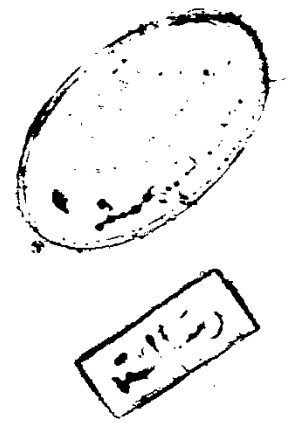
LUNG TRANSPLANTATION



AN ESSAY
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BY

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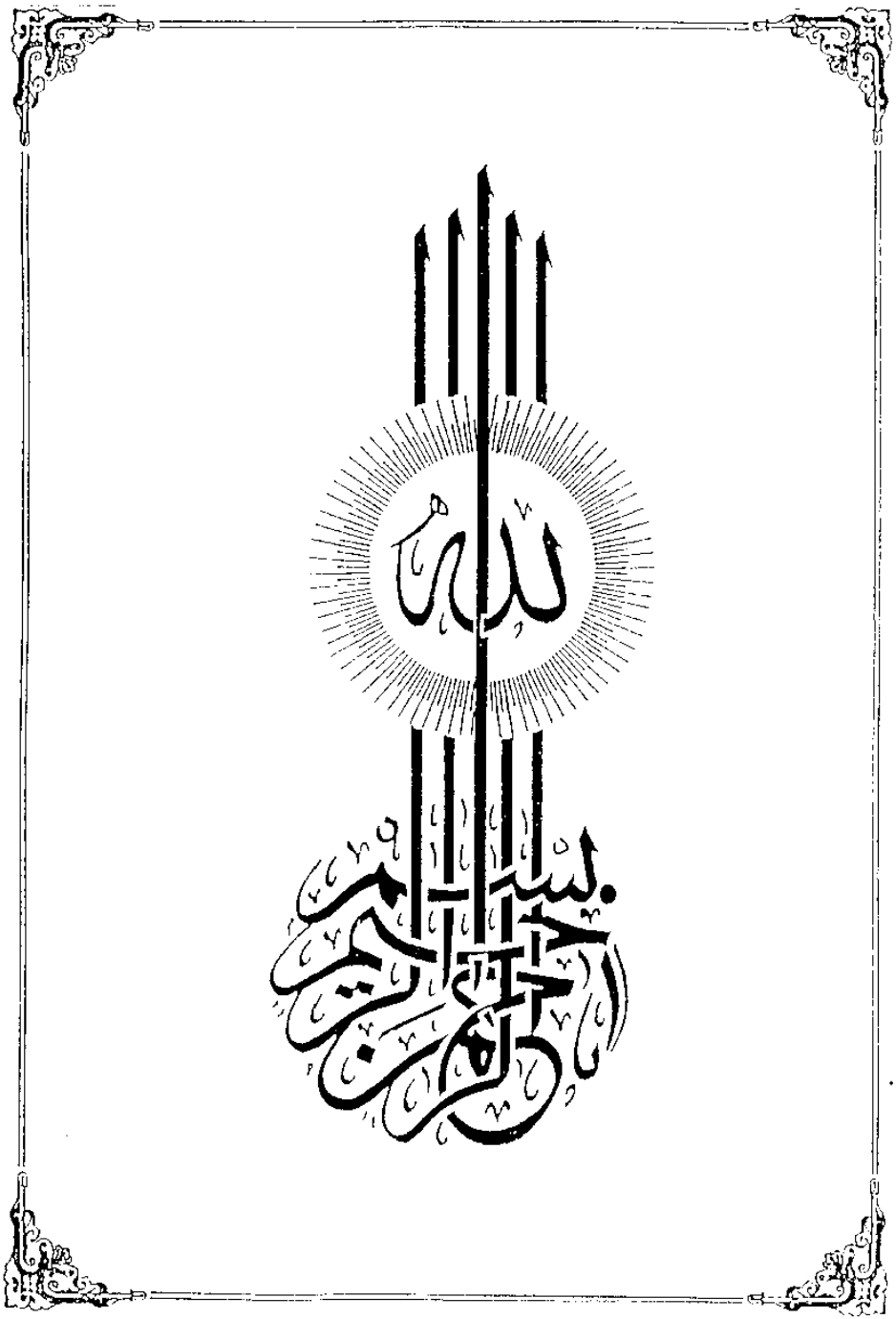

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INTRODUCTION

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For a number of years, transplantation has been used successfully for the treatment of irreversible failure of the kidney, liver and heart. Experience with transplantation for end-stage lung disease has proven discouraging, but recent progress suggests that the era of successful transplantation for end-stage lung disease has begun (Cooper et al., 1987).

Many patients with disabling, fatal lung disease might benefit from transplantation, including those with end-stage pulmonary fibrosis, emphysema, and cystic fibrosis. Three types of successful lung transplantation have now been achieved, heart-lung, single-lung, and double lung transplantation. Each is directed at different lung pathology.

There is still much to be learned about lung transplantation, mainly the development of more effective and selective immunosuppressive regimens and the development of effective methods of preservation decreasing the ischemic time to a minimum.

This work will review the subject of lung transplantation as regards :

1. Historical background of experimental and clinical development of lung transplantation.

2. The indications and contraindications for lung transplantation and how to select a suitable recipient.

3. Criteria used for the selection of the suitable donors, and the causes of the paucity of lung donation.

4. The different methods used for lung preservation and transportation.

5. The opeerative techniques of experimental and clinical lung transplantations.

6. The lung immunogenicity and the different immunosuppressives used for immunosuppression after transplantation.

7. The various complications of lung transplantation and the trials done to lessen the occurrence of these complications.

8. The results of most of the clinical lung transplantations done all-over the world.

9. A review of the subject of heart-lung transplantation.

AIM OF THE WORK

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The aim of this work is to study the classic and new techniques used in lung and heart-lung transplantation and to find out the best way for immunosuppression used in lung and heart-lung transplantation.

REVIEW OF LITERATURE

Historical Background

In the last two decades, transplantation of the kidney, liver, and heart has become clinically well established and has provided a therapeutic option for individuals with irreversible failure of these organs. Lung transplantation has been less progressive, not withstanding considerable interest and research activity in this field for several decades. Several problems unique to the lung, have impeded progress both experimentally and clinically. The lung is a very fragile organ with intimate approximation of the air spaces and the capillaries, so that even a relatively minor insult can lead to a significant malfunction. This malfunction can jeopardize the survival of the lung transplant recipient, who depends on the immediate function of the organ. The systemic arterial supply to the lung, the fine network of the bronchial vessels, is interrupted and is not restored at the time of transplantation; thus the bronchial anastomosis is rendered ischemic. The lung is exposed to the atmosphere, which increases the risk of infection, and the liability is all the greater with immunosuppression necessary to prevent rejection (Perelman and Rabinovich, 1970).

The earliest lung transplant recorded was by Guthrie (1907), using the vascular technique developed by Carrel and Gultrie (1905). The first successfull lung transplantation was performed in 1950 by Juvenelle and associates (1951). The surgeons performed a pneumonectomy and replanted that lung by individual anastomosis of the bronchus and the pulmonary artery and veins. Their postoperative studies demonstrated vascular perfusion of both lungs on the eighteenth postoperative day by angiocardiography, and good oxygen uptake by bronchospirometry when the dog was sacrified in the thirty-fifth postoperative day (Siegelman et al., 1977).

Between 1950 and 1952, there were reports of orthotopic lung allografts from several different groups of surgeons, with each group apparently developing their surgical techniques independently. The most significant technical advance was described by Metras (1950); Hardin and associates (1952); and Neptune and his colleagues (1952), and involved the retention of a cuff of left atrium containing the donor pulmonary veins. So that, the anastomosis would be between the donor left atrium and the recipient left atrium. This singular concept reduced but, of course, did not eliminate the dangers of obstruction of pulmonary venous ingress due to thrombosis and/or iatrogenic stenosis of the small and delicate pulmonary veins (Morgan et al., 1982).

A report of five complete transplants by Davis and co-workers (1952), preceeded those of Neptune and Hardin, but their technique included ligation of the pulmonary artery and vein passing to the middle lobe of the donor lung in order to reduce the number of anastomosis. Thus, it would not appear that this method was an advance suitable for clinical application. Even earlier, Demikhov described techniques of pulmonary lobe and lung transplantation, but this work escaped the attention of the western world until published in transplantation in 1962 (Lima et al., 1982).

In 1950, Staudacher and associates reported a technique using vitallium tubes for the vascular connections in studying allografted and autografted pulmonary lobes in dogs. The papers of Hardin and co-workers and Neptune and colleagues hold additional interest beyond their descriptions of the surgical technique. Both groups found that corticosteroids would extend the life of their animal, indicating the future use of this class of drugs in lung transplants, as has been demonstrated in kidney and heart trasplantations.

In light of the so-called "reimplantation response" to be descirbed subsequently, Hardin and associates (1952), noted in confirmation of Davis work, that alveolar edema fluid appeared