# HEART-LUNG TRANSPLANTATION

## Present Status

ESSAY

Submitted for the partial fulfilment of
the Master Degree in

*General Surgery*

BY


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FACULTY OF MEDICINE
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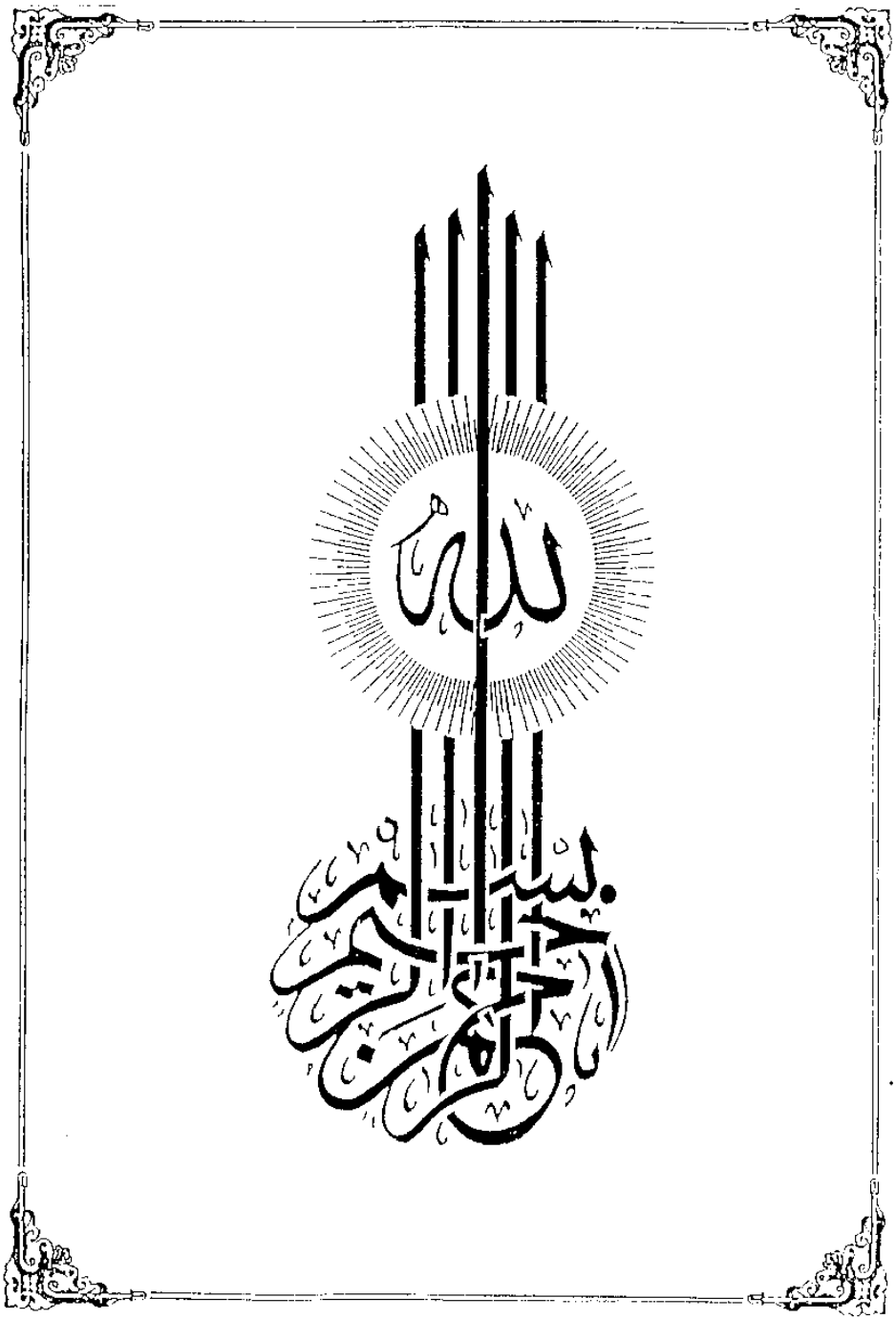
1993

TO MY MOTHER

MY FATHER



# ACKNOWLEDGMENT

**Praise be upon God of the universe for the gift of mind, may the Almighty give us more of his gifts.**

I would like to express my sincere thanks and deepest gratitude and appreciation to **Prof. Ali Seif El-Din Maklad,** *Professor of Cardiothoracic Surgery, Faculty of Medicine, Ain Shams University,* who kindly helped me by his precious time and generous support, encouragement, advice and fatherly guidance.

I am also very grateful to **Dr. Mohammad Ayman Shoeb,** *Assistant Professor of Cardiothoracic Surgery, Faculty of Medicine, Ain Shams University,* for his generous help, cooperation and encouragement.

***A.I. Rizk***

# CONTENTS

Page

# INTRDUCTION

# INTRODUCTION

Heart has long been regarded as the symbol of life, the faunt of romance, courage and even the soul of man. So, transplantation of this organ has fired his imagination.

Possibly no event in medicine has attracted such wide spread interest and comment by the news as the first human heart transplantation performed in Cape town, South Africa, in december, 1967 **(Christiaan Bernard).**

Only after several years of clinical trials by surgeons and immunologists in many countries are the legal, moral and philosophic implications, as well as the medical considerations of cardiac transplantation, being brought into proper prospective.

Heart-lung transplantation was introduced in 1981 as treatment for primary and secondary pulmonary hypertension. With the increasing success of H-L.T, patients with

pulmonary parenchymal disease, such as cystic fibrosis, emphysema and bronchiectasis, have undergone transplantation. Advances that have made heart-lung transplantation feasible included the introduction of cyclosporine, which permits the avoidance of steroids during the early stage of tracheal healing, improved lung preservation, and better recipient and donor selection.

With continuing developments in the field of immunosuppression and in the supply of donor hearts it would appear that, during the next decade, the results of transplantation can improve, and the procedure will steadily become available to an increasing number of patients for whom no other therapy exists.

# HISTORICAL REVIEW

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## * Experimental Background

The history of heart and heart-lung transplantation started at the begining of this century, Demikov, was among the first to perform successful experimental heart-lung transplantation operations. In the 1940s, he transplanted the heart and both lungs in dogs without the use of hypothermia or cardiopulmonary bypass by making the appropriate vascular connections with the recipient's heart and lungs in place and later excluding them from circulation **(Demikov, 1962).**

In 1957, Webb and colleagues reported six cardiopulmonary transplants using cardiopulmonary bypass in dogs with survival ranging from 75 minutes to 22 hours **(Webb et al., 1959).**

In 1958, Blanco and associates reported 8 attempts at orthotopic heart and lung replacement, maintaining the recipient on a pump oxygenator **(Blanco et al., 1958).**

In 1961, Lower, Stofer, Hurely and Shumway turned their efforts to complete heart-lung replacement. However, long-term survival was prevented by respiratory difficulties. **(Lower et al., 1961).**

In 1972, Castaneda and associates at the university of Minosta tried to avoid respiratory difficulties where they operated on primates and avoided allograft rejection by performing autotransplants. In addition to achieving technical success, they examined the pulmonary ventilation, perfusion and circulatory hemodynamics where they were found to be normal and at that time, it was predicted that heart-lung transplantation would be successful in human patients **(Casteneda et al., 1972).**

Additional primates (baboons) studies were begun in 1978 by Reitz and colleagues at Stanford University **(Reitz et al., 1980).**

Extensive study of the immunological aspects of heart rejection resulted in improved methods for tissue matching and better use of immunosuppressive agents **(Stinsen et al., 1972 b).**

Marcial and associates 1972 studied the hemodynamics of parallel heart. The advent of cyclosporine as an immuno-suppressant heralded the present era of successful cardiopulmonary allotransplantation. This drug provides superior immunosuppression to azathioprine and steroids combined and allow adequate healing **(Calne et al., 1978).**

This early experiment demonstrated that combined heart and lung allotransplantation was technically feasible, long term survival dogs has never been obtained, but this could be achieved in primates. Long term survival in monkeys using cyclosporine has been achieved in 1980 **(Reitz et al., 1980).**

**Clinical application:**

In the field of transplantation, heart-lung transplantation in humans was the dream of many surgeons. The first world-wide clinical heart-lung transplantation was carried out in 1968 by Cooley and associates, in a two-month- old infant. Although spontaneous attempts at

respiration resumed immediately after the operation, re-exploration was required for hemorrhage, and the child died 14 hours after the operation **(Cooley et al., 1969 b).**

The second human heart lung transplant was by Lillehei in 1970. The recipient was a 43-year-old man with advanced emphysema and pulmonary hypertension. Although the immediate post operative progress and good, and the recipient was extubated on the third postoperative day, progressive respiratory failure after the fifth day resulted in the patient's death at the eighth day **(Lillehie, 1980).**

A third patient underwent combined heart-lung transplantation in cape town in 1971. The patients was 49-year-old with chronic obstructive lung disease who survived 23 days after surgery **(Barnard & Copper, 1981).**

The first patient to survive heart-lung transplantation was Mary Gohlke in 1981. She was 45 year-old woman who had

end stage primary pulmonary hypertension. The donor for the procedure was brought to Stanford transplant centre in order to minimize the Ischemic time, and the heart-lung transplant was performed. She was treated with a combination of cyclosporine and azathioprine for 14 days and then azathioprine was discontinued and pridnisone was added. Mary Gohlke was discharged from the hospital in good condition & did very well for more than 5 years after transplantation **(Reitz et al., 1982).**

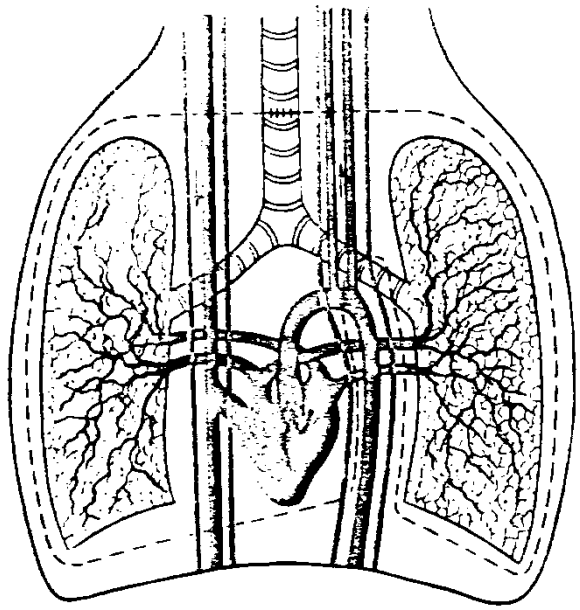

Figure 1

The points of transection and reanastomosis of the heart-lung bloc,as performed by Demikov in dogs during the late 1940s

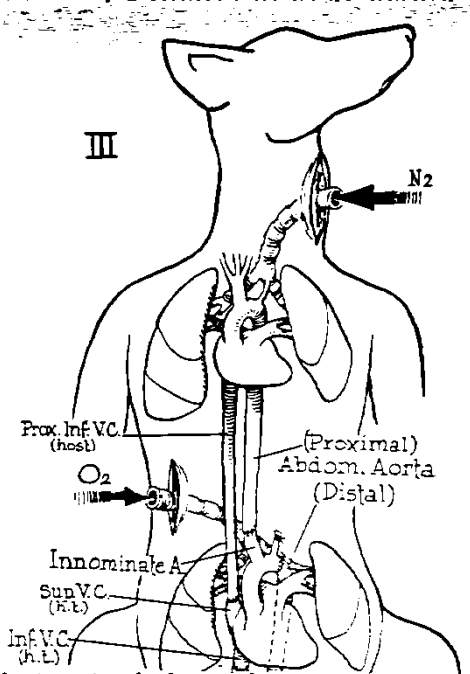


Figure 2

The use of a heterotopic heart-lung transplant to support the host as reported by Mavcus ans associates