

Recent Topics in the Japanese Association for Chest Surgery: Lung transplantation

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A recent topic in the field in which the Japanese Association for Chest Surgery (JACS) is involved, is the initiation of the clinical application of lung transplantation, although the number of patients who have undergone this treatment is still limited. After the Organ Transplant Law was promulgated in Japan in 1997, the first living-donor lung transplantation was carried out in 1998, and the first brain dead donor lung transplantation in 2000. Thereafter, until 2009, lung transplantation candidates registered in the Japan Organ Transplant Network (JOTNW) reached 412 individuals. These 412 patients included 99 with primary pulmonary hypertension (PPH), 80 with pulmonary lymphangiomyomatosis (LAM), 68 with idiopathic pulmonary fibrosis (IPF), 31 with bronchiectasis (BE), 29 with other interstitial pneumonia, 26 with bronchiolitis obliterans (BO), 19 with diffuse panbronchitis (DPB), 11 with pulmonary emphysema, 10 with Eisenmenger's syndrome, and 39 with other conditions. Although the annual number of new registrants has been 40–50 in recent years, registrants overwhelmingly outnumber donors since just over 10 cases of brain-dead organ donation have occurred annually. Under these circumstances, 176 patients, who accounted for 43% of all registrants, died while waiting for transplantation (Fig. 1). On the other hand, there have been 64 Japanese patients who underwent brain dead lung transplantation. Since two of these 64 received transplantation overseas, the number of domestic implementations is 62, including one case of retransplantation. Thus, the number of patients who underwent brain dead donor lung transplantation in Japan is 61. There are another 28 cases that reverted to living-donor lung transplantation while waiting for a brain dead donor. In total, 90 lung trans-

plantations have been performed for registered patients within this country. Adding 58 cases of living-donor lung transplantation not registered with JOTNW, a total of 148 lung transplantations had been performed by 2009 in 7 facilities authorized for lung transplantation in Japan (Fig. 2).

The 62 patients who underwent lung transplantation from a brain dead donor included 24 men and 38 women; there were 38 cases of single lung transplantation (right lung in 17 and left lung in 21) and 24 cases of double lung transplantation. Single lung transplantation was indicated for LAM (21 cases), IPF (5 cases), emphysema (4 cases), and others (9 cases), whereas double lung transplantation was indicated for PPH (12 cases), LAM (3 cases), Eisenmenger's syndrome (4 cases), and others (7 cases). Like general registrants, PPH and LAM were frequent among lung transplanted patients. At the time of single lung transplantation, 2 patients were aged 20–29 years, 11 aged 30–39, 17 aged 40–49, 7 aged 50–59, and one aged 60–69. Among double lung transplantations, 3, 6, 9, 1 and 5 patients were aged 10–19, 20–29, 30–39, 40–49, and 50–59, respectively. Thus, the peak age was in the 40s for single lung transplantation, and the 30s for double lung transplantation. The 1-year, 3-year, and 5-year survival rates after transplantation were 94%, 85%, and 75%, respectively, for single lung transplantation, whereas the corresponding rates were 67%, 62%, and 62%, respectively, for double lung transplantation. Although the outcomes of single lung transplantation were significantly better, there was no decrease in the survival rate after 3 years had elapsed from double lung transplantation, suggesting the possibility that the outcomes of the two types of transplantation would be similar given a long-term perspective.

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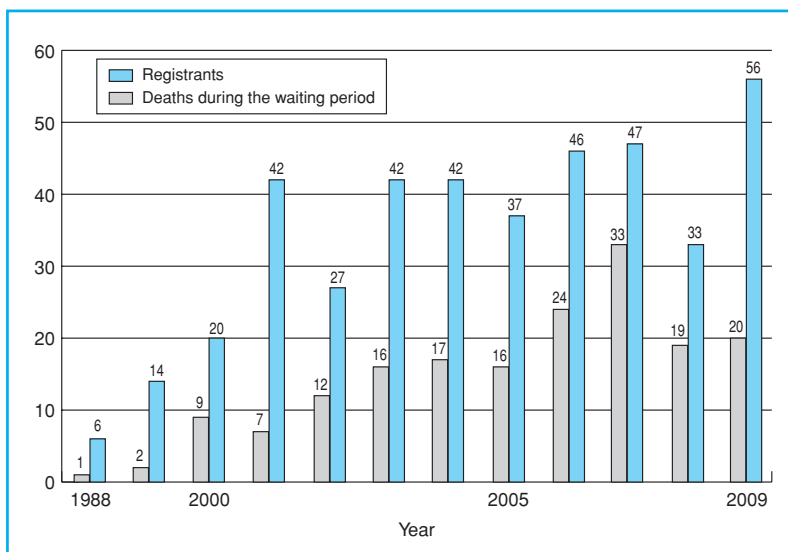


Fig. 1 Annual changes in registrants for lung transplantation and deaths during the waiting period

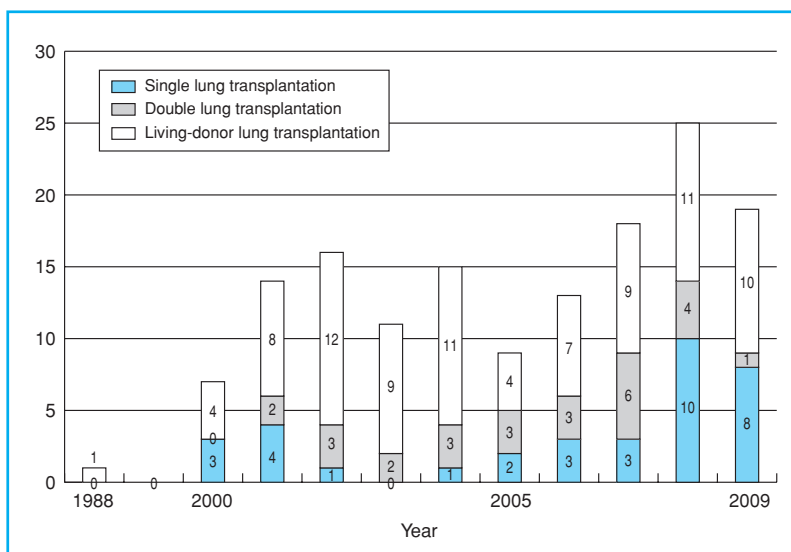


Fig. 2 Annual changes in the numbers of different types of lung transplantation

On the other hand, 86 patients who underwent living-donor lung transplantation included 22 men and 64 women; women were far more frequent in this group. The conditions for which transplantation was indicated were divergent, i.e., PPH in 24 patients, BO in 19, IPF in 18, LAM in 7, BE in 6, and the others conditions in 12. The age of the patient at transplantation was younger than 10 years in 5 patients, 10–19 years in 14, 20–29 years

in 20, 30–39 years in 19, 40–49 years in 17, and 50–59 years in 11. Thus, although there was a peak in the 20s and 30s, the age range was relatively extensive. The survival rate after transplantation was 91% at 1 year, 83% at 3 years, and 81% at 5 years, presenting figures similar to those in cases of single lung transplantation from a brain dead donor (Fig. 3).

As stated above, the results of lung transplan-

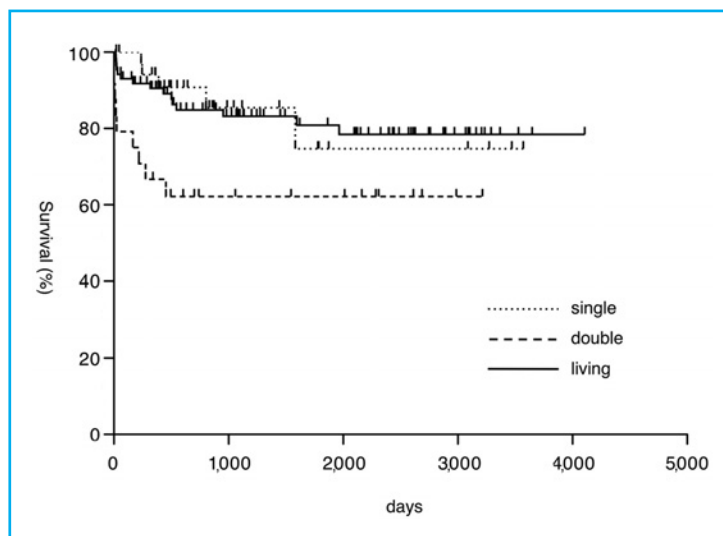


Fig. 3 Prognosis of lung transplantation by type of procedure

tation in Japan, although the number of cases was limited (148 cases in about 10 years), bear comparison with, or even overwhelm the results of the international registration containing more than 20,000 cases made open to the public by the International Society for Heart & Lung Transplantation. Every year the Japanese Association for Chest Surgery has been carrying out academic investigations that include lung transplantation. In 2007, data on about 55,000 surgical cases have been collected throughout Japan.¹ Among these cases, surgery for malignant tumor of the lung accounted for nearly 50%, or about 22,000 cases. The results of two representative survival procedures, lobectomy and pneumonectomy, were favorable, showing a mortality rate of 0.4% within 30 days after surgery. When attention is focused on deaths within 30 days after lung transplantation, there were 9 (6%) deaths out of 148 cases of lung transplantation, demonstrating that the risk of surgery-related deaths for lung transplantation is about 10-fold higher than that of lobectomy/pneumonectomy, even if the survival outcome is considered generally favorable.

In addition, the average waiting period in the

62 patients who underwent brain dead donor lung transplantation was as long as 1,000 days or longer. The waiting period among current registrants is also approaching 1,000 days. Thus, the chance of undergoing lung transplantation for future registrants is very limited. In relation to the diagnosis, the average survival period after registration was as short as 300–400 days for BE, IPF, and BO, indicating a high probability of death during the waiting period, compared to PPH and LAM with average survival period more than 1,600 days. Although the rank order in the waiting list has so far depended only on the order of registration, special measures to reduce deaths during the waiting period as in the USA may be necessary if donors increase in the future. It will be necessary to observe changes in the number of organ donors after the enforcement of the revised organ transplant law in July 2010. In the revised organ transplant law, the age limit for organ donation has been eliminated. The important issue in this regard is assessment of the size of the lung in young children. Development of criteria for choosing appropriate recipients is now underway.

References

1. Committee for Scientific Affairs. Thoracic and Cardiovascular Surgery in Japan during 2007.
2. Gen Thorac Cardiovasc Surg. 2009;57:488–513.