From the first attempts in the 60s, lung transplantation has evolved through the years to a validated treatment for end stage respiratory diseases. Replacing the lungs with a surgical technique is now a life saving step for patients. Main indications throughout the world are cystic fibrosis, emphysema, fibrosis, pulmonary hypertension, and more comprehensively any non-neoplastic life threatening respiratory illness with no other expected recovery except from transplantation. Three decades ago, heart-lung transplantation was believed to be the only way to transplant lungs in diseased patients. In the early 80s, the first series of successful lung transplantation were in fact heart lung transplantation performed for pulmonary hypertension at the Stanford University. As the heart had to be replaced to, healthy hearts from cystic fibrosis patients were explanted and used for domino heart transplantation representing an added logistical challenge for the transplantation teams. But the technically challenging heart lung technique relying on systematic cardiopulmonary bypass and the limitation of available solid organ grafts to perform this double solid organ transplantation set the limits to the efficiency of this treatment.

Initially, clinicians believed replacing both lungs was the only way to treat the respiratory deficiency regardless of the suppurative nature of the disease. In 1986, this paradigm was shifted by the Toronto group publishing the first series of successful single lung transplantation for fibrosis patients. As a consequence, single lung transplantation was developed as well as trying to perform double lung transplantation without transplanting the heart. En-bloc double lung transplantation was developed by the Toronto team for the experimental part by Dark *et al.* (1) and for the clinical part by Patterson *et al.* (2). Lungs were implanted while kept connected with an atrial cuff, the main pulmonary artery and the trachea. But the outcome of patient receiving en-bloc double lung transplantation was hampered with tracheal dehiscence with a high rate of lethal issue. The technique was abandoned with the developement of bilateral bronchial anastomosis by Noirclerc *et al.* (3).

Since then, the evolving surgical technique has led to performing worldwide bilateral sequential lung transplantation with a steadily increasing volume and long term survival. Bilateral lung transplantation applies to all end stage respiratory diseases even primary pulmonary hypertension. Bilateral transplantation has the potential to reverse the induced heart deficiency.

But the expansion of bilateral lung transplantation has its limits. Despite the possible recovery of heart function, severe right heart insufficiency as well as left heart insufficiency consecutive to pulmonary hypertension lead back to mandatory heart lung transplantation. Besides, pulmonary hypertension consecutive to cardiac defects such as in Eisenmenger syndrome also lead to a mandatory heart lung transplantation. Only a few surgical teams do advocate bilateral lung transplantation associated to concomitant cardiac repair provided the latter requires a simple repair. In all other cases, hear lung transplantation should be preferred.

As a conclusion, pushing the limits of indications for bilateral lung transplantation, most of the historical indications for heart lung transplantation have switched to a more simple single or bilateral sequential transplantation. But despite the need for a more technically demanding procedure, and despite organ shortage, heart lung transplantation now presents with a more precise and specific pattern of indications and patients who will highly benefit from this technique.

In this book, the reader will be able to comprehensively apprehend bilateral and heart-lung transplantation, their indications, and respective outcomes. But the strong relation between both techniques will also appear more obvious to the reader helping to make the difficult decision on whether one or the other should be performed for a given patient.

References

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