measured (Fig. 1).
Change in the Angle of the Main Bronchus on the Operated Side

Chest X-ray tomography films were done preoperatively and 1 month postoperatively. We measured the angles formed by the main bronchus and the truncus intermedius on the right side, and by the main bronchus and the lower bronchus on the left side, and calculated the postoperative change in these angles (Fig. 2).

Statistics

All values are expressed as mean ± standard deviation, and were analyzed using the StatView program (SAS Institute, Heidelberg, Germany). P values of less than 0.05 were considered significant.

Results

There were no major complications or operative mortality in either group.

Movement of Nonoperated Lobes

The dead space ratio in the divided group was 3.5% ± 3.1% and that in the preserved group 5.5% ± 6.6%, with no significant difference between the groups. For right upper lobectomy, the ratio in the divided group was 3.8% ± 3.5% and that in the preserved group 7.9% ± 6.8%, with no significant difference between the groups. For left upper lobectomy, the ratio in the divided group was 2.9% ± 2.4% and that in the preserved group 0.6% ± 1.4%, with no significant difference between the groups (Table 1).

Change in the Angle of the Main Bronchus on the Operated Side

The change in the angle of the main bronchus in the divided group was 49.1° ± 29.1° and that in the preserved group 44.2° ± 17.3°, with no significant difference between the groups. For right upper lobectomy, the change in the angle of the main bronchus in the divided group was 36.4° ± 26.2° and that in the preserved group 36.3° ± 13.8°, with no significant difference between the groups. For left upper lobectomy, the change in the divided group was 72.5° ± 18.1° and that in the preserved group 60.0° ± 12.2°, with no significant difference between the groups. The angle change tended to be greater after left than right upper lobectomy in both groups (Table 2).

Discussion

Division of the pulmonary ligament during lung resection is commonly performed based on the belief that it...