

Experimental Study of Mature Pulmonary Lobe Allo-transplantation in Puppies

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Abstract : Background: the use of a reduced-size adult lung transplantation could help solve the profound shortage in pediatric donor lungs. However, the adequate long-term function of mature grafts requires growth in proportion to the recipient's development.

Methods : Six mature left lower lobes from adult beagles (mean weight : 12 kg) were harvested and transplanted to 6 immature recipient beagles (age : 3 months, mean weight : 5 kg) that had undergone a left pneumonectomy (PR). The control group (AR) was 5 adult dogs which had undergone a mature pulmonary lobe allo-transplantation. After transplantation, immunosuppression therapy consisting of cyclosporine A, azathioprine and prednisolone was administered until sacrifice. The right pulmonary artery occlusion test was performed under mechanical ventilation with FiO_2 1.0 at 12 months or later after transplantation. The cardiac output and pulmonary arterial pressure (PAP) were measured, a femoral arterial blood gas analysis (PaO_2 and PaCO_2) was performed, and AaDO_2 was calculated before and after occlusion at 5, 10, 15, and 30 minutes. The grafts were removed and examined histologically.

Results : In the PR group, 5 dogs survived and 3 dogs tolerated the right pulmonary arterial occlusion test. In the AR group, 3 dogs survived and tolerated the occlusion test. The mean PAP was elevated after opposite side pulmonary artery occlusion. There were no difference in the PaO_2 , PaCO_2 and AaDO_2 levels before and after occlusion test. The PaO_2 levels before and 30 minutes after occlusion were 607 ± 21 and 535 ± 48 Torr in the PR group ; 560 ± 47 and 563 ± 26 Torr in the AR group, respectively. Histological studies showed a normal architecture of the lung parenchyma but alveolar enlargement was observed in grafts from both the PR and AR groups.

Conclusion : We conclude that in this experimental model of mature lobar transplantation in puppies, the alveolar architecture of a the mature lobe was found to show an almost normal appearance, and the long term function of the mature lobe was also found to be well maintained.

Key words : Living donor lung transplantation, Lobar lung transplantation