Transplantation Pulmonaire

Historique/Evolution des concepts

Hervé Mal

Service de Pneumologie et Transplantation Pulmonaire, INSERM U1152

Hôpital Bichat, Université Paris 7

Tx Pulmonaire

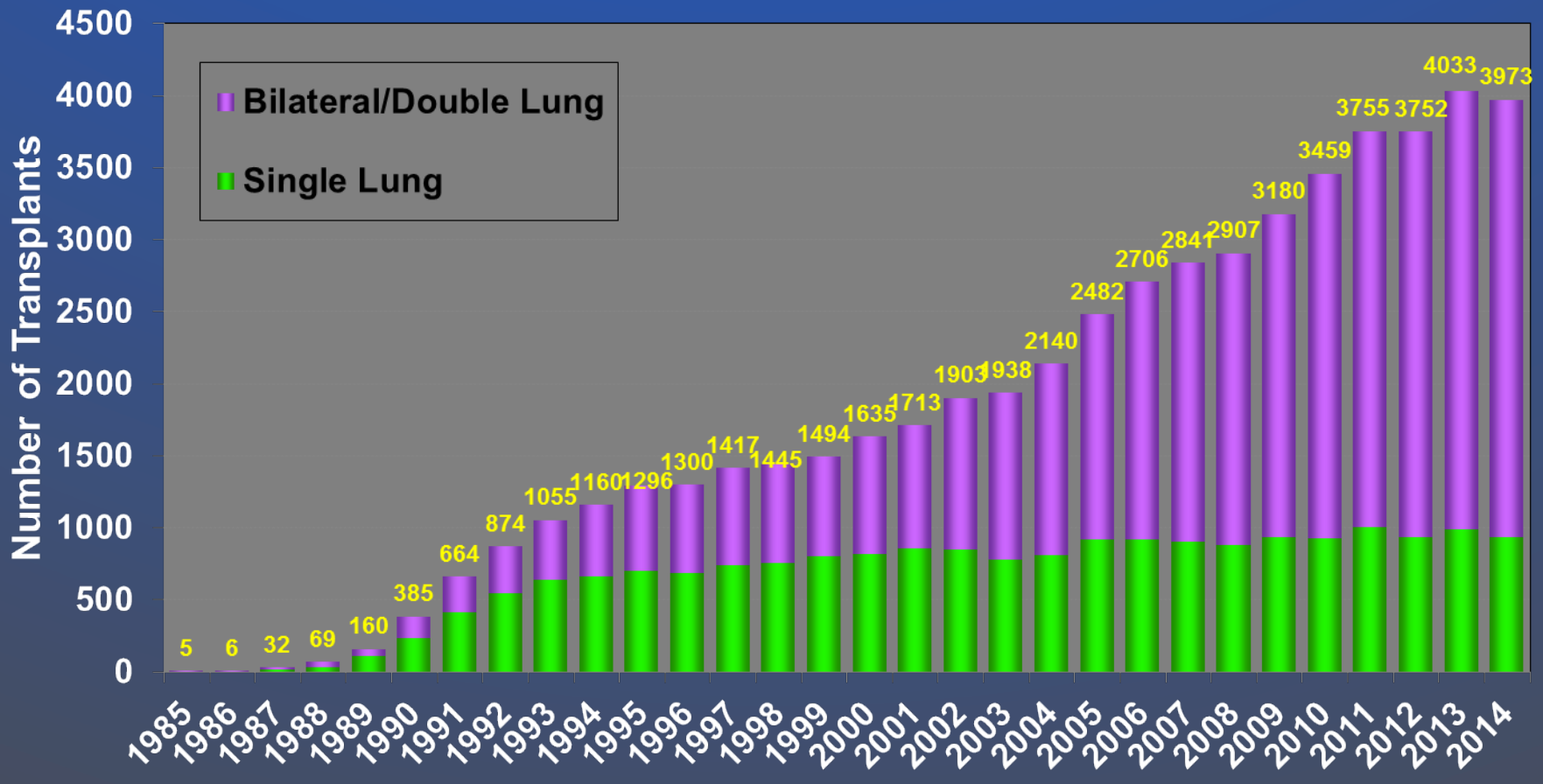
- Les trois types de TP peuvent être proposés
  - Transplantation monopulmonaire (TMP)
  - Transplantation bipulmonaire (TBP)
  - Transplantation cardiopulmonaire (TCP)
- En pratique:
  - TMP et TBP surtout proposées

Tx pulmonaire indications

- BPCO, fibrose idiopathique
- HTAP, DDB/mucoviscidose

- Mais aussi:
  - Histiocytose X, lymphangioléiomyomatose
  - Sarcoïdose (risque accru de récidive)
  - Sclérodermie, LEAD, PR
  - Bronchiolites, microlithiase alvéolaire

Adult Lung Transplants
Number of Transplants by Year and Procedure Type



NOTE: This figure includes only the adult lung transplants that are reported to the ISHLT Transplant Registry. As such, this should not be construed as representing changes in the number of adult lung transplants performed worldwide.

ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION

Adult Lung Transplants

Indications (Transplants: January 1995 – June 2015)

Diagnosis	SLT (N=17,213)	BLT (N=32,789)	TOTAL (N=50,002)
COPD	6,999 (40.7%)	8,674 (26.5%)	15,673 (31.3%)
IIP	5,979 (34.7%)	6,264 (19.1%)	12,243 (24.5%)
CF	209 (1.2%)	7,686 (23.4%)	7,895 (15.8%)
ILD-not IIP	977 (5.7%)	1,608 (4.9%)	2,585 (5.2%)
A1ATD	784 (4.6%)	1,784 (5.4%)	2,568 (5.1%)
Retransplant	874 (5.1%)	1,174 (3.6%)	2,048 (4.1%)
IPAH	87 (0.5%)	1,348 (4.1%)	1,435 (2.9%)
Non CF-bronchiectasis	64 (0.4%)	1,293 (3.9%)	1,357 (2.7%)
Sarcoidosis	307 (1.8%)	941 (2.9%)	1,248 (2.5%)
PH-not IPAH	129 (0.7%)	648 (2.0%)	777 (1.6%)
LAM/tuberous sclerosis	141 (0.8%)	359 (1.1%)	500 (1.0%)
OB	75 (0.4%)	354 (1.1%)	429 (0.9%)
CTD	122 (0.7%)	240 (0.7%)	362 (0.7%)
Cancer	7 (0.0%)	27 (0.1%)	34 (0.1%)
Other	459 (2.7%)	389 (1.2%)	848 (1.7%)

Special Contribution

This patient, satisfying stringent preset technical and moral criteria for the procedure, is believed to be the first recipient of a successful lung transplant. Although the patient died of renal failure on the 18th postoperative day, the lung was demonstrated to have functioned and immunologic rejection did not occur.

Lung Homotransplantation in Man

Report of the Initial Case

James D. Hardy, MD, Watts R. Webb, MD, Martin L. Dalton, Jr., MD, and George R. Walker, Jr., MD, Jackson, Miss

THE TECHNICAL FEASIBILITY of lung replantation and homotransplantation in animals was established by the work of previous investigators.[1, 2] It was found that occasionally a dog could survive temporarily on the function of the lung homotransplant alone, especially if the respiratory reflexes from the unexcised lung had been preserved. Preservation of these reflexes with exclusion of pulmonary function in this "normal" or contralateral lung was achieved by ligation of the pulmonary artery on this side. In addition to studies demonstrating that either a reimplanted lung or a homotransplanted lung could function fairly effectively to provide a significant degree of pulmonary function, the use of various agents in dogs to suppress the immune response had permitted substantial prolongation of the survival of lung homografts. In our own experience, the lung homograft had been rejected in untreated dogs in an average of from seven to eight days, whereas in dogs treated with azathioprine the lung had been rejected in an average of 30 days.[3]

For editorial comment, see page 1088.

After replantation and homotransplantation experiments involving more than 400 lungs in dogs,[3-6] we believed cautious clinical application of the procedure to be justified. A large number of possible candidates was carefully evaluated but none was selected until almost a year later, when a patient who fulfilled the criteria which had been set for the initial lung recipient was admitted to the hospital. These criteria were: (1) the patient must have a probably fatal disease, so that in the event untoward results were encountered, his life would not have been materially shortened; (2) there must be a reasonable possibility that the patient would be benefitted by the lung transplant; (3) the removal of the patient's own lung must not result in the sacrifice of any of his own functioning lung tissue; (4) transplantation of the left lung had been found to be somewhat simpler technically than transplantation of the right, and thus it was elected to initiate the clinical phase of the work by transplanting a left lung.

From the Department of Surgery and University Hospital, University of Mississippi Medical Center.

Clinical Evaluation of Case

A 58-year-old white man who was serving a prison sentence was admitted to the University Hospital on April 15, 1963, with the diagnosis of repeated attacks of pneumonia. He had had a productive cough and dyspnea for several months, having failed to respond satisfactorily to antibiotics administered in the prison infirmary. A heavy smoker, he had lost 26 lb (11.8 kg) since December, 1962, and recently the purulent sputum had contained streaks of blood.

In addition to the pulmonary disease, which the accompanying chest x-ray revealed to have pro-

JD Hardy, JAMA 1963

- Prisonnier de 58 ans , condamné à la prison à vie
- Carcinome épidermoïde sur bronche principale gauche
- Insuffisance rénale chronique avec protéinurie
- Donneur : arrêt cardiaque sur IDM massif

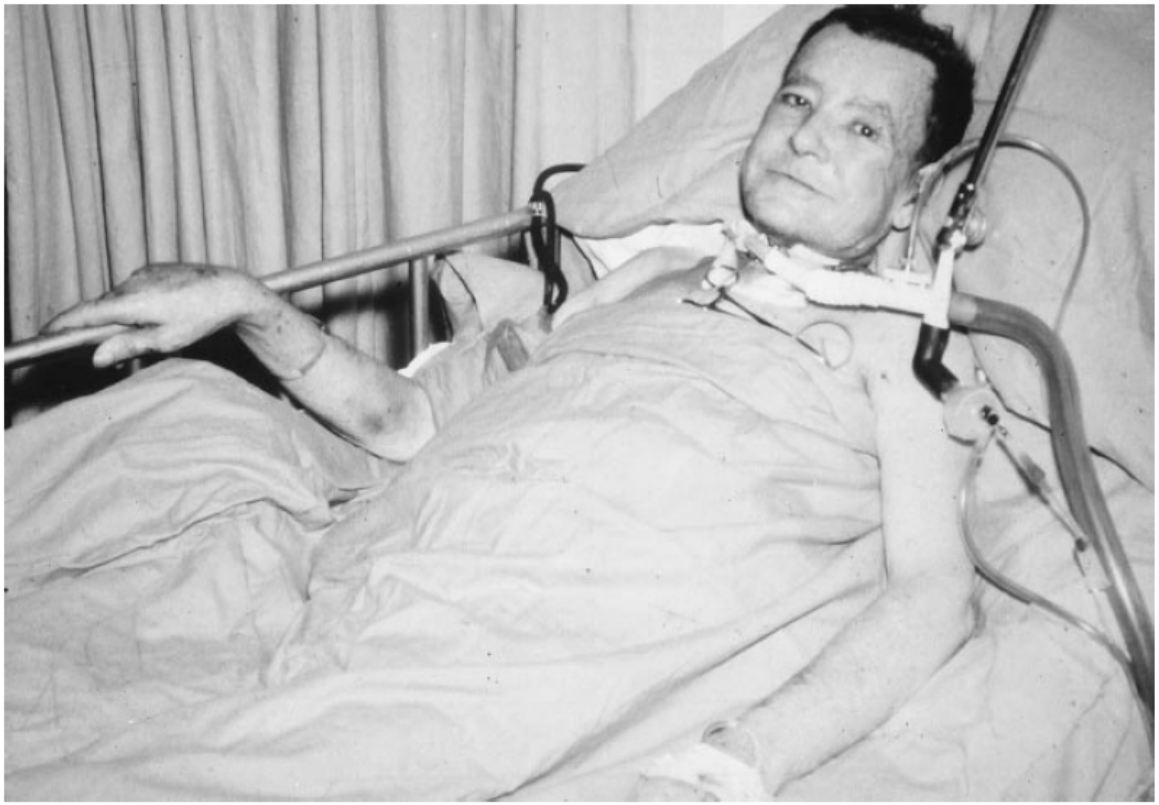


Fig 2. J.R., the first human lung transplant recipient following the operation.

function studies performed postoperatively. At his death 18 days later, caused by renal failure and his general debility from his extensive left lung and thoracic wall malignancy, the transplanted lung exhibited only minor evidence of rejection.[1] The immunosuppressive regimen had consisted

- Entre 1963 et 1974, TP réalisées dans le monde sur 36 patients: 2 survivent plus d’un mois
- Hiatus de 1974 au début des années 1980
- Début années 80: introduction de la ciclosporine

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE ARCHIVE

Heart-Lung Transplantation — Successful Therapy for Patients with Pulmonary Vascular Disease

Bruck A. Reitz, M.D., John L. Wallwork, M.B., Ch.B., Sharon A. Hunt, M.D., John L. Pennock, M.D., Margaret E. Billingham, M.B., Philip E. Oyer, M.D., Ph.D., Edward B. Stinson, M.D., and Norman E. Shumway, M.D., Ph.D.

N Engl J Med 1982; 306:557-564 | March 11, 1982 | DOI: 10.1056/NEJM198203113061001

Abstract

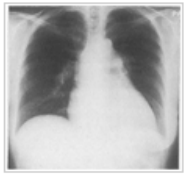
We report our initial experience with three patients who received heart-lung transplants. The primary immunosuppressive agent used was cyclosporin A, although conventional drugs were also administered.

In the first patient, a 45-year-old woman with primary pulmonary hypertension, acute rejection of the transplant was diagnosed 10 and 25 days after surgery but was treated successfully; this patient still had normal exercise tolerance 10 months later. The second patient, a 30-year-old man, underwent transplantation for Eisenmenger's syndrome due to atrial and ventricular septal defects. His graft was not rejected, and his condition was markedly improved eight months after surgery. The third patient, a 29-year-old woman with transposition of the great vessels and associated defects, died four days postoperatively of renal, hepatic, and pulmonary complications.

We attribute our success to experience with heartlung transplantation in primates, to the use of cyclosporin A, and to the anatomic and physiologic advantages of combined heart-lung replacement. We hope that such transplants may ultimately provide an improved outlook for selected terminally ill patients with pulmonary vascular disease and certain other intractable cardiopulmonary disorders. (N Eng J Med. 1982; 306:557–64.)

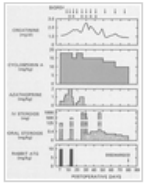
MEDIA IN THIS ARTICLE

FIGURE 1



Pretransplantation Chest Roentgenogram of Patient 1.

FIGURE 2



Transplantation Course and Immunosuppression in Patient 1.

ARTICLE ACTIVITY

330 articles have cited this article

Reitz BA, NEJM 1982

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE ARCHIVE

Unilateral Lung Transplantation for Pulmonary Fibrosis

Toronto Lung Transplant Group*

N Engl J Med 1986; 314:1140-1145 | May 1, 1986 | DOI: 10.1056/NEJM198605013141802

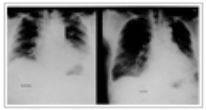
Abstract

Improvements in immunosuppression and surgical techniques have made unilateral lung transplantation feasible in selected patients with end-stage Interstitial lung disease. We report two cases of successful unilateral lung transplantation for end-stage respiratory failure due to pulmonary fibrosis. The patients, both oxygen-dependent, had progressive disease refractory to all treatment, with an anticipated life expectancy of less than one year on the basis of the rate of progression of the disease. Both patients were discharged six weeks after transplantation and returned to normal life. They are alive and well at 26 months and 14 months after the procedure. Pulmonary-function studies have shown substantial improvement in their lung volumes and diffusing capacities. For both patients, arterial oxygen tension is now normal and there is no arterial oxygen desaturation with exercise.

This experience shows that unilateral lung transplantation, for selected patients with end-stage interstitial lung disease, provides a good functional result. Moreover, it avoids the necessity for cardiac transplantation, as required by the combined heart–lung procedure, and permits the use of the donor heart for another recipient. (N Engl J Med 1986; 314:1140–5.)

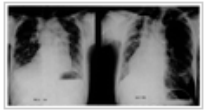
MEDIA IN THIS ARTICLE

FIGURE 1



Chest Roentgenograms of Patient 1, Taken before and after Transplantation.

FIGURE 2



Chest Roentgenograms of Patient 2, Taken before and after Transplantation.

ARTICLE ACTIVITY

309 articles have cited this article

Double-Lung Transplant for Advanced Chronic Obstructive Lung Disease[1,2]

J. D. COOPER, G. A. PATTERSON, RONALD GROSSMAN, and J. MAURER
and the Toronto Lung Transplant Group[3]

SUMMARY We have achieved repeated success with unilateral lung transplantation for pulmonary fibrosis and have developed an *en bloc*, double-lung transplant procedure for patients with advanced lung disease of an obstructive or infective nature. Six such procedures have now been performed for end-stage emphysema, and all recipients are alive and well 5 to 15 months later. A seventh transplant for primary pulmonary hypertension was unsuccessful.

All recipients were judged to have a life expectancy of 12 to 18 months on the basis of the degree of disability and the documented rate of disease progression. We feel the double-lung procedure is more appropriate than the combined heart-lung transplant for patients requiring replacement of both lungs when right heart function is adequate or deemed recoverable. With this procedure, the recipient is able to retain his or her own heart, avoiding the liabilities associated with cardiac transplantation. Furthermore, the donor heart is available for a separate recipient, and this sharing of the heart and lungs greatly increases the supply of transplantable lungs for patients with end-stage lung disease.

Ischemia of the donor airway has been a source of complication, including the one death to date, but this appears to be a surmountable problem. AM REV RESPIR DIS 1989; 139:303-307

Introduction

In 1983, we initiated a clinical program of transplantation for end-stage lung disease, beginning with single lung transplantation for end-stage pulmonary fibrosis. We have previously reported our success with this procedure (1–3), and our initial patient remains in good health now more than 4 yr later.

Although we consider single lung transplant the ideal procedure for end-stage pulmonary fibrosis, it is not suitable for patients with chronic obstructive lung disease or bilateral pulmonary sepsis, as in these conditions the remaining contralateral native lung might jeopardize the transplanted lung. Therefore, we chose combined heart-lung transplantation, a procedure initially developed by the Stanford Group for patients with pulmonary hypertension and right heart failure (4), and more recently applied by other groups for patients with end-stage lung disease (5, and Yacoub M, personal communication). However, many patients with end-stage pulmonary disease other than primary pulmonary hypertension have adequate or recoverable right ventricular function, and for such patients the combined heart-lung transplant was far from ideal. Combined *en bloc* double-lung transplantation seemed a more reasonable approach, as it would avoid all of the complications associated with the cardiac portion of the transplant, including acute and chronic rejection as well as development of advanced coronary artery disease. Double-lung transplantation eliminates the need to secure a suitable donor with the combination of suitable cardiac and pulmonary function. Furthermore, double-lung transplant, as with single-lung transplant, permits use of the lungs from a donor after extraction of the heart for transplantation, and thus increases manyfold the supply of donor organs for patients with end-stage lung disease. For these reasons, we developed in the laboratory a technique for double-lung transplantation (6, 7) and have now applied this successfully in humans. We have initiated the double-lung transplant program in patients with chronic obstructive lung disease, and this report outlines our experience to date.

Methods

Patients

Between November 1986 and October 1987, six patients with chronic obstructive pulmonary disease underwent double-lung transplantation (table 1). The obstructive lung disease was secondary to emphysema with alpha$_1$-antitrypsin deficiency in three patients, unclassified familial emphysema in one, post-viral bronchiolitis obliterans in one, and eosinophilic granuloma in one. Candidates for this procedure were those with progressive, disabling disease whose life expectancy was considered to be 12 to 18 months. These candidates were oxygen-dependent or had experienced life-threatening episodes of respiratory failure within the previous 12 months. Candidates were subjected to a thorough preoperative evaluation, including studies of pulmonary, cardiac, hepatic, and renal function and psychosocial evaluation. All recipients were completely weaned from corticosteroid therapy prior to transplantation because our previous laboratory studies demonstrated the adverse effect of steroid administration on healing of the airway anastomosis (8, 9).

Right heart function was evaluated noninvasively using echocardiography and nuclear angiography. All patients had a right ventricular ejection fraction greater than 20% using the first-pass method of nuclear angiography.

Preoperative Rehabilitation

Because of the muscle wasting, loss of stamina, and overall limited reserve exhibited by lung transplant candidates, we used a program of rehabilitation and muscular training preoperatively. The exercise program included

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[1] From the Division of Thoracic Surgery and the Departments of Surgery, Medicine, Anesthesia, and Pathology, University of Toronto, Toronto, Canada.

[2] Correspondence and requests for reprints should be addressed to Dr. J. D. Cooper, Suite 3107, Queeny Tower, Barnes Hospital Plaza, St. Louis, MO 63110.

[3] The members of the Toronto Lung Transplant Group are: Surgery: Joel D. Cooper, M.D., Bernard S. Goldman, M.D., Melvyn Goldberg, M.D., Robert J. Ginsberg, M.D., F. Griffith Pearson, M.D., G. Alexander Patterson, M.D., Hugh E. Scully, M.D., Thomas R. J. Todd, M.D., Paul Waters, M.D.; Respirology: Ronald Grossman, M.D., Janet Maurer, M.D.; Immunology: Phillip Halloran, M.D.; Anesthesia: Wilfred DeMajo, M.D., Vite Zulys, M.D.; Hematology: Michael F. X. Glynn, M.D.; Infectious Disease: Hiller Vellend, M.D.; Pathology: Dean Chamberlain, M.D.; Physiotherapy: Cheryl Dear, B.Sc., Anne Kuus, B.Sc.; Psychiatry: J. Craven, M.D.; Jane Bright, M.S.W.; Organ Donor Coordinator: Judy Boychuk, R.N.; Transplant Coordinator: Kandy Rogers, R.N.

Le problème de la TBP en-bloc avec anastomose trachéale

- Fistules anastomotiques très fréquentes source de morbi-mortalité élevée
- Pourquoi ne voit-on pas cette complication avec TCP?

Le problème de la TBP en-bloc avec anastomose trachéale

- Fistules anastomotiques très fréquentes source de morbi-mortalité élevée
- Pourquoi ne voit-on pas cette complication avec TCP?
  - Anastomoses coronaro-bronchiques

Le problème de la TBP en-bloc avec anastomose trachéale

- La solution trouvée:
  - double anastomose bronchique (M Noirclerc)
  - double TMP (A Bisson , P Bonnette JTCS 1992)

TMP pour BPCO?

- Le dogme en cours à la fin des années 80: TMP contre-indiquée dans le cas de la BPCO
  - Risque de compression du greffon par un natif surdistendu
  - Risque de désordre d'hématose: toute la perfusion vers le greffon et toute la ventilation vers le natif à l'origine d'un shunt majeur

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE ARCHIVE

Regional Ventilation and Perfusion after Lung Transplantation in Patients with Emphysema

Paul M. Stevens, M.D., Philip C. Johnson, M.D., Robert L. Bell, M.D., Arthur C. Beall, Jr., M.D., and Daniel E. Jenkins, M.D.

N Engl J Med 1970; 282:245-249 | January 29, 1970 | DOI: 10.1056/NEJM197001292820504

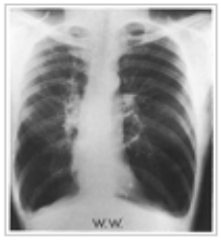
Abstract

Serial ^{133}Xe ventilation and perfusion scans were done on two patients who underwent left-lung transplantation because of severe emphysema associated with alpha[1] antitrypsin deficiency. In both, perfusion of the implants increased to nearly 70 per cent of total and was accompanied by a decrease in ventilation and volume to about 30 per cent of total. Under these circumstances the implants functioned largely as physiologic shunts. The remaining emphysematous lung increased in volume and received most of the ventilation but very little of the total perfusion.

Patients with emphysema thus may be poor candidates for lung transplantation because the high vascular resistance and static compliance of the remaining emphysematous lung predispose it to further hypoperfusion and hyperinflation.

MEDIA IN THIS ARTICLE

FIGURE 1



Preoperative Chest Film of W.W., Showing Diffuse Hyperinflation, with Marked Decrease in Vascularity in Both Lower Lobes Characteristic of Emphysema Associated with Alpha$_1$ Antitrypsin Deficiency.

- Modèle de TMP chez le chien avec emphysème induit à la papaïne: RAS
- Certains n'étaient pas convaincu par le travail de Stevens (TMP avant l'introduction de la ciclosporine)
- Le dogme se basait sur la distensibilité du poumon natif (compliance élevée) mais oubliait le pb de la résistance des voies aériennes

Case Reports

Unilateral Lung Transplantation in End-Stage Pulmonary Emphysema[1,2]

HERVÉ MAL, BERNARD ANDREASSIAN, FABRICE PAMELA, JEAN-PIERRE DUCHATELLE, ERIC RONDEAU, FRÉDÉRIC DUBOIS, PIERRE BALDEYROU, MICHEL KITZIS, CHARLES SLEIMAN, and RENÉ PARIENTE

SUMMARY Patients with end-stage pulmonary emphysema are usually proposed for either heart-lung or double-lung transplantation. The single-lung transplantation is reserved for patients with pulmonary fibrosis. Patients with emphysema are thought to be unsuitable for single-lung transplantation because of the ventilation-perfusion imbalance that is supposed to occur, the ventilation being preferentially distributed to the native lung when the perfusion is distributed to the transplanted lung. We now report a preliminary success with single-lung transplantation in two consecutive patients with end-stage pulmonary emphysema. Despite the persistence after transplantation of an obstructive syndrome, the clinical status was good, the blood gases were markedly improved, and ventilation-perfusion imbalance did not occur on lung scans. After discharge from the hospital, the patients could return to an almost normal life. Thus, our data support the feasibility of single-lung transplantation in patients with end-stage pulmonary emphysema, and we consider that single-lung transplantation could be the optimal form of lung transplantation in these patients.

AM REV RESPIR DIS 1989; 140:797–802

Introduction

The first human lung transplantation was reported in 1963 by Hardy and coworkers (1). During the next 25 yr, more than 40 attempts were made without long-term clinical success.

In 1986 (2), the Toronto Lung Transplant Group reported long-term success in two patients who had received single-lung transplants for the relief of terminal pulmonary interstitial fibrosis. On the basis of these results, several dozen lung transplantations have been performed to date.

Patients suitable for single-lung transplantation are thought to be those with end-stage lung disease and poorly compliant lungs such as those with pulmonary fibrosis. Similarly, at present, patients with a combination of irreversible cardiac and respiratory diseases are candidates for heart-lung transplantation; those with emphysema or bilateral chronic pulmonary sepsis may benefit from either heart-lung or double-lung transplantation. Because of the loss of elastic recoil in the recipient's lungs, which may lead to progressive air trapping in the remaining lung and may shift the mediastinum toward the transplanted site, patients (2) with bilateral emphysema are not considered good candidates for single-lung transplantation. We now report preliminary success with single-lung transplantation in two consecutive patients with end-stage pulmonary emphysema. They were the first two of eight patients to receive single-lung transplantations in our hospital.

Case Reports

Patient 1

A 60-yr-old man had an 8-yr history of progressive exertional dyspnea and was able to walk less than 50 m during the last months. He had smoked 20 cigarettes daily for 30 yr, but stopped smoking 8 yr before entry. During the last year, he complained of a weight loss of 5 kg. He had no sputum production. A chest roentgenogram revealed hyperinflated lungs (figure 1A); pulmonary function tests demonstrated a severe obstructive syndrome (table 1), and blood gas determinations showed severe hypoxemia; he had required continuous nasal oxygen therapy since 1983. A perfusion lung scan showed bilateral heterogeneous perfusion defects; a computerized tomography scan of the thorax revealed bilateral bullous emphysema, the lesions being predominant in the upper lobes.

Hemodynamic study revealed mild pulmonary hypertension with a mean pulmonary arterial pressure of 33 mm Hg and a cardiac index of 2.7 L/min/m^2. Bidimensional echocardiography demonstrated a normal left ventricular function with an ejection fraction of 76%.

A diagnosis of end-stage pulmonary emphysema was made, and the patient was accepted for unilateral lung transplantation. A suitable donor was found, and left lung transplantation was performed on March 1, 1988. The lung was obtained from a 44-yr-old woman who had sustained severe cranial trauma and who had compatible thoracic morphologic features (her thoracic perimeter was 10% less than that of the patient). The surgical procedure was performed using a classic, previously described technique (3) without cardiopulmonary bypass. The removed recipient's lung showed histologic features of diffuse panacinar emphysema.

The anastomosis was not wrapped with an omental flap but with the donor's pericardial flap. Extubation was accomplished in the operative room 1 h after the end of the surgical procedure. Immunosuppression was begun on the day of transplantation and initially consisted of oral cyclosporine, intravenous azathioprine, and antilymphocyte globulin. Antilymphocyte globulin was discontinued on Day 14, and daily prednisone (0.5 mg/kg) was initiated on postoperative Day 21. A chest film taken 1 wk after surgery is shown in figure 1B.

The postoperative course was complicated by an acute pulmonary rejection on the eighth day, which responded promptly to intravenous corticosteroids (methylprednisolone 1 g daily for 3 days), the patient being reintubated and ventilated for 24 h. On Day 33, he experienced an episode of cytomegalovirus gastrointestinal infection (fever, positive viremia, duodenal biopsies yielding typical inclusions with positive immunofluorescence and subsequent culture). Treatment with ganciclovir was instituted, with a marked improvement in the clinical symptoms and disappearance of the viremia. Six weeks after the transplantation, the patient was discharged to a rehabilitation unit, and he was back home 60 days after the procedure. Immunosuppression at that time consisted of oral cyclosporine, oral azathioprine, and prednisone 15 mg daily.

Over the course of the next 3 months, the clinical status remained good, with a progressive improvement in exercise tolerance; the patient was able to walk several kilometers and to climb two flights of stairs without exertional dyspnea.

The pulmonary function of the patient (table 1) showed marked improvement in the blood gases, contrasting with mild improvement in the FEV_1. A ventilation-perfusion lung scan was performed on the ninetieth day showing the preferential ventilation and perfusion of the transplanted lung (figure 2) with a defect in perfusion and in ventilation in the territory of the left upper lobe. Right lung perfusion represented 26% of the total amount of perfusion of both lungs. Right lung ventilation (Krypton) represented 33% of the total amount of ventilation of both lungs. At the end of the first month after transplantation, flexible bronchoscopy showed a clear narrowing of the left upper lobe segmental bronchi without localized stenosis. This aspect was stable on repeated bronchoscopies and was associated with a loss of volume of the left upper lobe on the chest roentgenogram.

At 6 months after transplantation, clinical sta-

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[1] From the Service de Pneumologie et Réanimation and the Service de Chirurgie Cardiovasculaire et Thoracique, Hôpital Beaujon, Clichy, and the Service de Nephrologie, Hôpital Tenon, Paris, France.

[2] Requests for reprints should be addressed to Dr. H. Mal, Service de Pneumologie et Réanimation, Hôpital Beaujon, 100 Bd du Général Leclerc, 92110 Clichy, France.

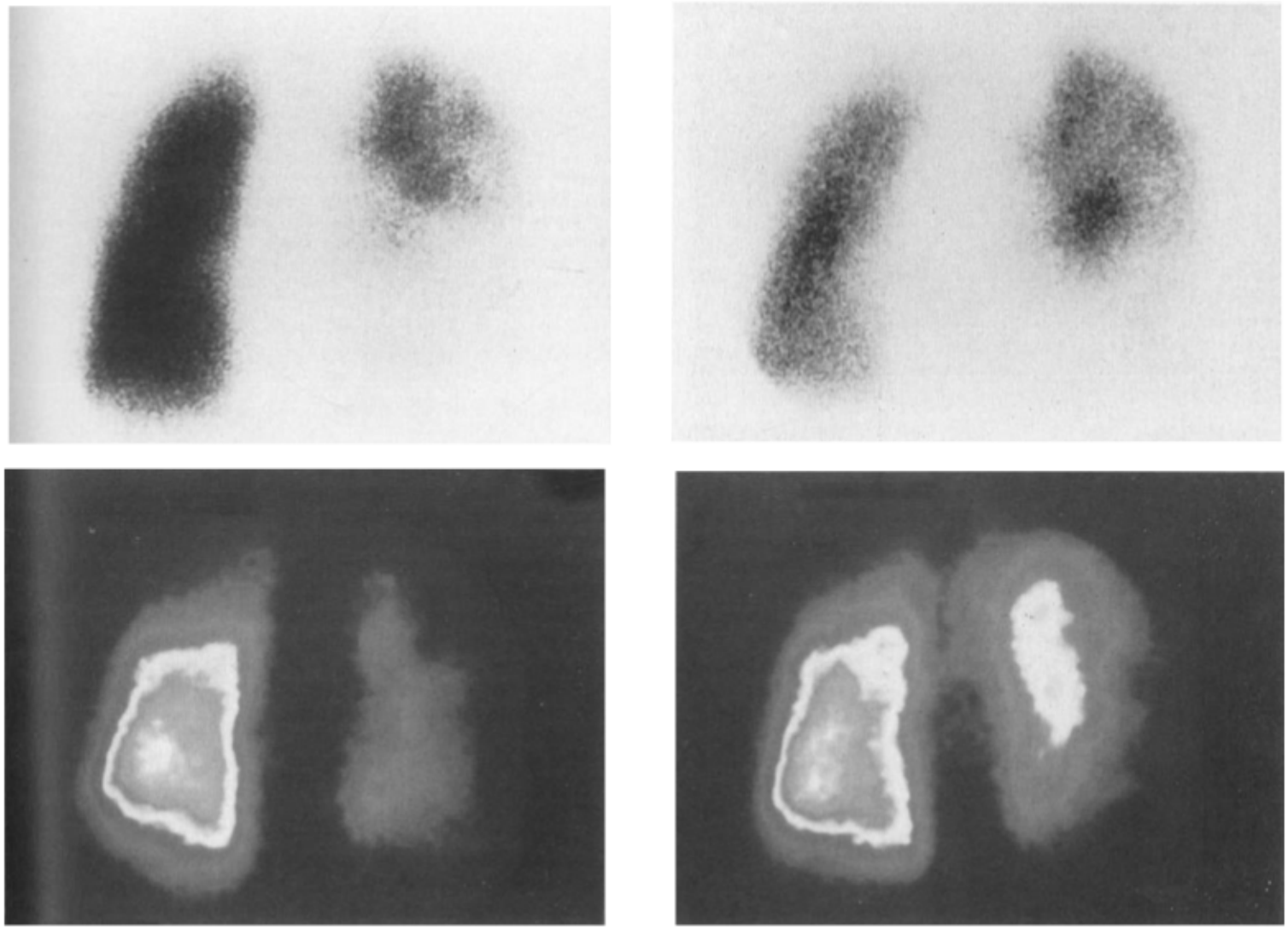
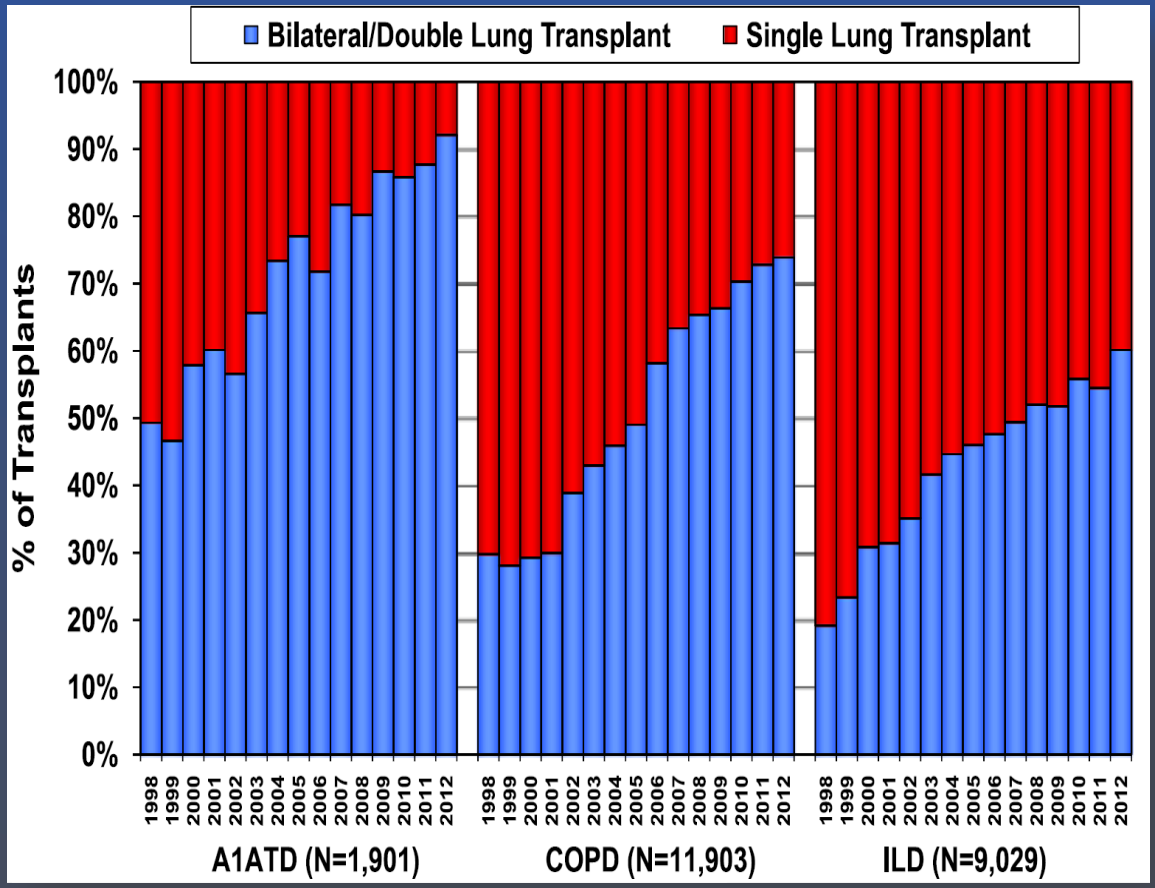


Fig. 2. Ventilation (krypton) and perfusion (technetium albumin microspheres) in the two patients. The upper figure shows the ventilation lung scan (*right*) and the perfusion lung scan (*left*) in Patient 1, obtained 3 months after transplantation (posterior views with the left lung on the right); 67% of total ventilation and 74% of total perfusion are distributed to the transplanted lung, with a defect in the upper part of the left lung (see text). The lower figure shows the ventilation scan (*right*) and the perfusion scan (*left*) in Patient 2 obtained 4 months after left lung transplantation. On these posterior views, ventilation and perfusion of the left transplanted lung are normal with a minimal residual flow to the native lung; 71% of total perfusion is distributed to the transplant. The relative amount of ventilation to the lung was not calculated.

Transplantations pulmonaires
Type de chirurgie par indication selon les années



ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION

JHLT. 2014 Oct; 33(10): 1009-1024

Yusen *et al*. JHLT. 2014; 33(10): 1

TP/HTAP

- Peut-on greffer les poumons seuls chez un patient atteint d'HTP sévère?
- Récupération du VD après greffe pulmonaire en cas d'HTP?
- Les premiers patients avec HTAP: TCP
- Y a t–il des cas où la TCP est encore nécessaire?

Single-Lung Transplantation for Pulmonary Hypertension

Three-Month Hemodynamic Follow-up

Michael K. Pasque, MD; Elbert P. Trulock, MD;
Larry R. Kaiser, MD; and Joel D. Cooper, MD

Background. **Shorter waiting times, relative technical simplicity, and satisfactory application to a broad spectrum of patients has made single-lung transplantation an attractive option in the treatment of patients with end-stage pulmonary hypertension.**

Methods and Results. **Seven patients with pulmonary hypertension underwent single-lung transplantation. Simultaneous closure of associated atrial septal defects was accomplished in two patients. Despite severely compromised pretransplant right ventricular function in all patients, there was no early or late mortality. Right ventricular functional recovery as characterized by hemodynamic assessment before and at a mean of 13 weeks posttransplant was nearly uniform and characterized by a drop in 1) pulmonary arterial systolic pressure from 92±7 mm Hg to 29±6 mm Hg ($p=0.001$), 2) central venous pressure from 10±6 mm Hg to 1±2 mm Hg ($p=0.02$), and 3) pulmonary vascular resistance index from 1,924±663 to 232±73 dyne·sec·cm^{-9} ($p=0.001$). Radionuclide ventriculography before and at a mean of 17 weeks posttransplant documented a significant ($p=0.006$) increase in right ventricular ejection fraction from 22±15% to 51±11%. Quantitative pulmonary perfusion scintigraphy at a mean of 17 weeks posttransplant demonstrated a significant ($p=0.001$) increase in perfusion to the transplanted lung from 56±6% to 89±7%. There was a concomitant, slight but significant ($p=0.004$) decrease in ventilation to the transplanted side from 56±6% to 49±8%. After transplantation, all patients returned to New York Heart Association functional class I or II from their preoperative levels of class III or IV.**

Conclusions. **These early follow-up data cautiously support the option of single-lung transplantation in patients with pulmonary hypertension, although long-term durability of these hemodynamic changes deserves documentation before widespread application. (*Circulation* 1991;84:2275–2279)**

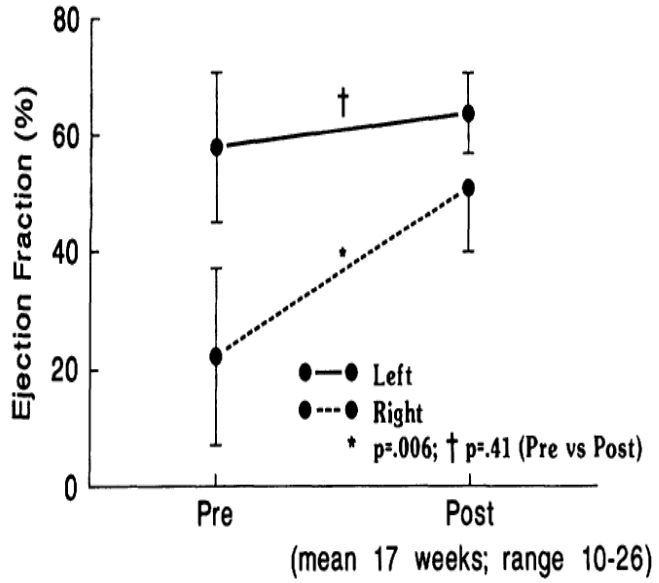


FIGURE 1. *Graphic demonstration of changes in right ventricular ejection fraction measured by radionuclide ventriculography (RVG) after single-lung transplantation* (n=7).

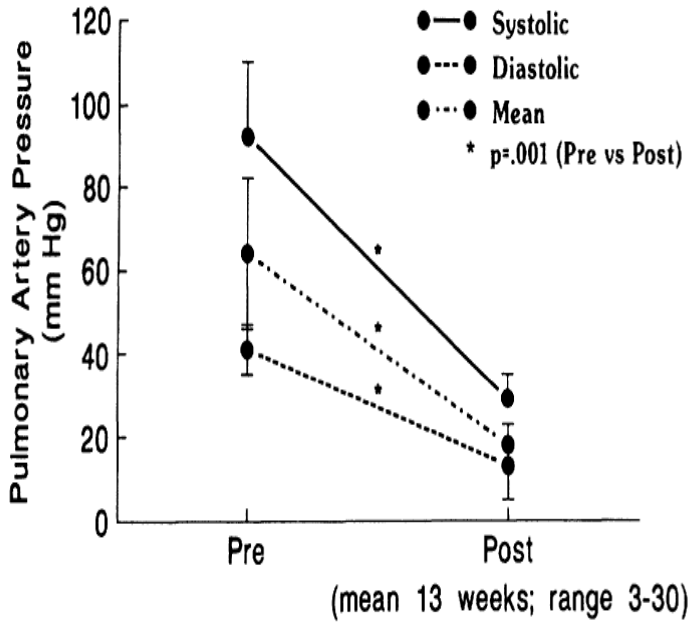


FIGURE 2. *Graphic demonstration of the changes in pulmonary arterial systolic, mean, and diastolic pressures measured at cardiac catheterization after single-lung transplantation (n=7).*

TMP/HTAP

- La TMP permet de lever le barrage précapillaire chez un patient atteint d'HTAP
- Avec correction de la fonction VD
- Le pb: gros désordre d'hématose en cas de dysfonction du greffon
  - La ventilation se distribue préférentiellement vers le côté natif (parenchyme et bronches normales)
  - La perfusion se distribue vers le côte greffé avec les RVP les plus basses

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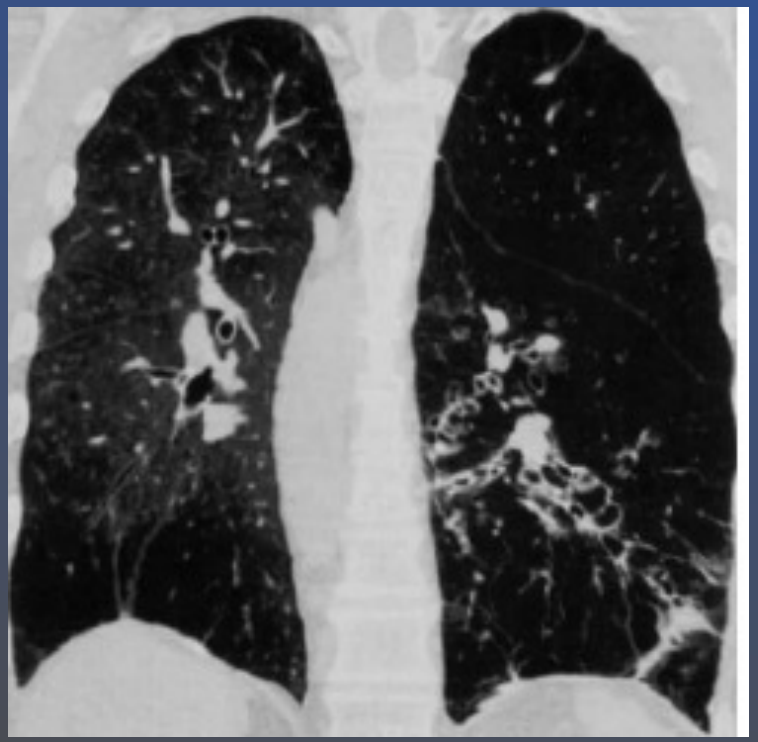
- Indication abandonnée

Récidive de la maladie

- Décrite dans un certains nombre de cas
  - Sarcoïdose
  - Lymphangioléiomyomatose
  - Histiocytose X
  - K bronchiolo-alvéolaire
  - DIP
  - Panbronchiolite diffuse
  - Protéinose alvéolaire
  - Pneumopathie à cellule géante
- Pas décrite après TxP pour fibrose idiopathique et EPL déficitaire

Déficit AAT/Récidive de l'emphysème après TP

- TMP dte en 1989 chez un déficitaire AAT
- Multiples épisodes de rejet aigu précoce
- Reprise d'un tabagisme modéré
- Activité élastasique très élevée dans LBA



Faut-il substituer les déficitaires post Tx?

Mal H. AJRCCM 2004

Accès à la TP en urgence

- Certains patients s'aggravent en liste d'attente
- Certains patients qui ne sont pas encore sur liste sont référés en condition critique
- Les 2 options pour ces patients à risque de mort imminente
  - La SU
  - L'ECMO en « bridge » vers la TP

Emergency access to LT

- Lung Allocation Score (LAS) in the US
- Emergency rules in Spain, Eurotransplant…
- French experience

One-Year Experience With High-Emergency Lung Transplantation in France

Véronique Boussaud,[1] Hervé Mal,[2,12] Ludovic Trinquart,[3] Gabriel Thabut,[2] Isabelle Danner-Boucher,[4] Claire Dromer,[5] Christelle Saint Raymond,[6] Martine Reynaud-Gaubert,[7] Romain Kessler,[8] François Philit,[9] Richard Dorent,[10] and Marc Stern[11]

(*Transplantation* 2012;93: 1058–1063)

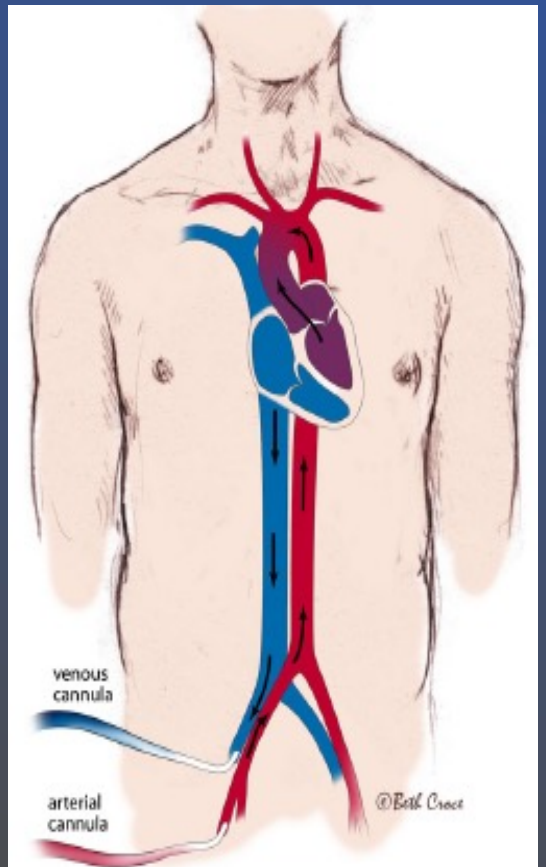
-Introduite en 2007 en utilisant des critères durs

-3 indications retenues

- Mucoviscidose et DDB hors muco
- Maladie vasculaire pulmonaire
- Fibrose pulmonaire

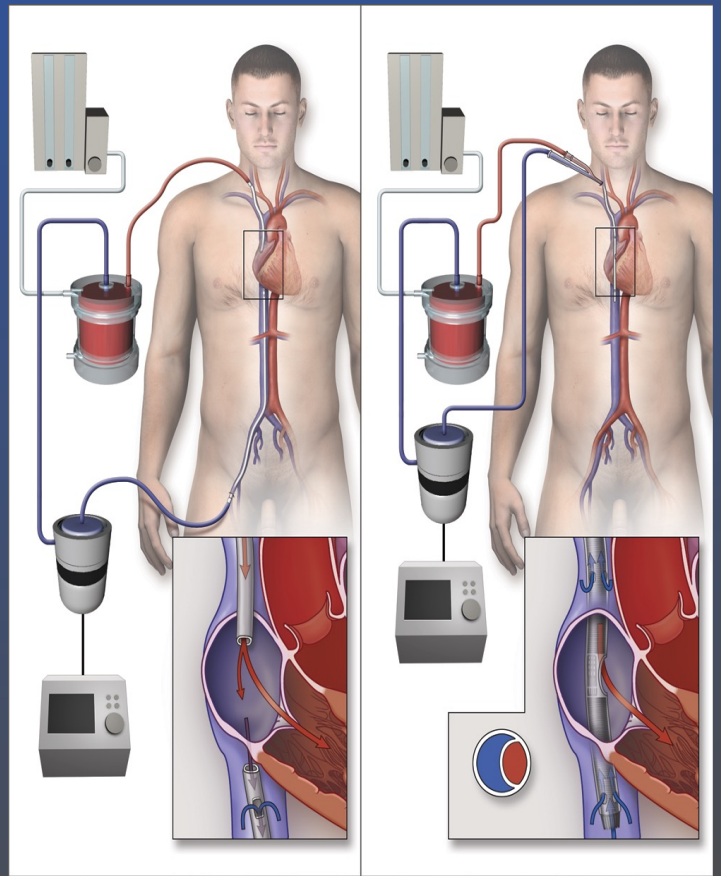
Extracorporeal membrane oxygenator (ECMO)
Pre, per, post opératoire

V-A ECMO: respiratory and circulatory assistance

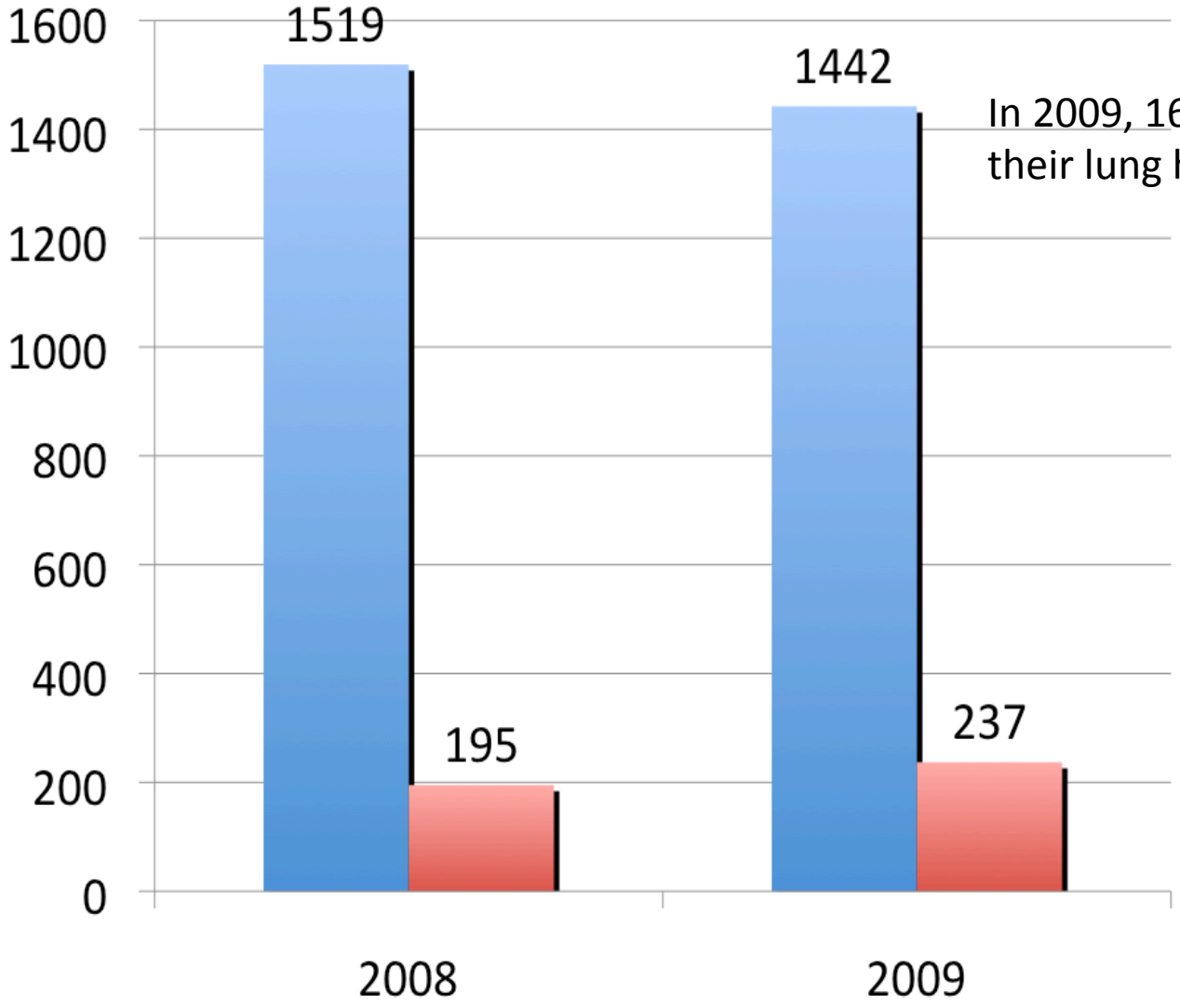


V-V ECMO : respiratory assistance (gas exchange)

Brodie D, NEJM 2011



Lung harvesting in France



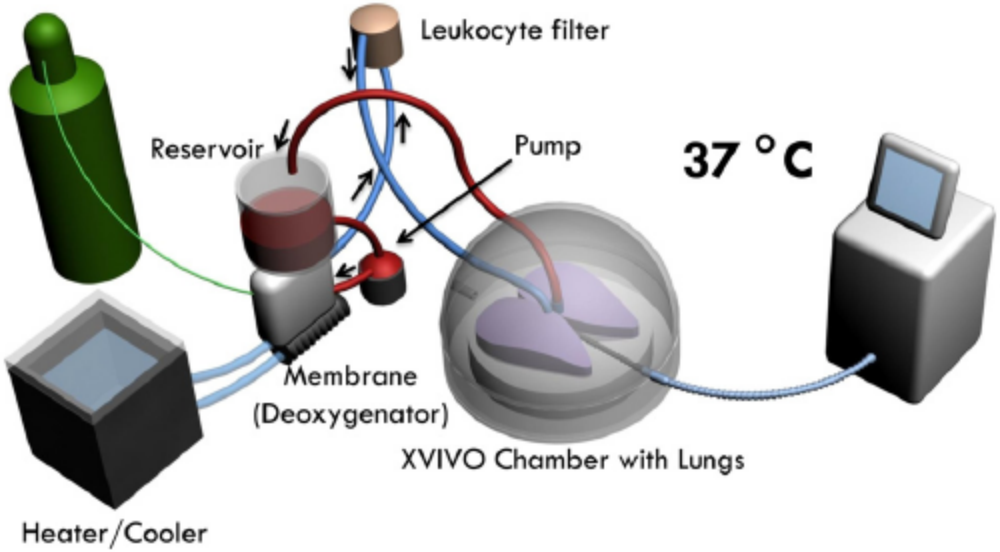
In 2009, 16% of harvested donors had their lung harvested

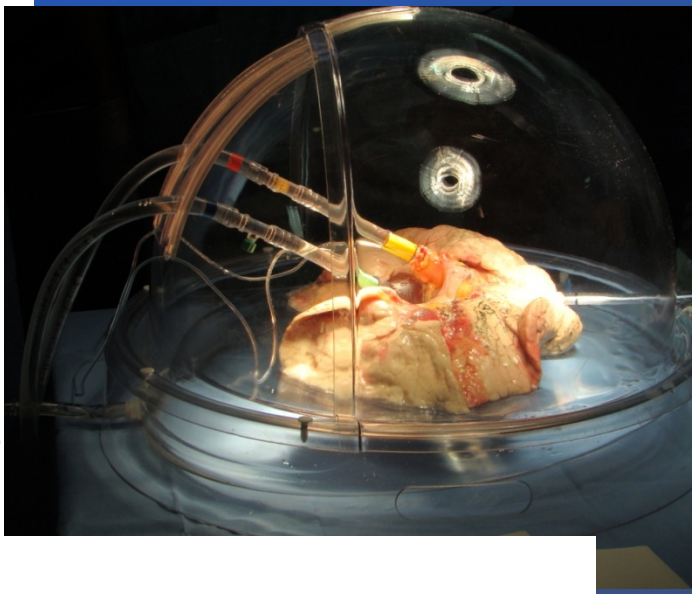
Données de l'ABM

Ex vivo Lung Perfusion Equipment

Red: Venous (Oxygenated) perfusate
Blue: Arterial (Deoxygenated) perfusate
Perfusate: Acellular Steen

Gas for deoxygenation
86% N_2, 8% CO_2, 6% O_2





Donneur en état d’arrêt cardiocirculatoire

- Origine du poumon greffé
  - Donneur en état de mort cérébrale (DBD)
  - Donneur en état d’arrêt cardiocirculatoire (DCD)
    - donneur incontrôlé
    - donneur contrôlé (Maastricht III)

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    - donneur incontrôlé
    - donneur contrôlé (Maastricht III)
- Une des solutions pour augmenter le pool de donneurs
- Quantitativement: nombre encore faible/DBD
  - Ca commence à se développer en France
  - Dans certains pays: jusqu'à 30% des donneurs

Questions plus ou moins résolues…

- Modalités optimales de la préservation pulmonaire?
- Traitement d'induction vs pas de traitement d'induction?
- TBP plutôt que TMP quand on a le choix?
- Peut on prévenir le phénomène d'ischémie/reperfusion?
- Bronchiolite oblitérante moins fréquente quand on greffe 2 poumons plutôt qu'un seul?
- Fonction, capacité d'exercice meilleures si TBP?
- Revasculariser les bronches pour prévenir les complications bronchiques?
- Un régime d'immunosuppression supérieur aux autres?
- Et bcp d'autres questions……

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