

In an advanced stage of the disease, primary pulmonary hypertension could be distinguished in the arteriogram from thromboembolic hypertension, but pathologically only with difficulty, even using quantitative methods.

#### PHYSICS OF GAS FLOW IN THE TRACHEOBRONCHIAL TREE

R. C. SCHROTER Flow patterns obtained in inspiration and expiration are described. The effect of the physical properties of the gas mixture (density and viscosity) on the flow patterns and distribution of resistance are discussed and related to obstructive and restrictive lung disease.

#### LUNG TRANSPLANTATION

##### Immunological Control in Lung Transplant

M. BEWICK There are many tests of lymphocyte activity available but the majority of them are of little clinical importance because of the time taken to produce a result. If rejection is occurring then it has progressed for 24 to 48 hours before therapy, based on these results, can be instigated.

The Rosette inhibition test may be an exception to this, in that it can produce an estimate of lymphocyte activity within four hours of taking a relatively small sample of peripheral blood. Clinical evaluation of this test has been studied in renal transplantation and is now used as one of the major adjuncts to management of a renal transplantation in our unit. In the lung transplant performed at King's College Hospital the Rosette results seem to correlate with other retrospective immunological investigations and the clinical picture.

##### Functional Problems of Lung Transplantation

A. GUZ This review attempts to show the relevance of animal experimental work in lung autotransplantation to the problem of transplantation in man. There is now good evidence in both dog and primate that, provided the surgical anastomoses of pulmonary artery, vein, and bronchus are adequate, a lung will function as a gas exchanger *in the long term*. Thus disruption of the bronchial circulation, lymphatic drainage, nervous supply, and ciliary clearance mechanism does not seem to matter very much. Bilateral autotransplantation in animals results in *slow* breathing, often inadequate to maintain adequate ventilation. This is due to abolition of the important Hering-Breuer reflexes. This is *unlikely* to happen in man where these reflexes do not modulate breathing within the eupnoeic range. Denervation of the lungs is likely to have its most serious effect as a result of abolition of the cough; the degree of abolition will depend on whether the major bronchi of the recipient can be left intact.

The problem of matching perfusion to ventilation becomes very serious when one lung is transplanted and the other diseased lung is untouched.

##### Operative Technique for Lung Transplantation

A. M. MACARTHUR Two surgeons were in adjacent operating rooms. Through a right posterolateral thoracotomy a dissection pneumonectomy was started but because of gross arterial hypoxaemia a right atrio-femoral bypass had to be instituted before the lung could be resected. Meanwhile the donor lung was removed, the timing of this being arranged to reduce the period of ischaemia to a minimum. End-to-end anastomosis of the pulmonary artery and veins was carried out first, followed by the bronchial anastomosis. The technical points of these anastomoses are discussed, in particular the difficulties due to disproportion between the donor and recipient structures.

Postoperative haemorrhage necessitated a second thoracotomy for the evacuation of clot on the first postoperative day.

##### Lung Postoperative Care

P. A. CULLUM Major obstacles to human lung transplantation have included pulmonary infection, the absence of simple tests to detect impending rejection, and the inability to distinguish infection from rejection in an ill patient.

This report concerns the clinical, radiographic, and immunological findings following lung transplantation in a man of 40 with terminal fibrosing alveolitis. One episode of pulmonary sepsis was successfully treated. Four episodes of rejection, indicated by changes in the Rosette inhibition test, were usually associated with clinical deterioration either immediately or within two to three days. Radiological changes were non-contributory. Detection of circulating lung-binding antibody possibly indicated incipient rejection about 72 hours before other changes on two occasions. Each rejection episode responded to an increase in immunosuppressive therapy so that the patient lost his dependence to oxygen, became ambulant, and was able to leave the hospital for limited periods.

These preliminary findings indicate that pulmonary sepsis can be controlled after human lung transplantation, and infection can be distinguished from rejection, and that the latter can be diagnosed within a few hours by simple laboratory tests, even before clinical deterioration occurs.

##### Pathological Findings following Lung Transplantation

KEITH SHILKIN and LYNNE REID The pathological findings in a patient who underwent right lung transplantation seven weeks before death are described. The pulmonary artery system in the resected right lung was injected: at necropsy material was obtained for electron microscopy.

The pathological findings were important to establish the cause of death and to investigate the changes that developed in the donor lung during the period of survival—changes either of rejection or of the disease from which the patient suffered.

Another problem in transplantation, necrosis of the stump of the donor bronchus, is also illustrated.